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Bearsden

A Roman Fort on the Antonine Wall

David J Breeze

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BEARSDEN

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DAVID J BREEZE

With contributions by

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Jacket image: an artist's impression of the bath-house at Bearsden undergoing roof repairs (Michael Moore)

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For the people of Bearsden and the archaeologists and archaeo-scientists of Bearsden

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PREFACE

The excavations at Bearsden lasted from 1973 to 1982 with the post-excavation work continuing thereafter until 1992; there was then a hiatus which largely coincided with my period as Chief Inspector of Ancient Monuments and while the specialist reports were being prepared. All work was undertaken as part of my official duties as an inspector of ancient monuments and funded by Historic Scotland and its predecessor departments. During the years from 1973 the structure of archaeology changed considerably, with most excavations now undertaken by archaeologists employed full-time as excavators. The work at Bearsden had to be fitted round other duties and the pressure of those undoubtedly delayed the publication of this final report, though interim and advance reports and discussions had appeared elsewhere (eg Breeze 1974a; Breeze 1977a; Dickson, J H 1979b; Dickson et al 1979; Breeze 1982; Breeze 1983; Knights et al 1983; Breeze 1984a; Keppie & Arnold 1984; Breeze 1986; Collins 1986; Dickson, C & Dickson, J H 1988; Dickson, C 1989; Dickson, C 1991).

Illustration i
The bath-house at the end of the 1973 being prepared for an influx of visitors.

Illustration ii
The opening of the bath-house in 1982.

Many of the above references relate to the detailed work and subsequent publications by Camilla Dickson and her husband Jim Dickson on the botanical remains discovered at Bearsden. This has been amongst the most important aspect of all the post-excavation analysis and even led to a series of letters in *The Times* on feeding Roman troops (20, 27 and 29 June 1983). There were special exhibitions of the objects from the excavations at the Hunterian Museum, University of Glasgow, and the Lillie Art Gallery, Milngavie, in 1977.

This long delay has also allowed for discussion and reassessment of the structural evidence, not least by Geoff Bailey (Bailey 1994 and forthcoming), and of the artefactual material. Of particular importance has been the work on the pottery. At an early stage Louise Hird appreciated that the pottery did not form a normal Antonine Wall assemblage. The unusual forms, which appeared to me to be early second century, suggested to her local production, and this was confirmed by Geoff Collins; this in turn led to detailed chemical and petrological analysis of the local oxydised wares (Breeze 1986: 186; Collins 1986; Gillings 1991). This important observation attracted the attention of Vivien Swan and led her to undertake a wide-ranging survey of the pottery from the Antonine Wall with important ramifications (Swan 1999). Vivien died before she could complete her report on the pottery from Bearsden but this was subsequently undertaken by Paul Bidwell and Alex Croom. The significance of the local manufacture is reflected in their report and that on the mortaria by Katharine Hartley. The fact that there was only one period of occupation at Bearsden was also amongst the new material that led Nick Hodgson to review the evidence for two periods of occupation on the Antonine Wall (Hodgson 1995: 31). The undertaking of an excavation project on a seasonal basis retains certain advantages in that time is allowed for consideration between each season. yet the problem with this project was that it was never certain that a further season would be possible, so each year had to be planned as if it was the last. Nevertheless, work was carried out within a strategic framework prepared before the excavation began. This determined that the main aims of the excavation would be to discover the state of any remains, obtain a complete plan of the fort in all periods of occupation, determine the history of the site and investigate the possibility of the existence of an annexe or a civil settlement (internal memo dated 21 March 1972 on AMG/A40/2/1, lodged in the SRO). When it became clear that the botanical material survived so well, tracing the vegetational history of the site was added to the list. It is fair to state that these aims were largely achieved.

The extension of a single four-week trial excavation into a ten-year excavation project resulted in the production of annual plans. The continuing emendation of the plan as a result of new information becoming available is a salutary lesson in trying to interpret too much from limited information: *Britannia* 5 (1974) – 10 (1979).

The excavation, in particular at its beginning and end, provoked much public interest. At the end of the first season, a television report on the discoveries led to an enormous influx of visitors. The erection of a fence prevented visitors from inadvertently falling into the excavation, and, together with a nightwatchman, helped to protect the visible remains from unwanted attention (illus i). The public interest was focused on the bath-house, which was presented by the then owners, Miller Homes, to the state. This was protected by a timber cover and reopened in 1979 for the visit of the Congress of Roman Frontier Studies and then consolidation. The bath-house was opened to the public by Allan Stewart, MP, Minister for Home Affairs and the Environment in the Scottish Office on 17 May 1982 (illus ii), the first such event in Scotland and soon repeated as new monuments were acquired and new displays created (Breeze 1984a: 64–7).

The artefactual material from the excavation has been allocated to the Hunterian Museum, University of Glasgow, while the archive lies in Historic Environment Scotland, Edinburgh.

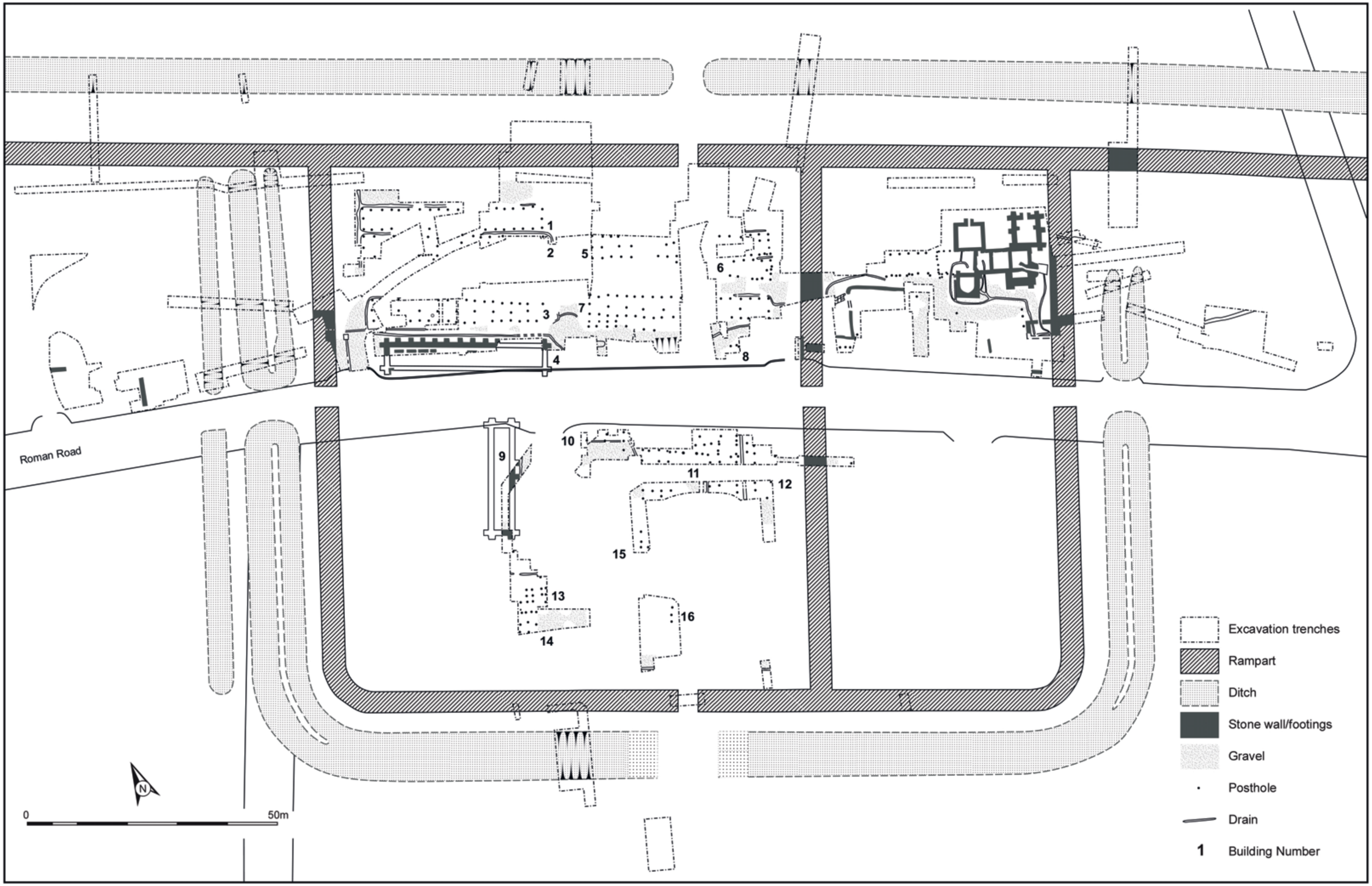

Illustration iii
The Roman fort and annexe at Bearsden.

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Over two hundred people worked on the excavation, many returning year after year. Sincere thanks are offered to all, but in particular to the site supervisors: Merlyn Vyner, senior supervisor, Paul Austen, Alison Caldwell, Vicky Crosby, the late Brian Dobson, the late Tom Robertson, Judith Stones, David Thornborrow, Ceri Vyner (now Lamb), Avril Whittle (now Sinclair) who prepared many of the site drawings, and to the finds recorders, Susan Ritchie (now McLarty) and Pamela Breeze. I am grateful to all the specialists for their reports, which have been revised for publication, and in particular to the late Mrs Camilla Dickson for her labours, advice, encouragement and patience, as well as a most important report. I am also grateful to Geoff Bailey, Paul Bidwell, Paul Buckland, Rikke Giles, Adrian Goldsworthy, Bill Hanson, Ian Haynes, Peter Hill, Lawrence Keppie, Michael J Moore and Tony Rook for advice and discussion.

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ABSTRACT

The Roman fort at Bearsden (NS 545 721) was occupied within the period 142 to 165. It was placed within a landscape already at least partly cleared of woodland and supporting a diversity of pasture, heath, bog and aquatic vegetation. The original plan for a fort (Bearsden 1), covering 1.72ha and laid out to a grid measuring 5 × 4 *actus*, was amended after work on the headquarters building, a granary and bath-house, being divided into a fort (Bearsden 2) and an annexe roughly on a ratio of 2:1. The headquarters building and granary were retained, resulting in an eccentric plan for the fort; the bath-house was demolished and rebuilt. The granaries were of stone, other buildings of timber including, uniquely on the Antonine Wall, the headquarters, which, again uniquely, appears to have included a forehall. Its construction, and the plan of the barrack-blocks, suggests that cavalry were based at both Bearsden 1 and 2. There were an irregular number of ditches; the turf rampart appears to have been surmounted by a timber breastwork.

The annexe contained a bath-house and a latrine. Analysis of the sewage revealed that the soldiers ate both emmer and spelt wheat, barley, pulses, local fruit and nuts, figs, coriander, celery and dill, and opium poppy; they had a mainly plant-based diet; they suffered from worms; they appear to have used moss to clean themselves.

Supplies such as food and pottery came from southern Britain, Gaul and Spain. Much pottery was made locally.

Occupation ended with the buildings demolished and burnt, the rampart partially slighted and its timber breastwork burnt.

The bath-house and latrine were placed in state care in 1982.

ZUSAMMENFASSUNG

Das rmische Kastell von Bearsden (NS 545 721) war in der Zeit von 142 bis 165 belegt. Es wurde in einem zumindest schon teilweise gerodeten Naturraum angelegt, der auch Weiden, Heide, Sumpf und teilweise unter Wasser stehende Vegetation aufwies. Der ursprngliche Kastellplan (Bearsden 1), der sich auf 1.72ha erstreckte und ein Raster von 5 × 4 actus aufwies, wurde nach Umbauten am Kommandogebäude, dem Speicher und dem Bad geteilt, wodurch das Kastell (Bearsden 2) und ein Annex im Verhltnis 2:1 entstanden. Das Kommandogebude und der Speicher wurden beibehalten, woraus sich ein ungewhnlicher Kastellplan ergab; das Badegebude wurde geschliffen und neu gebaut. Einmalig am Antoninuswall war, dass die Speicherbauten in Stein, andere Bauten, wie auch das Kommandogebäude, das ebenfalls einzigartig am Antoninuswall eine Vorhalle aufwies, in Holz ausgeführt waren. Diese Konstruktionsmerkmale und der Grundriss der Kasernenblöcke lassen vermuten, dass in Bearsden 1 und Bearsden 2 Kavallerie stationiert war. Es gab eine uneinheitliche Anzahl von Gräben; der Rasensodenwall scheint von einer hölzernen Brustwehr bekrönt gewesen zu sein. Der Annex wies ein Badegebäude und eine Latrine auf. Analysen der Abwässer erbrachten den Nachweis, dass die Soldaten sowohl Emmer als auch Spaltweizen, Gerste, Hülsenfrüchte, einheimische Früchte, Feigen, Koriander, Sellerie und Dill, und Schlafmohn aßen; sie ernährten sich hauptsächlich von pflanzlicher Nahrung, litten an Wurmbefall; um sich selbst zu reinigen scheinen sie Moos verwendet zu haben.

Nachschub an Lebensmitteln und Keramikgefäße kam vom Süden Britanniens, von Gallien und Spanien. Viel Keramik wurde aber auch lokal hergestellt.Die Besiedlungsgeschichte endet mit dem Brand und Abriss der Bauten, einem teilweise geschliffenen Wall und der niedergebrannten hölzernen Palisade. Das Badegebäude und die Latrine wurden 1982 in staatliche Obhut übergeben.

RÉSUMÉ

La forteresse Romaine de Bearsden était occupée pendant l'époque 142 à 165. Elle était localisée dans un paysage qui a été déjà au moins partiellement débarrassé de bois, et qui soutène diversité de pasturage, bruyère, marécage et vegetation aquatique. Le plan primitif de la forteresse (Bearsden 1), qui occupe 1.72ha, et qui a été disposé sur une grille mesurant 5 × 4 *actus*, a été modifié après le commencement de construction du quartier général, du grenier et de la maison de bains; par la suite elle était se divisée en une forteresse (Bearsden 2) et une annexe, en rapport de 2:1. Le quartier général et le grenier etaient tous les deux conservées, et en consequence la forteresse avait un plan irrégulière; la maison de bains était démolit et reconstruit. Le grenier était construit de pierre, mais des autres bâtiments de bois; uniquement sur le mur Antonin, le quartier général était de bois, et aussi uniquement il semble qu'il en avait eu une avant-salle. Sa construction de bois at le plan des casernes suggérent que Bearsden1 et aussi Bearsden 2 étaient tous les deux pour la cavalerie. Il y'avait un nombre irrégulier de fosses autour de la forteresse; il semble que le rampart tourbeaux était surmonté

par un parapet de bois.L'annexe a contenu une maison de bains at une latrine. L'analyse d'égouts a démontré que les soldats ont mangé et emmer et spelt blé, orge, légumineuses, fruits et noix locals, coriander, celery, et aneth, et pavot d'opium. Ils ont mangé un régime principalement herbivore. Ils étaient affligés de vers intestinals. Il semble qu'ils nettoyent eux-mêmes avec mousse.L'approvisionnements de nourriture et poterie, par example, était envoyé par le sud Bretagne, Gaul et Espagne. Mais beaucoup de poterie était fabriqué en localité.

L'occupation de la forteresse était terminé lorsque les bâtiments étaient détruits et brûlés. Le rampart était partiellement démolit, et son parapet brûlé.

La maison de bains et la latrine ont mises en charge de l'état en 1982.

SUMMARY

Rescue and research excavations from 1973 to 1982, funded by Historic Scotland and its predecessor departments, on and around the site of the Roman fort at Bearsden on the Antonine Wall (NS 545 721) revealed evidence for the vegetation history of the area, elucidated the plan of the fort and annexe, and the history and occupation of both, and provided important information on the diet of the soldiers (illus iii).

Pollen analysis suggests that when the army arrived the vegetation in the area was mainly of established pasture with some partly cleared woodland. Trees were mainly of alder and hazel with some willow while grasses, heather and rushes grew in cleared areas. The climate may have been a little cooler than today.

The fort, built on uneven ground, was planned to be an enclosure (Bearsden 1) measuring 152m east–west × 113m north–south across the ramparts thereby covering 1.72ha, and 143m × 104m within the ramparts, 1.48ha. During building work this large enclosure was divided into a western fort (Bearsden 2), 102m east–west over the ramparts, 93m within (1.15ha/0.95ha), and an annexe 54m east–west over the ramparts, 45m within (0.61ha/0.47ha). Bearsden 1 was laid out within the framework of a grid measuring 5 × 4 *actus*. Five buildings in Bearsden 2 were about one *actus* long while the distance across the width of one pair of buildings was half an *actus*, and across another pair only a little less. This suggests that the soldiers who built the first fort also planned and possibly built the second, which in turn suggests that one activity followed closely on the other. The changes at Bearsden may have had wider implications for military deployment on the Antonine Wall; perhaps it was at this point, rather than when the secondary forts were added to the Wall, that some units were moved.

The fort and annexe were attached to the rear of the Antonine Wall, the north defences of both being the Wall itself. The Military Way passed through the centre of the fort; the line is now occupied by Roman Road. There were three ditches to the west of the fort, one wide ditch to the south and two to the east of the annexe: there were no ditches between fort and annexe. No ditch showed any evidence for recutting.

The stone rampart base surrounding Bearsden 1 was 4.5m (15½ Roman feet) wide with the overlying turves averaging 400mm × 320mm (the regulation size was 430mm × 300mm). The rampart between the fort and annexe was 4.35m wide. To its east burnt debris about 1.5m wide and containing thin branches of willow, alder and hazel is best interpreted as the remains of the rampart's timber breast-work.

The buildings started or completed in Bearsden 1 included the headquarters, a granary, the bath-house and latrine. The first two buildings were retained in Bearsden 2, creating an eccentric plan for the fort, but the bath-house was demolished and rebuilt on a different alignment. Identified buildings of Bearsden 2 include part of the headquarters building together with a possible forehall; two barrack-blocks, each apparently containing officer's quarters and eight rooms; two stone granaries; a possible storehouse, and three long-narrow buildings; there were also open areas, some owing to the steep slope in the north half of the fort; other areas contained depressions, perhaps for the collection of water, and small pits. Most of the buildings were of timber with wattle and daub walls and probably thatched roofs. The exceptions were the granaries which were stone, one at least probably with a tile roof. A forehall suggests the presence of cavalry in Bearsden 1, while barrack-blocks with eight rooms also implies cavalry. The small size of the fort and the apparent lack of accommodation for a complete unit suggests that Bearsden was linked to another fort, possibly Castlehill, 2.5km to the west, which appears to have been too small to hold all of the Fourth Cohort of Gauls attested there.

The annexe contained a bath-house and a latrine. An earlier heated room, presumably part of a bath-house, was abandoned before completion and replaced by a new building on a different alignment. The new bath-house contained a timber changing room and cold room, a stone heated range (two warm rooms, a hot room and a hot bath) and a cold bath, with a hot dry room apparently added later. The latrine was built against the inside face of the east annexe rampart. The sewage de-bouched into the east annexe ditches. The contents of the outer ditch included fragments of moss which may have been used for cleaning purposes.

Analysis of the sewage indicated that the soldiers had a mainly plant-based diet. Different species of wheat were found: emmer may have been used for porridge and spelt for bread while durum may have been used to make pasta and/or porridge. Barley may have been used for thickening broth. Figs and the spices coriander, celery and dill, with the oily seeds of linseed and opium poppy together with pulses were consumed, as were local fruit and nuts. The soldiers suffered from worms.

The soldiers were supplied with food and pottery from southern Britain and from Gaul and Spain. Considerable quantities of pottery were made in the area of Bearsden. These

include the wares of Sarrius, a potter established in the English Midlands, who appears to have established a workshop in the area, almost certainly at Bearsden.

Occupation outside the fort was sought to west, east and south, but with little success. Two short cobble foundations were found to the west of the fort, one containing a pivot-hole at one end. Only a gulley was located to the east of the annexe.

Hints at minor modifications in the fort were recorded; as many as three amendments occurred in the second bath-house, excluding its predecessor. Pottery reveals that the fort was occupied in the Antonine period, that is from 142/3 to no later than 170. Burnt debris demonstrates that the fort was destroyed, probably by the Roman army itself. By this time the outer east annexe ditch appeared to have silted to about half its original depth with sewage from the latrine. Two almost unworn coins dating to 153–5 suggest that the fort was abandoned soon after that date.

The bath-house and latrine were placed into state care in 1982 having been consolidated, landscaped and laid open for public viewing (Breeze 1984: 64–7).

Chapter 1

THE STRUCTURE OF THE REPORT

This report starts with a note of earlier accounts of the site. The structural remains discovered during the excavations are then described, followed by the specialist reports in the order recommended by Grinsell et al (1966), finally interpretation and discussion. Each section of the report takes the same form: description of the material (features or structures and artefacts or other material) followed by commentary. Normally buildings are not identified until they have been described ('building' is the term used not only to describe such a structure but also a clutch of post-holes which may have been a building); the exceptions are the bath-house and latrine as their functions are clear. As this is a single-period site, artefacts are not discussed or listed for dating purposes in relation to the individual features or structures, though they may be referred to if relevant to the deposit.

Plans (illus 1.2 and 3.0.1) illustrate the relationship between the excavated areas and the buildings existing during the excavation and provide the key to the more detailed plans which accompany each section. On the detailed plans the unexcavated areas are marked by tone.

I have avoided use of Latin terms, except where necessary. The main exceptions relate to the roads within the fort. The road leading from the centre of the fort, usually the headquarters building, to the main gate, the north gate at Bearsden, was the *via praetoria*, that from the rear of the headquarters to the back gate was the *via decumana*. The road across the fort from side gate to side gate was the *via principalis*, and that to the rear of the central range the *via quintana*. At Bearsden the *via principalis* is presumed to lie under the modern Roman Road and be coeval with the Military Way, the road along the Antonine Wall. The forward part of a Roman fort was the *praetentura* and the rear section the *retentura*. A room in a barrack-block occupied by soldiers was termed a *contubernium*, also the name of the said group of soldiers.

Latin words which are regularly used in English, even with Latin plurals, such as mortarium/mortaria and amphora/amphorae, are not italicised. All dates are AD/CE unless otherwise stated.

Measurements are in metric with Roman feet used where appropriate. 1 Roman foot (*pes monetalis*) = 296mm.

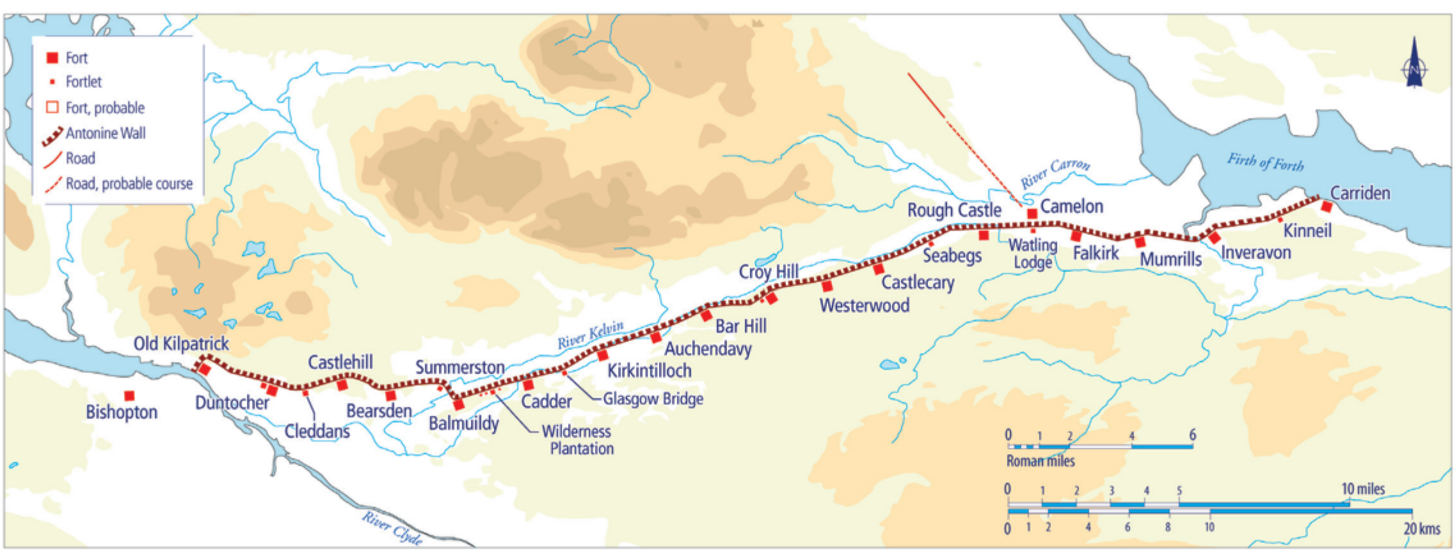


Illustration 1.1
The Antonine Wall.

Illustration 1.2
Key to excavated areas, detailed plans and section in the report.

References to illustrations and tables in the text are prefixed by illus and table; to sections of the report by number, for example, 7.8, and to artefacts by section followed by the number of the object, 5.2.1.1. In the description of the excavation relevant finds are noted at the end of each section.

Chapter 2

PREVIOUS ACCOUNTS

The existence of a fort on the Antonine Wall at Bearsden was recorded by Christopher Irvine, Historiographer Royal for Scotland, in the late 17th century (Keppie 2012: 42–3). Irvine's papers were acquired by Sir Robert Sibbald who published Irvine's list, which included: 'From thence [Castlehill] over the Mossfaldhill of Led Carmmock, by the New Kirk of Kilpatrick a Mile, at the Hay Hill a Fort' (Sibbald 1707: 28). Irvine's observation was followed by those of Gordon (1726), Horsley (1732), Maitland (1757) and Roy (1793). Roy, as usual, provided the best plan (illus 2.1) and noted for the first time that the fort was surrounded by two ditches: 'a double envelope' (Roy 1793: 159). Moreover, the measurements scaled off Roy's plan closely approximate to the size of the complex as determined in the excavations: Roy's 475 × 360 feet compared to 476 × 380 feet (illus 3.2.1). All these commentators failed to record the rampart between the fort and the annexe. The reason is no doubt recorded by Roy, who remarked that the fort was 'so much defaced by the plough, that excepting on the south side, it is with much difficulty that it [the double envelope] can be traced' (Roy 1793: 159). The antiquarians noted the Military Way running through the centre of the fort, Gordon (1726: 53) stating that perhaps here the 'Causeway is not to be seen in greater perfection, measuring 20 feet in Breadth'. Horsley (1732: 166) also commented on the military way 'being … conspicuous and magnificent', and that 'the gates at which the military way enters then goes out, are nearly in the middle of the east and west ramparts'.

Roy (1793: 158–9) also recorded the topographical setting of the fort: 'the fort of New Kirkpatrick, stands lower than most we meet with on the Wall, having the rivulet which afterwards falls into the Allender in front. And as the rising grounds, on the right and left of this post, form a sort of gorge or pass, through which it seems to have been apprehended that the enemy might penetrate from the north and north-west, therefore the fort hath not only been made to larger dimensions, but likewise to render it more respectable, it hath been surrounded with a double envelope … The military way passes through it, and it is distant from Castle-hill only two thousand four hundred and fifty yards' (illus 2.2).

Stuart's plan retained the two ditches, but he recorded robbing of stones from the fort: 'Many hundred cart-loads of stones have been removed at different times from the line of the Military Way, and also from the foundations of the Station, and

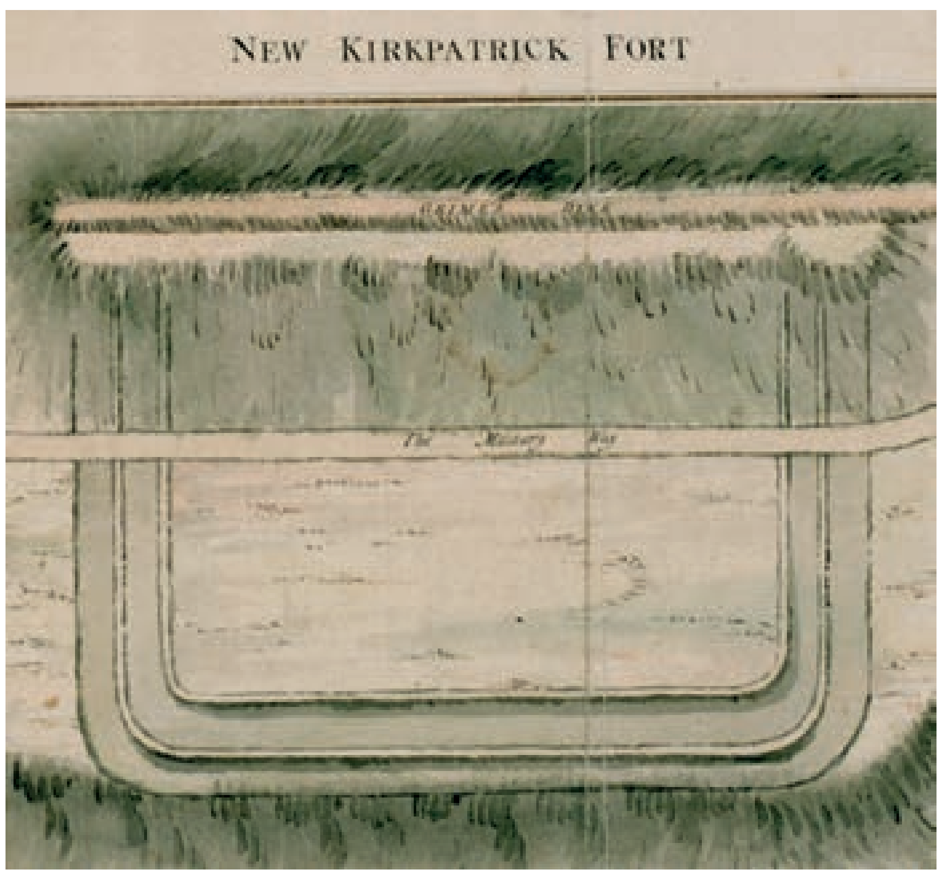


Illustration 2.1
Roy's plan of Bearsden, 1755.

Illustration 2.2
Roy's map of the Bearsden area, 1755.

many hundreds more remain to be dug out whenever they may be required' (Stuart 1852: 313). In 1825 Reverend John Skinner had noted 'large squared stones . . . some of them chiselled in lines after the Roman manner' re-used in a building near the fort (Keppie 2003: 225). Stuart recorded the existence of a spring 'within the ramparts at East Kilpatrick, the water from which has been recently led into a drain, and now makes its crystal appearance towards the bottom of the field, at a considerable distance from its former outlet. When first discovered a few remains of masonry existed near it – confirming in some degree the opinion, that this tiny fountain had been a source of supply to the ancient garrison' (Stuart 1852: 313). In addition, Stuart stated that 'some fragments of Roman pottery have also been found at East Kilpatrick, which much resembled those discovered at Duntocher; they likewise contain the figures of centaurs, and what might also be called a copy of the Medicean Venus – all in low relief', presumably samian ware (Stuart 1852: 315).

The fort was still visible and free of encumbrances when the Ordnance Survey recorded it in 1862 (illus 2.3), though by this time the only trace of the defences was a broad hollow marking the line of the ditches south of Roman Road; north of the road two fence lines maintained the line of the west and east ramparts (Feachem 1974: 74–5). By the time the second edition was published in 1896 two villas had been erected in the northern part of the fort (illus 2.4), while south of the road lay a further two; the only part of the fort not built over was the south-west corner, though the ditch to the south-west and south was still marked as visible. By the 1914 OS map, the fort was recorded as 'Roman Station (site of)', with no remains visible (Feachem 1974: 75; Macdonald 1934: 324–6).

Since that day little has been recorded of the fort and few finds have come to light. Macdonald (1934: 325) recorded events during the building of the villas on the site: the corner of one villa had been erected over 'a soft mass of black material' and required strengthening; the south rampart was grubbed up during the laying out of gardens; and also during gardening was discovered 'a number of pits from 30 to 36 inches in diameter and similar in depth. In the bottom there was usually or always some ashed or charred wood'. Fragments of amphora and a coin of Trajan were found in October 1912 in the garden of Maxholme, an intaglio cut in cornelian and the device of a female figure making an offering of fruit found in 1933 (Macdonald 1934: 326) and a coin of Constantine I in the grounds of 16 Roman Road (Robertson 1950: 139–40) complete the catalogue. Macdonald concluded his report with the ill-judged prophesy that 'it is unlikely that we shall ever learn more' (Macdonald 1911: 165; 1934: 326).

Illustration 2.3
The OS first edition map of Bearsden, 1862.

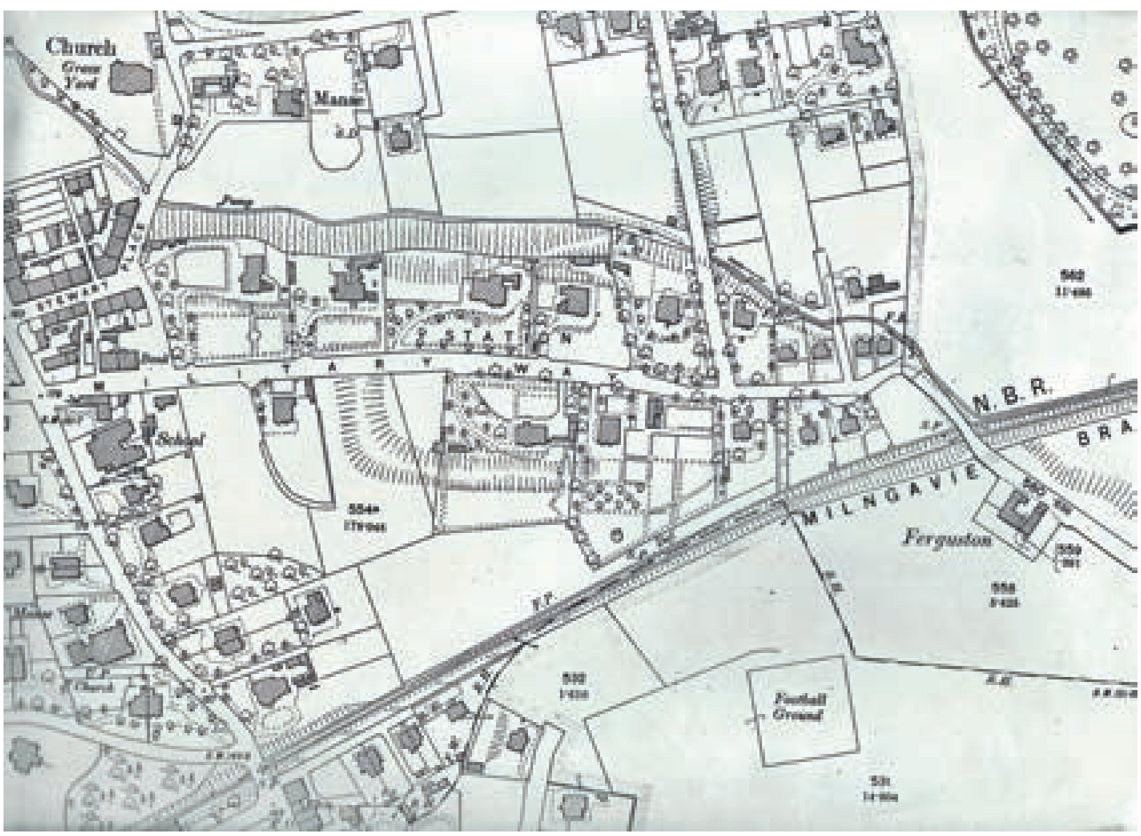


Illustration 2.4
The OS 1896 map of Bearsden.

Illustration 2.5
The grounds of 35 Roman Road before excavation looking east.

Today, the site of the fort can still be recognised, particularly on Roman Road. A slight dip in the road marks the western ditches of the fort, while the ground falls away to the east of the annexe. To both north and south of the fort and annexe the grounds drops steeply away, to the north into the valley of the Manse Burn.

The modern name assigned to the fort has varied. Irvine called it Hay Hill (Sibbald 1707: 28). The parish of East Kilpatrick was created in 1649 and a church erected soon after which was known to Roy as New Kirkpatrick, but by 1860 had become New Kilpatrick; the names were in contrast to the parish and church at Old Kilpatrick at the west end of the Wall. However, when a railway station was opened in 1863, it was given the name Bearsden after a small farmhouse (Feacham 1974: 74–5). With the popularity accorded to the excavations reported upon in this volume, this name was accorded the fort rather than the more cumbersome and otiose 'New Kilpatrick'.

Chapter 3

THE EXCAVATIONS

In 1971 the Ancient Monuments Branch of the Department of the Environment (now Historic Scotland) learned of proposals to redevelop the grounds of 31–37 Roman Road, Bearsden. Permission was sought from the owners, Miller Homes (Northern) Ltd, for a trial excavation and readily given. Excavations took place for an initial four weeks in the summer of 1973 and the results proved to be so promising that the work was extended for a further three weeks. In view of the delay in commencing building work on the site, Miller Homes generously granted permission for further excavations to take place each summer until 1979 when they disposed of the site to Woodblane Developments (Scotland) Ltd who kindly agreed to the continuation of excavation for a further season (illus 3.0.1). The excavations north of Roman Road in advance of redevelopment exhausted all the available area in that part of the site. It was considered that it would be useful to examine part of the south half of the site in order to be able to establish further and wider conclusions concerning the history and layout of the fort. Accordingly Bearsden and Milngavie District Council were approached for permission to excavate in the grounds of their property, Maxholme, 14 Roman Road. Permission was immediately granted and excavations took place there in 1977–9 at the same time as rescue work was proceeding on the north side of Roman Road. The bath-house, discovered in 1973, was generously excluded from the proposed development by Miller Homes, and donated to the state by Woodblane Developments Ltd. Further excavation took place in 1979–82 on the bath-house and the adjacent latrine in advance of consolidation. As a result, excavations were conducted for a total of a little over 26 weeks.

A total of 5,000m^2 (0.5 ha = 1.25 acres) of the fort, the annexe and areas outside the defences were subjected to archaeological investigation over the ten seasons, 1973–82 (illus 3.0.1). The area of the fort and annexe as measured over the rampart is 16,000m^2, and over the ditches 17,680m^2, so the area excavated represents the equivalent of rather less than one-third of the military enclosure. The main areas unexamined were the south-western part of the fort and the southern half of the annexe. Subsequently, evaluations and rescue excavations took place in the latter area; the work usefully provided an additional line for the rampart between the fort and the annexe but otherwise reported only insubstantial remains (Duncan & Leslie 2003; Will & Sneddon 2010; Becket 2012).

Certain constraints restricted activity. All the trees on the site were protected by Tree Preservation Orders. This not only prevented the investigation of certain areas where problems might have been answered, but restricted mobility on site; the use of machinery in some areas was not possible (illus 3.0.2). Further, all areas had to be backfilled at the end of each season. The clay subsoil at times hampered work, in particular investigation of the ditches, as water was slow to drain and the clay quick to harden in the sun. A final difficulty, of rather a different nature, arose through the terracing of the house gardens in the Victorian period. It gradually became clear that agricultural activity on the site had denuded the higher parts of the site, towards the north as recorded by Roy (1793: 159) and caused a build-up of soil in the lower areas, mainly immediately to the north side of Roman Road (illus i). Victorian builders had then created terraces using red clay in front of the houses. This was not at first apparent, not least because the red clay used was so similar to the natural subsoil of the site, and it took some time to determine in each garden where the obscured Roman levels lay in relationship to the 19th century terraces. While the clay dump hampered progress in this way, and also because its weight had led to the squeezing of the old ground surface over the tops of post-holes, it had a considerable beneficial effect elsewhere for buried beneath, and, thus protected by the terrace in front of 35 Roman Road, lay the bath-house still surviving up to ten courses high.

Beneath the Victorian terracing, and generally over the site, earlier truncation of the Roman layers, presumably through ploughing, was such that floor levels rarely survived. Some road surfaces remained, but no floors within buildings, with the exception of one small fragment in one room in building 7 and the courtyard in building 11. Stratified features were therefore few. They included the drains and gulleys within the fort, some pits and post-holes, and some floors in the bath-house and latrine. Most of the stratified pottery was found in the levels relating to the abandonment of the fort and is not noticeably different from the unstratified material. In view of the short life of the fort no attempt has been made to date the phases as the pottery will not allow such precision. The pottery from Bearsden by weight (excluding amphorae) formed about a fifth of all the pottery from the Antonine Wall forts, excluding Camelon (Swan 1999: 451–62).

The area of the bath-house was offered to the state in 1973 as a public monument. As a result, its excavation was not

Illustration 3.0.1
The excavated areas in relation to the features existing in 1973.

completed that year. The building was protected by a wooden superstructure. By 1979, after the site had changed hands, agreement had been reached about the way ahead and as building work started on the housing development, the cover was removed and the full excavation of the bath-house and the surrounding area commenced (illus 3.0.3). The excavation continued not only as the bath-house was being consolidated but as the houses were being constructed round the area of the bath-house and latrine, causing a different form of constriction on archaeological activity, and the inadvertent destruction of part of the latrine by the builders.

3.1 TOPOGRAPHY AND GEOLOGY OF THE SITE

The Antonine Wall, which here formed the north rampart of the fort and annexe, was built along a ridge which ran east to west, falling to the east from the high point of the fort (illus 3.1.1). From this high point the land dropped steeply to the south to a fairly level plateau on which the south half of the fort sat: there was a slight rise towards the south-east quarter of the fort where the headquarters building was to be placed. A depression, apparently natural, south of building 7 appeared to be part of a broad natural gulley running east–west a little to the north of the modern road

Illustration 3.0.2
Excavating the north granary.

Illustration 3.0.3
The final stages of the excavation of the bath-house were undertaken in 1982 while the building was being consolidated (right) and the flats were being built out of sight to the left and below with the builders' encampment top right.

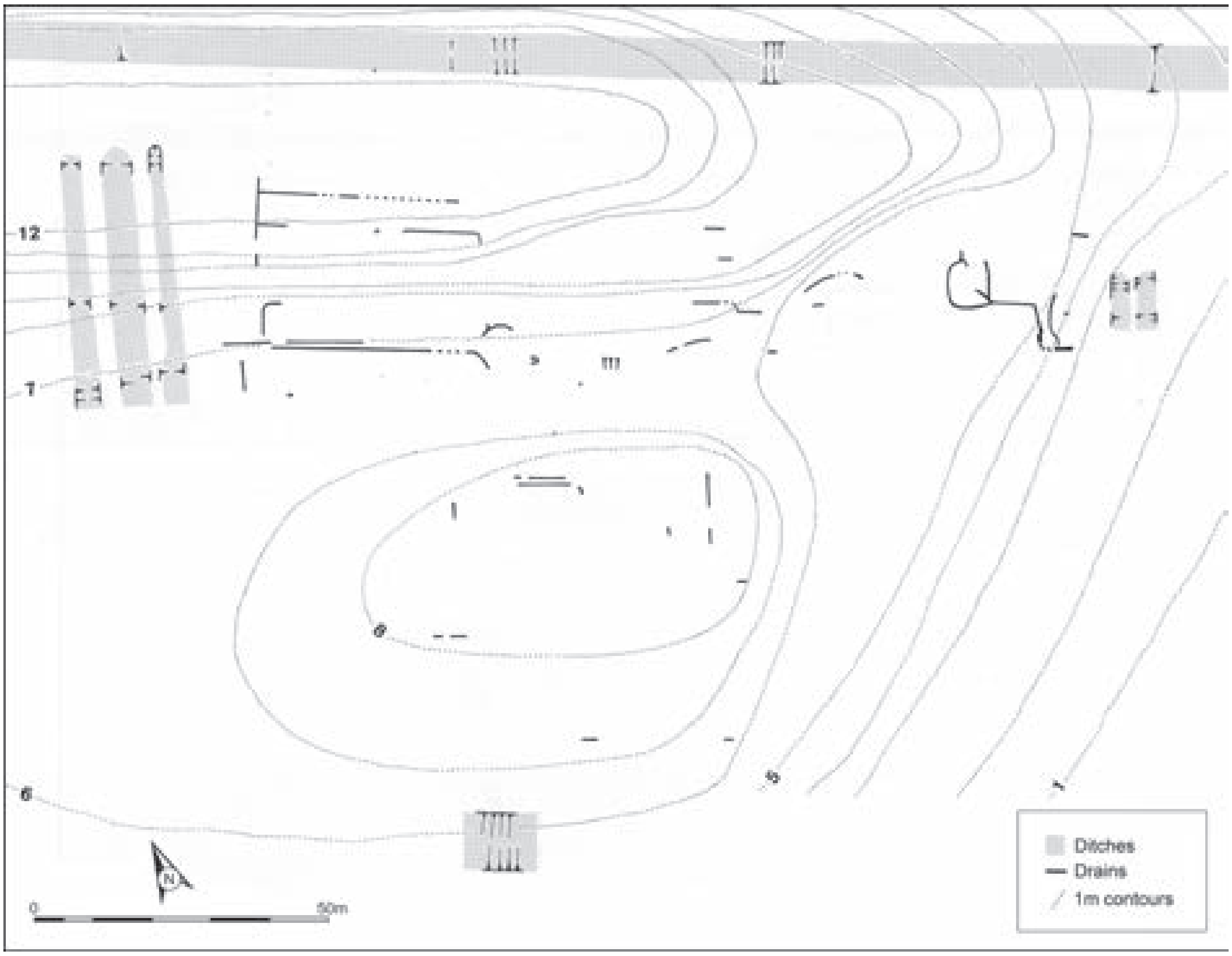


Illustration 3.1.1
Map of the contours and drains.

and draining to the east; the contours hint at this. Thus the ground within the fort varied in height by as much as 6m.

The land within the annexe generally also sloped from north to south and from west to east. The ground continued to fall to the east of the annexe and more steeply south of the fort. It also fell steeply to the north into the valley of the Manse Burn.

The subsoil was boulder clay, generally red in colour. In one area (under the west rampart) a brown earth soil survived overlying the boulder clay (4.1).

3.2 THE FORT

The enclosure which contained the fort and the annexe measured 152m east–west by an estimated 113m north–south over the ramparts (neither north nor south rampart was located) and covered 1.72ha (illus 3.2.1). Within the ramparts, the measurements were 143m by an estimated 104m, 1.48ha. As it gradually became clear during the excavations, this large enclosure was divided into two on a ratio of about 2:1 while the internal buildings were being erected. The western area remained the fort, 102m east–west over the ramparts, 93m within (1.15ha/0.95ha), while the eastern part became an annexe measuring 54m east–west over the ramparts, 45m within (0.61/0.47ha).

3.2.1 The defences

There were two elements to the defences, the ditches and, inside them, the rampart. The ditches surrounded the whole enclosure, the northern also serving as the ditch of the Antonine Wall. A separate rampart separated the fort from the annex.

3.2.2 The ditches

The ditches were sectioned on every side, often in difficult circumstances owing to the depth of overburden and the general restrictions of the site. Similar difficulties sometimes resulted in the sections remaining uncompleted.

The north ditch was traced across the site from north of the annexe east ditches to beyond the west fort ditches. Two sections were machine cut in 1973, a third hand dug in 1974, while smaller trenches to trace the ditch further west were machine

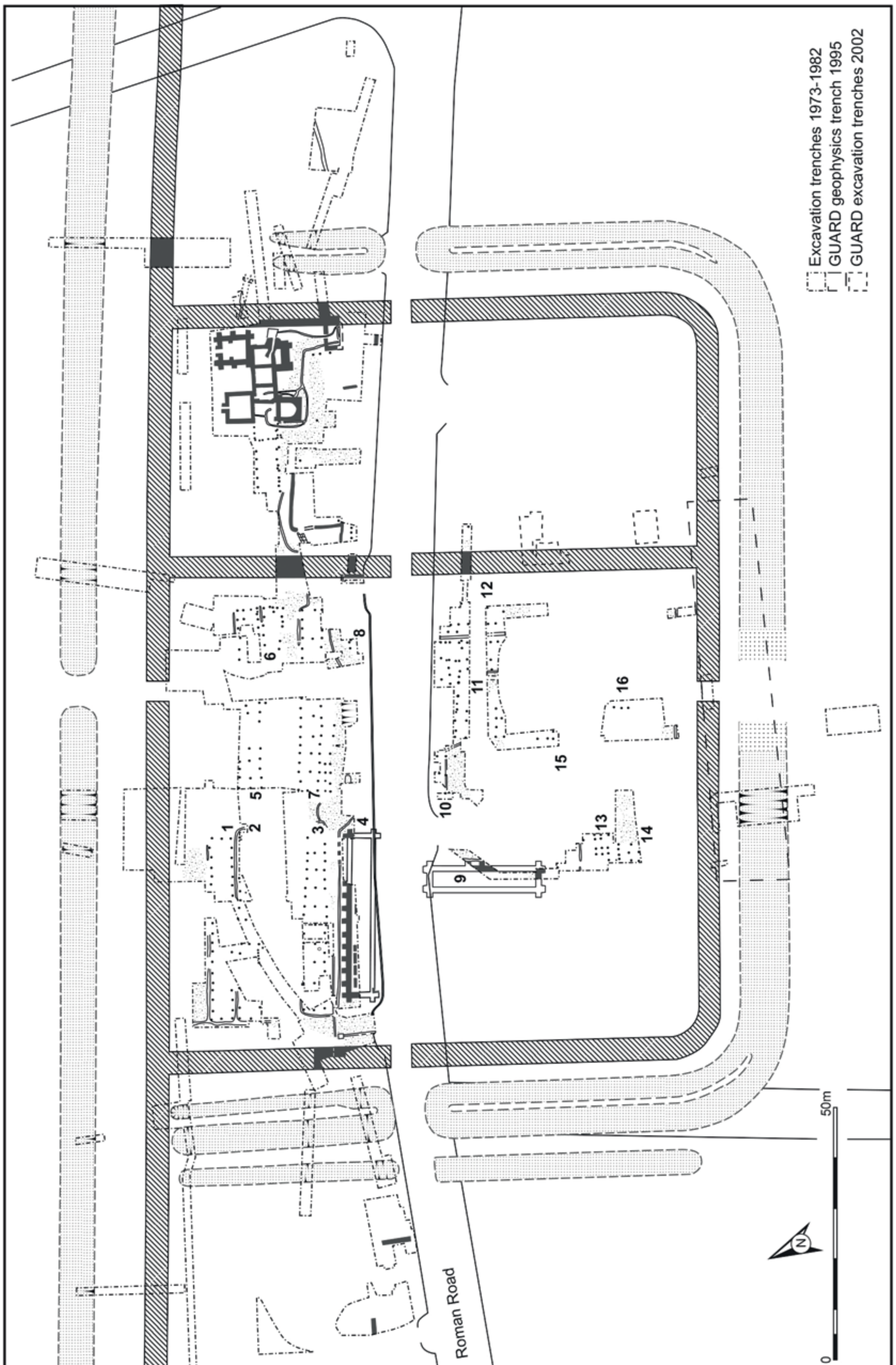


Illustration 3.2.1
Plan of the fort and excavated areas.

Illustration 3.2.2
The north ditch section looking west.

cut in 1975. In these two western trenches the north lip of the ditch was not located: here the ditch passed so close to the steep south bank of the Manse Burn that part of the ditch had been eroded.

In 1974 a small area was opened in order to try to locate a causeway outside the putative position of the north gate (section E–E on illus 1.2). The ditch here was found to be at least 6.5m wide (illus 3.2.2 and 3.2.7). Opposite the east rampart of the fort it had widened to 7.2m (section F–F), and north of the east annexe ditches to 8.3m (illus 3.2.7). The profile revealed an irregular slope of about 45° on the south, with a rather steeper slope to the north; the ditch was a little over 2.5m deep. At the bottom of section E–E lay a deposit of 'organic' material (illus 3.2.2 and 3.2.7). Elsewhere this overlay a deposit of fine grey silt. It seems possible that the position was the same in this trench, but here the silt was not recognised owing to the difficulty of distinguishing it from the natural clay into which the ditch had been excavated and from which it had come. The u -shaped profile may therefore be false: it is possible that the profile should be V-shaped, as in section D–D. Over the 'organic' deposit lay silt of varying colours and consistencies, generally coarser than the fine silt usually accumulated in the bottom of the ditches. The silt merged into brown loam, and over this lay Victorian infill.

Illustration 3.2.3
The outer west ditch looking south.

Illustration 3.2.4
The outer annexe ditch looking south.

Section F–F was not 'bottomed' owing to problems with water. However, the upper silts and superimposed levels were located. The ditch here had been dug a little to the south of the valley of the Manse Burn with the result that a narrow ridge or glacis had been left between the ditch and the valley, and still survived in spite of later erosion.

Three ditches were located on the west side, and sectioned at three points, though the bottom was not always reached (sections A–A, B–B, C–C on illus 1.2). All three ditches varied in width, profile and depth, both from each other and along their own length (illus 3.2.3, 3.2.5 and 3.2.8). However, the outer lip of each ditch was almost parallel to the west rampart of the fort, which may suggest the location of the marking out line. The outer ditch widened from 2.8m just south of the butt-end to 3.7m and then 4.7m a little to the north of the putative causeway outside the

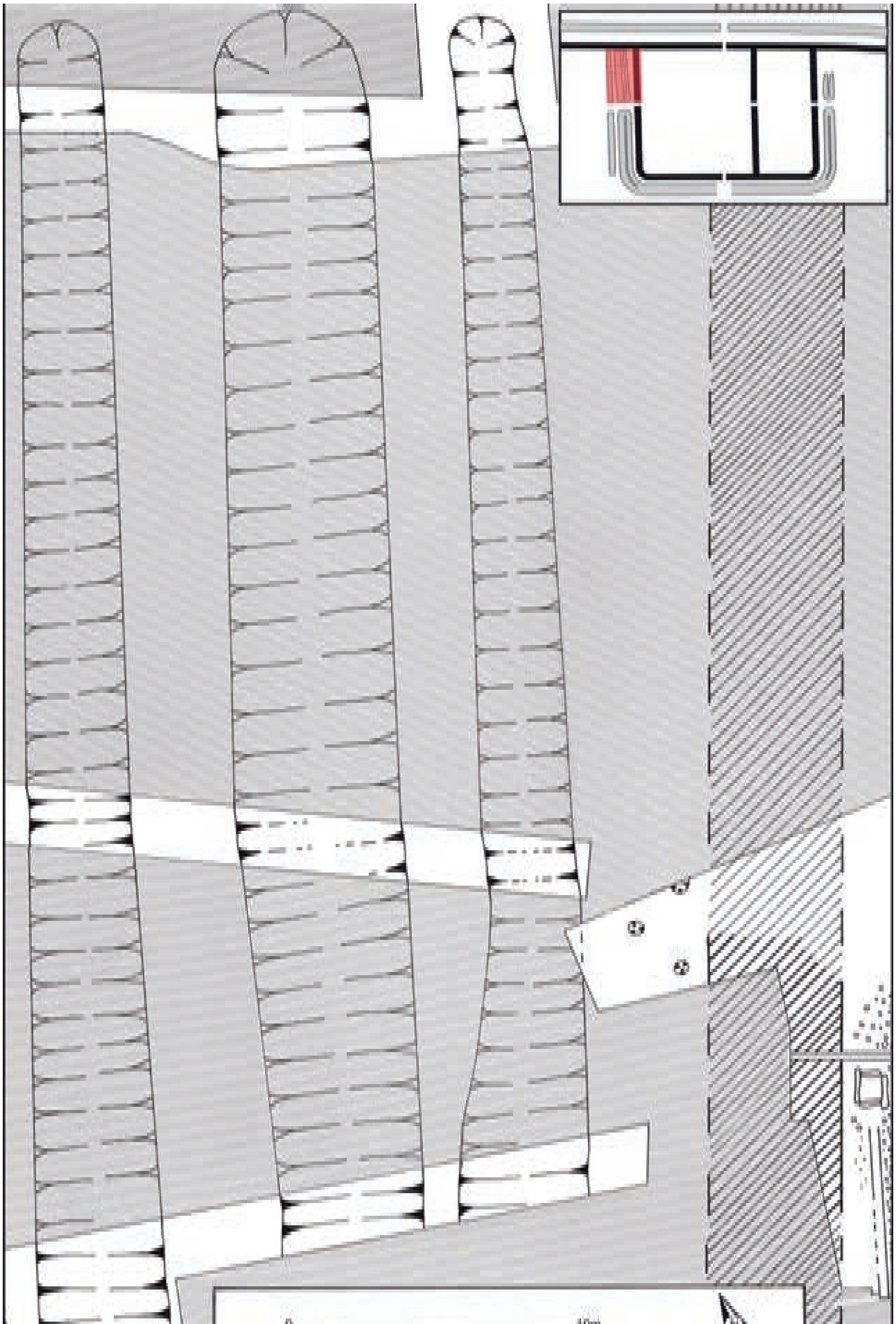


Illustration 3.2.5
The west ditches in plan.

Illustration 3.2.6
The south ditch section looking east.

west gate of the fort. The middle ditch, 3.5–4m to the east and the most regular, widened from 5.3m to 5.5m before narrowing to 5m. The inner ditch was even more irregular. Placed 2.8m to the west of the middle ditch for the northern 30m, it was only about 2.8m wide, but it then broadened to 4.4m at the expense of the spine between these two ditches.

The outer ditch was the same depth, 2.2m, in both sections across it, though narrowing to the north and therefore gaining steeper sides: the outer slope was longer than the inner (illus 3.2.3). The middle ditch was also 2.2m deep in section C–C, but only 1.4m in section A–A, presumably because it was approaching the butt-end. The inner ditch was 1.55m deep in both sections A–A and C–C but again was steeper to the north owing to the narrower dimensions.

The fill of the three ditches varied somewhat along their length. In the section just north of the putative causeway outside the west gate the fine silt at the bottom of each ditch, 400mm–750mm deep, was covered by the 'organic' deposit, 800mm–1m thick, and this in turn was below a grey-brown silt, coarser than the lower level of silt, and merging into the layer of brown loam which uniformly covered the ditches and the spines between them. In Section B–B only the outer ditch was 'bottomed'. Here the fine silt was 750mm thick, the same depth as further south, but the 'organic' layer was reduced to 150mm, while the upper coarse silt had thickened to 1m. In section A–A no 'organic' debris was found, the silts merging into each other, though in both the inner and middle ditches there was less silt, while the brown loam above was more stony than further south.

In section C–C, a little north of the presumed causeway leading out of the west gate of the fort, a quantity of metal objects was recovered from the lower fine silt about 300mm from the bottom of the middle ditch (11.3.1.1–6; 15–61; 11.3.2.97; 102; 105–8; 11.3.3; 115; 122–31; 11.3.4.158); a quern was found in the outer west ditch (5.2.2.3). These objects were all found at the same level and appeared to have entered the ditch at the same time (13.4; 13.5 and 13.6 for analysis of the contents of these three ditches).

The north butt-ends of the east ditches of the annexe were located, but were not emptied: both ditches were 3m wide at this point. 8m to the south a complete section across the outer ditch was excavated (Section D–D on illus 1.2). 3.5m wide, the ditch sides sloped steeply to a depth of 2.4m (illus 3.2.4 and 3.2.7). The bottom 1.3m of the ditch contained dark grey silt, and above this was a shallow 'organic' deposit, 280mm thick. Above this lay further, coarser silts. Analysis of the 1.3m of fine silt in the bottom of the ditch demonstrated that this contained food debris, and had clearly accumulated during the life of the fort (13.2, 17.2 and 18 for analyses of the contents of this ditch).

The south ditch was sectioned at one point, opposite the putative position of the south gate of the fort (section G–G). It was 9.7m wide, measured to a break in slope, but thereafter it continued to slope up, more gradually, to the presumed position of the south rampart (illus 3.2.6 and 3.2.7). Measured from the south lip, the ditch was 2.7m deep, and from the north 3.3m. The fill was similar to other ditches, with a fine grey silt at the bottom, 'organic' layer above, coarser silt, of various hues of grey, blending into brown loam (see 13.7 for analysis of the contents of this ditch). This ditch was considerably deeper than any other ditch and in width approximately equal to any two of the west and east ditches.

No evidence was found in any ditch to suggest that it had ever been cleaned out during its life; though conversely none was found to suggest that it had not. The metalwork in the middle west ditch, most likely deposited there when the fort was abandoned, lay within the fine lower silt, with no break noticeable in the silting pattern above.

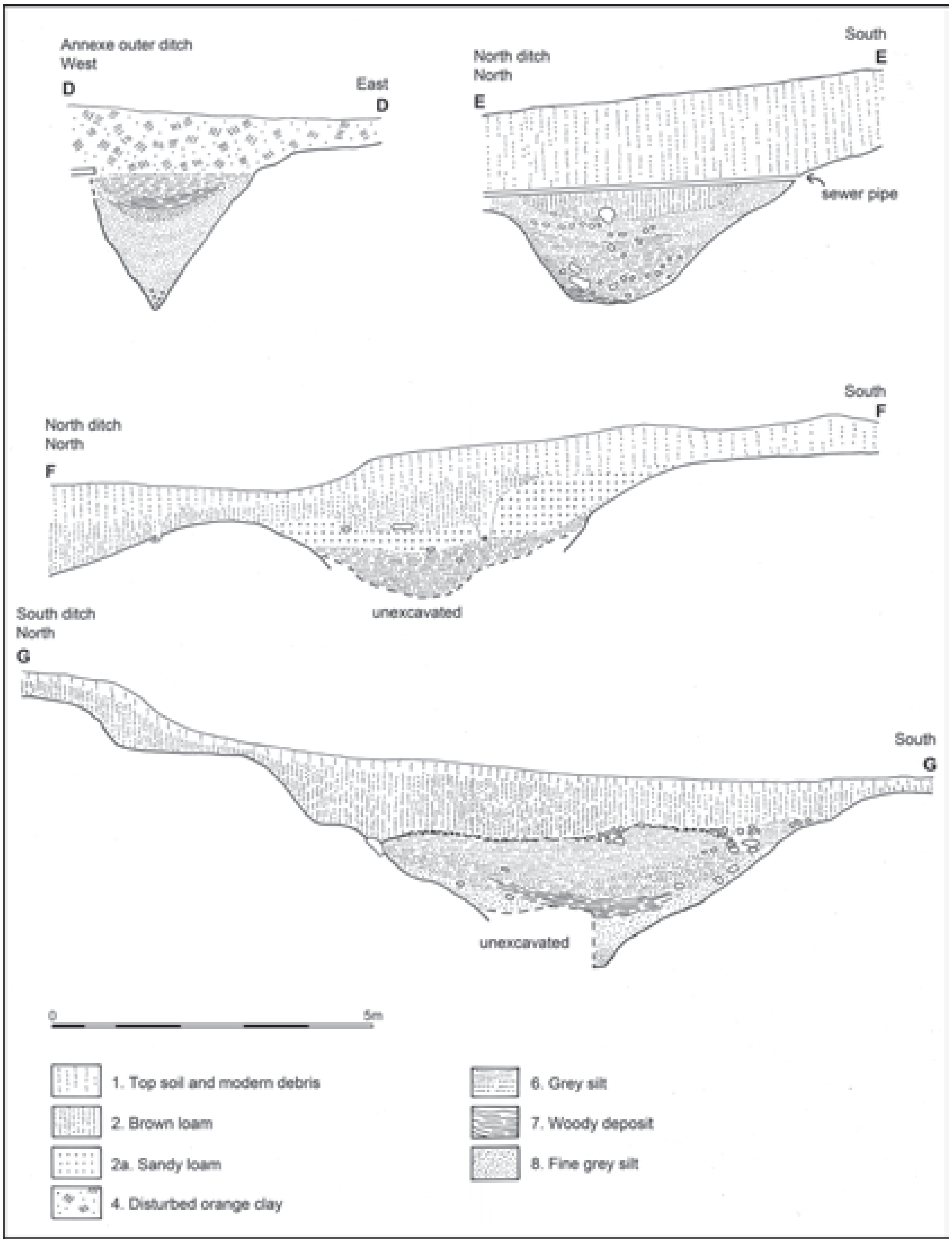


Illustration 3.2.7
Sections of the north, east and south ditches.

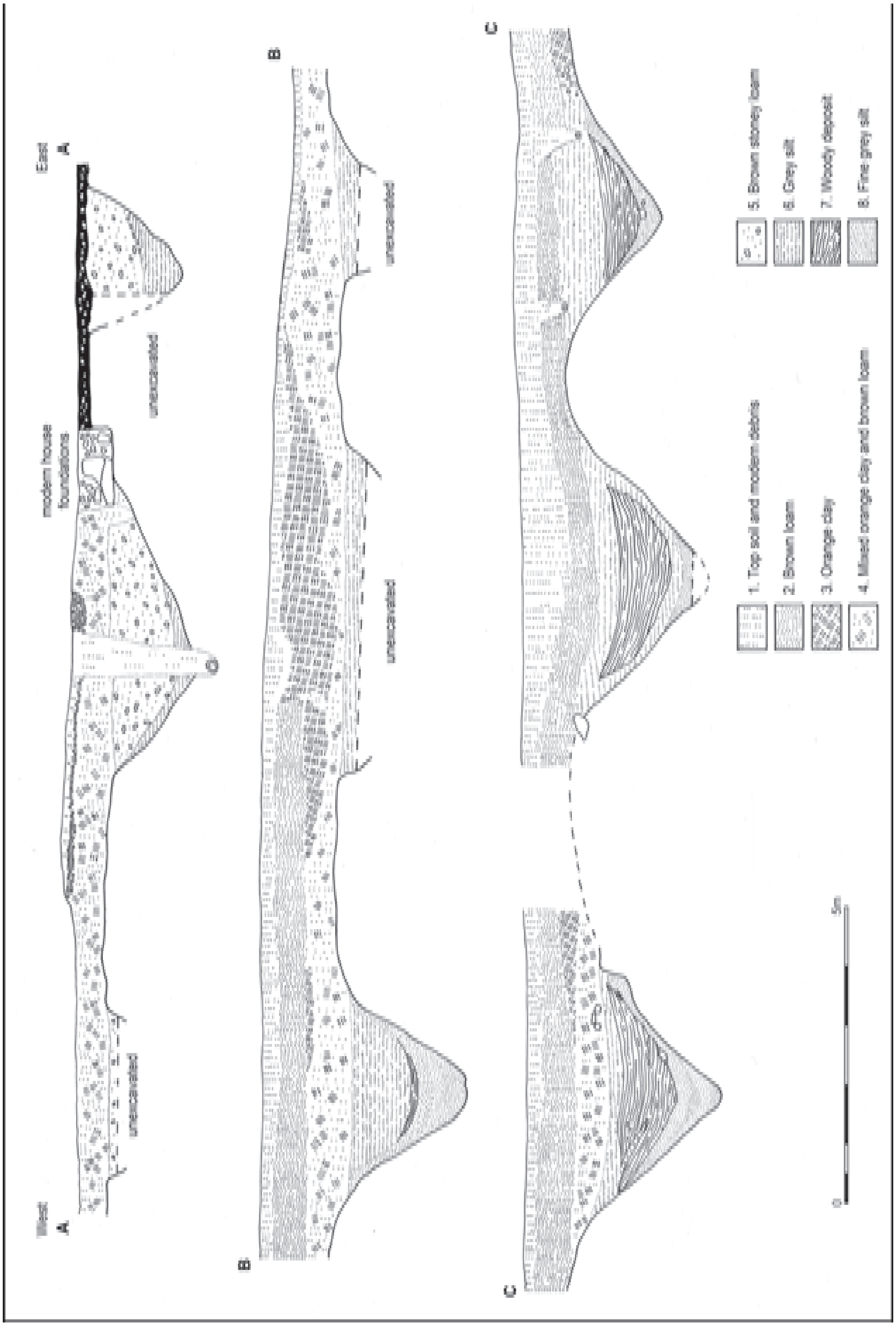


Illustration 3.2.8
Sections of the west ditches.

Comment

The variety and nature of the ditches require consideration, but this is undertaken in the general discussion section. The report on the geophysical survey along the south ditch is in Section 3.5.

3.2.3 *The rampart*

Complete sections across the ramparts of the fort were made at only three points, one to the west and two to the east, so general comment must be limited in scope.

The north rampart was sought in three trenches but nowhere survived. At one point, north of the north end of the east annexe ditches, the subsoil was noticeably harder and more compacted than the surrounding area. This strip, running east–west across the trench, was about 4.3m wide while the north edge lay 9m south of the south lip of the Antonine Wall ditch. This would be the appropriate position for the rampart.

The south rampart was not located. Macdonald recorded that it had been removed when the garden was laid out; a terrace wall now sits on its site (Macdonald 1911: 163; 1934: 325). A 10m length of the west rampart was traced northwards from Roman Road, though a complete section, 1m wide, was determined at only one point (illus 3.2.9). The rampart base was 4.5m wide, and was formed of rough stones of varying sizes from 400mm long downwards, though with an average size of 150mm × 200mm, bordered by roughly dressed kerbs of sandstone blocks, all set

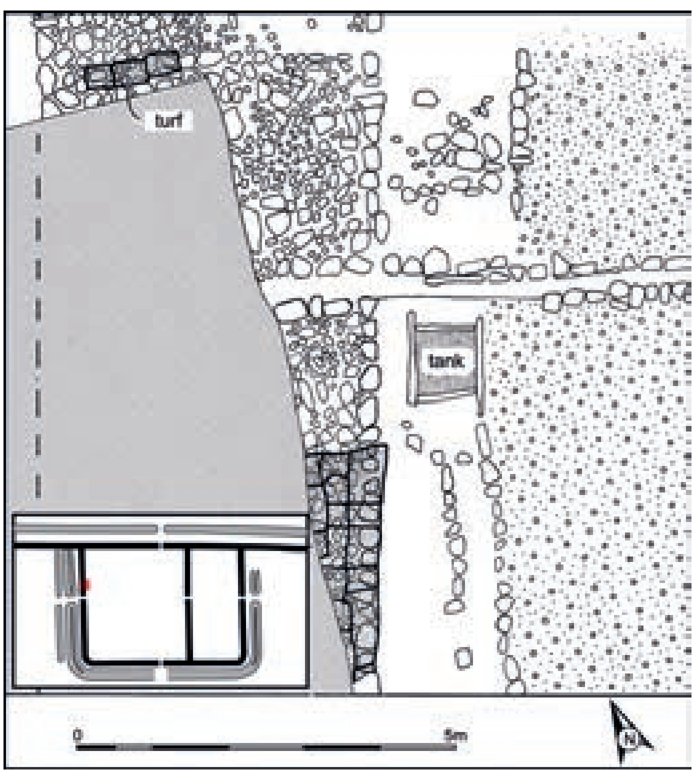


Illustration 3.2.9
Plan of the west rampart of the fort, the surviving turves, and the intervallum.

Illustration 3.2.10
The west rampart of the fort (to the right), water tank and intervallum road looking south.

Illustration 3.2.11
The turves of the west fort rampart.

into the natural red clay (illus 3.2.10). At one point a brown forest earth soil survived below the rampart base (see 4.1 for analysis of the soil and 13.8 for analysis of the turves). The base was crossed by a drain, described below. Turfwork survived on the stone base up to a maximum height of 300mm. Up to three layers of turf, each 80mm–100m thick, were preserved. In two areas the turfwork was sufficiently well preserved to allow accurate measurement of the individual turves (illus 3.2.11). At one point three turves, rectangular in shape, measured 400mm–450mm × 300mm–350mm. Elsewhere, the turves were

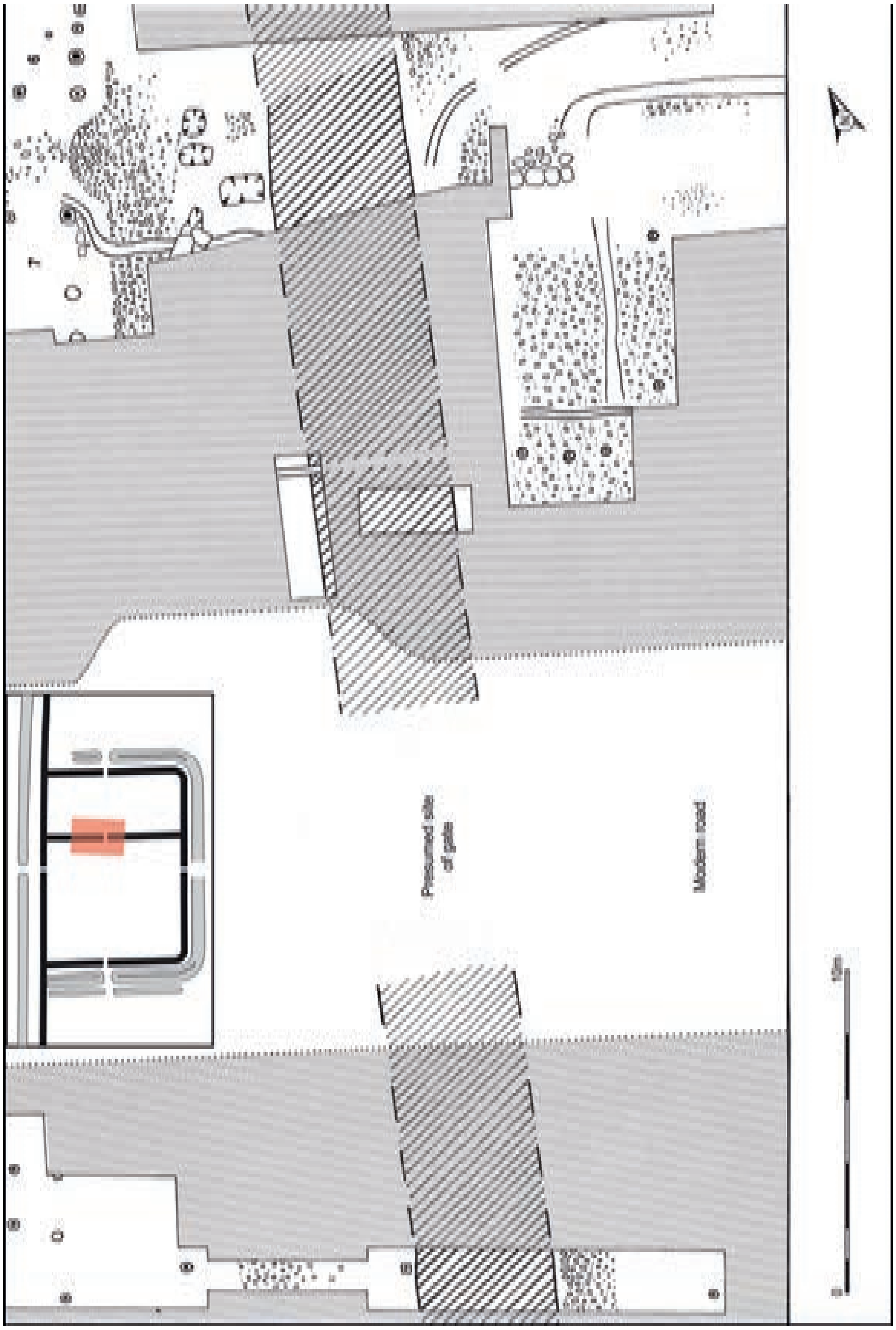


Illustration 3.2.12

Plan of the rampart between the fort and the annexe, the intervallum and adjacent areas of the annexe.

Illustration 3.2.13
The rampart base between the fort and the annexe south of Roman Road and east of the headquarters building with its covering of turf looking south with the path to its east.

Illustration 3.2.15
The rampart base between the fort and annexe north of Roman Road with the area of burning to the east, looking west.

more irregular in shape. They were laid in rows, the eastern about 450mm wide, the second, less regular, varying from 250mm to 380mm. The smallest turf measured 250mm × 280mm and the largest 450mm × 840mm; the average was about 400mm × 320mm.

The east rampart was located at three points, but full sections were only achieved at two (illus 3.2.12). To the south of Roman Road it was 4.35m wide and, to the north, also 4.35m but narrowing 3m further north to 4.2m. The rampart base was constructed in the same manner as the west rampart, with stones of similar size and shape. Only the barest skim of turf survived (illus 3.2.13 and 3.2.14). North of Roman Road a layer of burning covered a rough cobble surface to the east of the

Illustration 3.2.14
The rampart base between the fort and the annexe south of Roman Road and east of the headquarters building looking south with the path to its east following removal of the turf.

Illustration 3.2.16
The cobbling under the burning north of Roman Road.

Illustration 3.2.17
Turf and wood of the fort/annexe rampart.

rampart. It was up to 120mm thick and about 1.5m wide (illus 3.2.15 and 3.2.16). Analysis of this material demonstrated that it contained willow, alder and hazel branches, 10mm to 15mm in diameter (13.8). A small amount of fallen turfwork overlay the burning. At one point, immediately north of Roman Road, a fragment of wood lay parallel to the rampart, but it was very soft and proved impossible to lift (3.2.17).

A complete section across the east rampart of the annexe was only achieved at one point, though a stretch of the inside face of the rampart was uncovered over 19m. The complete section was by the latrine. Here the rampart was 4.5m wide, the same width as the west fort rampart, and built in the same manner as elsewhere. The stones were embedded in the natural red clay and over them turfwork survived to a height of 400mm (see 13.8 for an analysis of the turves). 15m to the north, the eastern 2.7m of the rampart base was examined in a small trench. Here no part of the base was preserved, but a drain through the rampart survived (illus 3.2.18); see below.

3.2.4 Internal roads

Intervallum road *(via sagularis)*

A metalled surface, the intervallum road, ran round the whole of the fort within the rampart. It was not always possible to relate this road to the rampart, usually because either the rampart or the road had been destroyed. There was some evidence surviving, however, to suggest that the road was separated from the rampart by an open space.

Along the inside of the presumed position of the north rampart the very denuded remains of the intervallum street at least 2.7m wide survived. It can be calculated that its southern edge will have lain about 8m south of the rampart. On the south side of the fort the intervallum road was 1.8m wide west of the site of the *via decumana*, while to the east the road was separated by at least 4m from the rampart. This space was occupied by two small pits and two post-holes, possibly part of a building placed in the shelter of the rampart.

On the west side of the fort (the *praetentura*) the intervallum road was 3.2m wide north of building 4, widening opposite this building to 7m (illus 3.2.19). A gap of 1.5m to 1.7m was left between the road and the rampart. This was crossed by a drain, north of which lay a few stones, while to the south lay a water tank (illus 3.2.20). This measured 800mm north–south by 860mm east–west on the west side, narrowing to 720mm on the east. The sides were formed of four slabs placed on edge, with the two north–south slabs longer than the east–west stones. The floor was of clay and the joints were luted with clay. There was no visible entry to or exit from the tank. Two conjoining fragments

Illustration 3.2.18
The outfall of the drain through the east annexe rampart east of the primary bath-house.

Illustration 3.2.19
The west intervallum looking north with the water tank.

Illustration 3.2.21
The east intervallum looking south (left) with the path between buildings 6 and 7.

of the lower stone of a quern were recovered from the rampart tumble in this area (5.2.2.4).

On the east side of the northern part of the fort the intervallum road was about 2m wide, but was placed 3m from the inside edge of the rampart, the intervening area containing three pits and a small patch of cobbling (illus 3.2.21). A quern was incorporated into the metalling to the east of building 7 (5.3.1).

On the east side of the southern part of the fort the scattered remains of the intervallum road, 2.1m wide, ended 3.7m west of the rampart. A small patch of burning, possibly from the destruction of the fort, lay on the old ground surface, in the intervening space, while a post-hole was located immediately behind the rampart, suggesting that a building may have lain here.

Several sections of the intervallum road were bounded by gulleys. Those along the inside of the north and west intervallum roads were associated with the internal buildings. However, the gulley along the south intervallum lay on the rampart side, which here was the downhill side of the road. There was no gulley along the east intervallum road.

Illustration 3.2.20
The water tank looking west.

Illustration 3.2.22
The junction of the *via praetoria* (left) and the *via principalis* (right) looking east, with the post-holes of the west wall of building 7 beyond.

Illustration 3.2.23
The *via decumana* looking east.

Other roads

The main east–west road across the fort presumably lies under the modern Roman Road. This, the *via principalis*, from the accounts of the antiquarians, also formed part of the Military Way along the Antonine Wall. Running north towards the north rampart, and the putative position of the north gate, was the *via praetoria* (illus 3.2.22). This was located in one area, between buildings 3 and 7: further north the road did not survive. The road at this point was at least 3.8m wide. It was bounded on the west side by a drain, and was crossed by a second drain. Running south from the centre of the fort was the *via decumana*, 9.2m wide at its widest point east of building 14, but probably only about 7.8m wide east of building 13 (illus 3.2.23). There was also a metalled strip 6.3m wide to the south of building 12, which may have been the *via quintana* (illus 3.2.24).

Minor roads, or paths, were noted between several buildings. One left the intervallum road approximately at a right angle to pass between buildings 6 and 7 (illus 3.2.21; 25). It was traced for 11m, and was up to 1.7m wide. Another lay along the south side of building 7, and was also about 1.7m wide. A third lay between buildings 3 and 4, and consisted of a lightly metalled path up to 2m wide.

Inside the west rampart of the annexe a metalled surface was recorded both north and south of Roman Road (illus 3.2.14; 16).

Illustration 3.2.24
The road south of building 12 looking south.

Illustration 3.2.25
The path between buildings 6 and 7 looking south.

It was formed of cobbles overlain with smaller stones and gravel and defined along its west edge by rough kerbing, leaving a gap of about 200–300mm between the cobbles and the base. To the south the cobbled surface was 1.7m wide, but further north it was more irregular. Here the metalling was crossed by a drain, leading south-west from the bath-house to turn and apparently run parallel to the east rampart of the fort, presumably emptying into the gap between the rampart base and the cobbled path though the point of junction did not survive.

Comment

There was little uniformity in the width of the roads. The intervallum street, fully sectioned in five places, varied in width from 1.8m to 3.2m, excluding the area opposite the north granary (building 4), where it attained a width of 7m, presumably to aid access to the building. The *via praetoria* was at least 3.8m wide, but probably not much more, while the *via decumana* was over twice as wide: the road behind building 12 lay between these two extremes. The smaller paths between individual buildings were all just short of 2m wide.

The strip of metalling south of building 12 was originally interpreted as the *via quintana* because it was in the correct location while to the west there appeared to be a gap between buildings 11 and 15. The proposal that these two buildings formed part of a single structure, the headquarters building, casts doubt on this interpretation (for further discussion see Comment to buildings 10, 11 and 15).

None of the roads or paths occupied the full space available between buildings or between ramparts and buildings. The gap between the intervallum road and the rampart varied between 1.5m and at least 4m, and may have been up to 5m wide along the north rampart. Apart from several small pits of indeterminate function, a water-tank and patches of cobbles, there is some indication that buildings may have occupied this area. The gap between the internal roads and buildings was no more than 2m, and generally much less. In only one instance did the road surface lap against the outside wall of a building, the north granary. No ovens were found in the intervallum space.

The construction of the roads

The roads were all built in a similar fashion. A layer of water-worn cobbles formed the bottoming and smaller stones lay on top, reducing gradually to a gravel surface, though in places the surface was formed of crushed sandstone fragments.

Frequently, the road surface had been destroyed. The average thickness of the road was 300mm from base to surface. The road to the west of building 4 (the granary) was especially thick; the layer of cobbles, which included very large stones at the base, was 400mm deep, and the smaller stones and gravel 140mm thick. The more substantial nature of the road here indicates the location of the loading bay of the granary.

The paths were constructed in a similar manner to the roads, though they were of lighter build. The path south of the western two-thirds of building 7 was formed of a single layer of yellow sandstone fragments. The east end of the path was more substantial, having a bottoming of cobbles.

3.2.5 Drains and gulleys

Water was carried off the fort in either an open gulley or a drain (illus 3.1.1 and 3.2.27). The former were generally about 400–500mm wide and 100mm deep, and the drains 100–150mm wide and the same in depth.

In the north half of the fort an open gulley was located along the northern (uphill) side of each building, though frequently it did not survive throughout its whole length. Most of these gulleys were simple channels dug into the clay and were not lined, nor covered. These are distinguished separately on the plans. Other channels may be more correctly described as drains. These were mostly lined with roughly dressed sandstone blocks, though in one case – the drain immediately north of building 4 – water-worn cobbles were used. Occasionally the capstones over these drains survived. These gulleys or drains flowed either west or east to the intervallum roads or to the *via praetoria*, thence turning south, and then turning again to pass through the rampart. At this point the channel was lined with stones and capped. The drain through the west rampart, but no other, was floored with flat stones.

A drain passed through the annexe rampart towards its northern end. It was 220mm–300mm wide and 300mm deep. Built of roughly dressed sandstone blocks, it was two courses high and the east end was supported by three courses of stone. The drain discharged its contents into a channel, 1m wide and 550mm deep. It was traced for 2.7m in a south-easterly direction, remaining the same width, but deepening to 850mm. Over half the fill of the channel was fine silt, dark in colour, below brown loam.

In the southern half of the fort drains or gulleys were provided alongside buildings 9 and 11 and across the centre of the fort, while a drain led out of the courtyard of building 11.

Many of the gulleys were choked with burnt wattle and daub, together with broken pottery and pieces of metal, relating to the destruction of the fort.

Comment

The steep slope of the ground in the northern half of the fort, combined with the clay subsoil, demanded the use of a considerable number of drains, or what might be regarded as storm gulleys as much as normal drains. The flow of water may account for the greater width of the gulleys over the drains.

3.2.6 Open spaces

Large gaps were left between buildings 2 and 3, between the north intervallum and building 5, between buildings 5, 6 and 7 and between buildings 7 and 8 and the *via principalis*. In the first two, possibly three, cases the gap probably resulted from the steep slope of the ground in the northern half of the fort. However, a different reason operated in the last example. Two intrusions were located between building 7 and the *via principalis*, though it was not possible to explore either fully.

To the west lay the eastern butt-end of a depression 1.5m long (within the trench), 1.5m wide and 800mm deep. If the depression had extended as far west as the west end of building 7 it would have been 4m long, though, as the width of the *via*

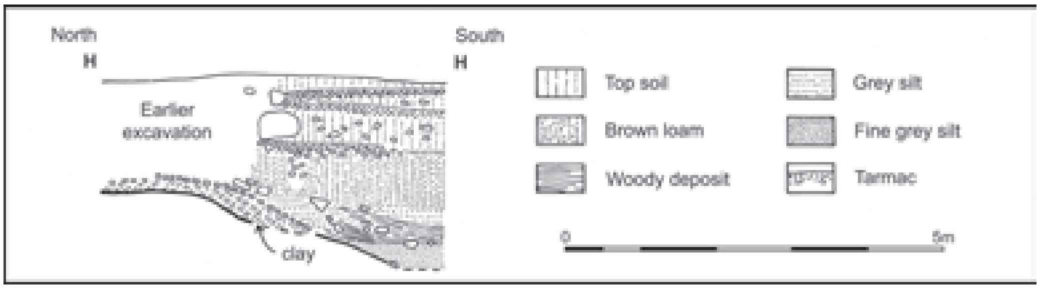


Illustration 3.2.26
Section across the depression between building 7 and the *via principalis*.

praetoria is not known here, it may have been a little longer. The fill was predominantly coarse sandy silt mixed with dressed stones. The ground surfaces around the depression were metalled and cobbles and gravel formed the sides of the depression for the upper 300mm. To the east lay a larger depression, running east–west through the excavated area. This was traced for a distance of 5m, though only the northern half of the depression was located (illus 3.2.26). It can be calculated to have been about 6m wide, and was 1.05m deep. Assuming a space of about 3m between this depression and that to the west it may have been as long as 18m.

The metalling to the south of building 7 extended up to the north lip of the depression and about half-way down the northern slope. The bottom 200mm of the depression was fine grey silt and above that lay an 'organic' deposit (see 13.3 for analysis). A thin deposit of silt lay on this merging into brown loam.

Comment

Although the western depression contained stone debris, it is unlikely to have been excavated as a demolition pit; rather the existing depression was used as a convenient deposit for stones from the nearby granary.

Illustration 3.2.27
General view of building 1 looking south-east.

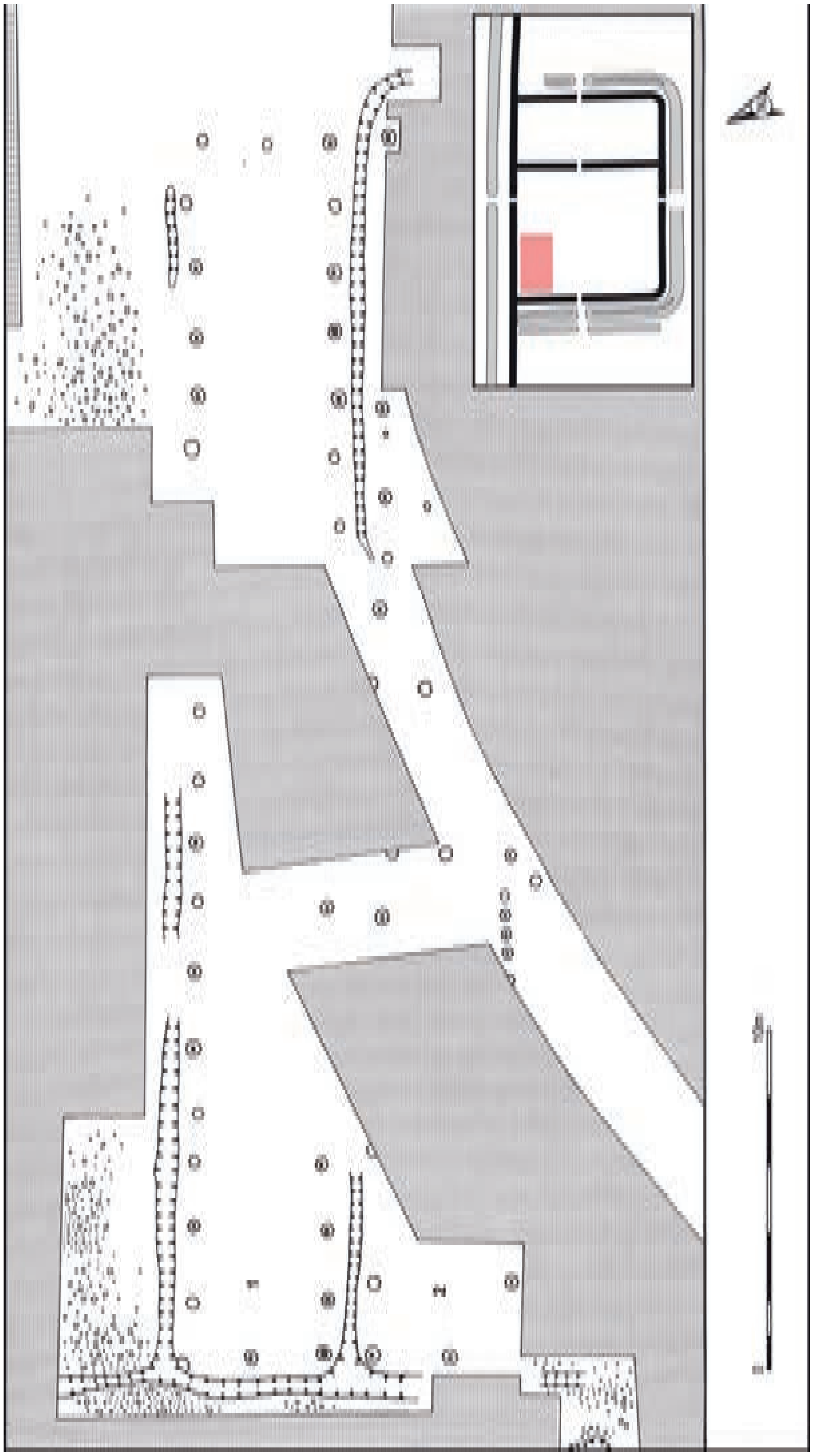


Illustration 3.2.28
Plan of buildings 1 and 2.

A sample taken from the eastern depression indicated that it had probably stayed open during the occupation of the fort, and the fact that the metalled surface extended down the northern slope lends support to this.

Both depressions lie on the line of the slight valley extending westerly through the annexe and into the fort. It is possible that they formed part of that valley. One or both depressions may have been used for water storage and this suggestion gains credibility from the metalling on the sides of both which supports a requirement for access.

3.2.7 Internal buildings

The post-pipes indicate that the structural timbers were 100mm–120mm square. The addition of daub to the wattles would have thickened the walls to perhaps 200mm. In view of this uncertainty, measurements are usually given from centre-to-centre of the post-pipe or post-hole.

Building 1

A timber building measuring externally 36.2m × 4.4m, except for the east wall which could be no longer than 4.05m (illus 3.2.27; 3.2.28 and 3.2.29). The posts were from 1.7 to 2.3m (average 1.9m) apart, and with no internal partitions found in spite of a considerable part of the building being examined. No internal floor survived. A gulley, probably always open, ran along the north side of the building, and flowed westwards into another gulley passing down the west side of buildings 1 and 2. Fragments of a drop hinge were recovered from the gulley (11.3.3.100). A coin of Trajan was found at the western end of the building (12.3).

Comment

Structures of this nature in Roman forts are usually interpreted as stores buildings.

Illustration 3.2.29
The west end of building 1 looking east.

Building 2

A timber building measuring externally 36.2m × 4.2m at the west end, though apparently narrowing to 3.9m towards the centre (illus 3.2.28). Relatively little of this building was examined and the interpretation of the remains as relating to a single building must remain a presumption. The spacing of the posts was not as regular as in most of the other timber buildings. It ranged from 1.7m to 2.3m mostly, but with 1.3m and 0.9m recorded in the north wall, while in one section of the south wall six post-holes were found where three might have been expected. Traces of internal subdivisions survived in the form of two definite, and one possible, post-holes. The two confirmed post-holes were 5m apart, a wider spacing than in the barrack-blocks, but this eccentricity matches the spacing in the external walls. The possible post-hole lay to the east. It did not lie at right angles to the north wall of the building and had no stone packing, simply a gravelly fill. The middle post-hole was doubtful because it was not fully excavated owing to lack of time.

The west end of the gulley between buildings 1 and 2 flowed west into the north–south gulley. The east end, traced for 13m from its western end, ran eastwards, turning south at the north-east corner of the building to pass along the edge of the *via praetoria*.

Comment

The existence of internal sub-divisions hints at the identification of this building as a barrack-block, but the irregular spacing of the post-holes is unusual and in general there are too many imponderables to allow for certainty of identification.

Building 3

A timber building 34.4m long and varying in width from 4.2m at the west end to 4.6m in the middle to 3.6m at the east end (illus 3.2.30). The posts in the north and south walls were set between 1.5m and 2.0m apart (average: north wall 1.7m; south wall 1.6m) though some of the posts in the internal partitions were 2.3m apart (illus 3.2.31). The building was divided into a series of

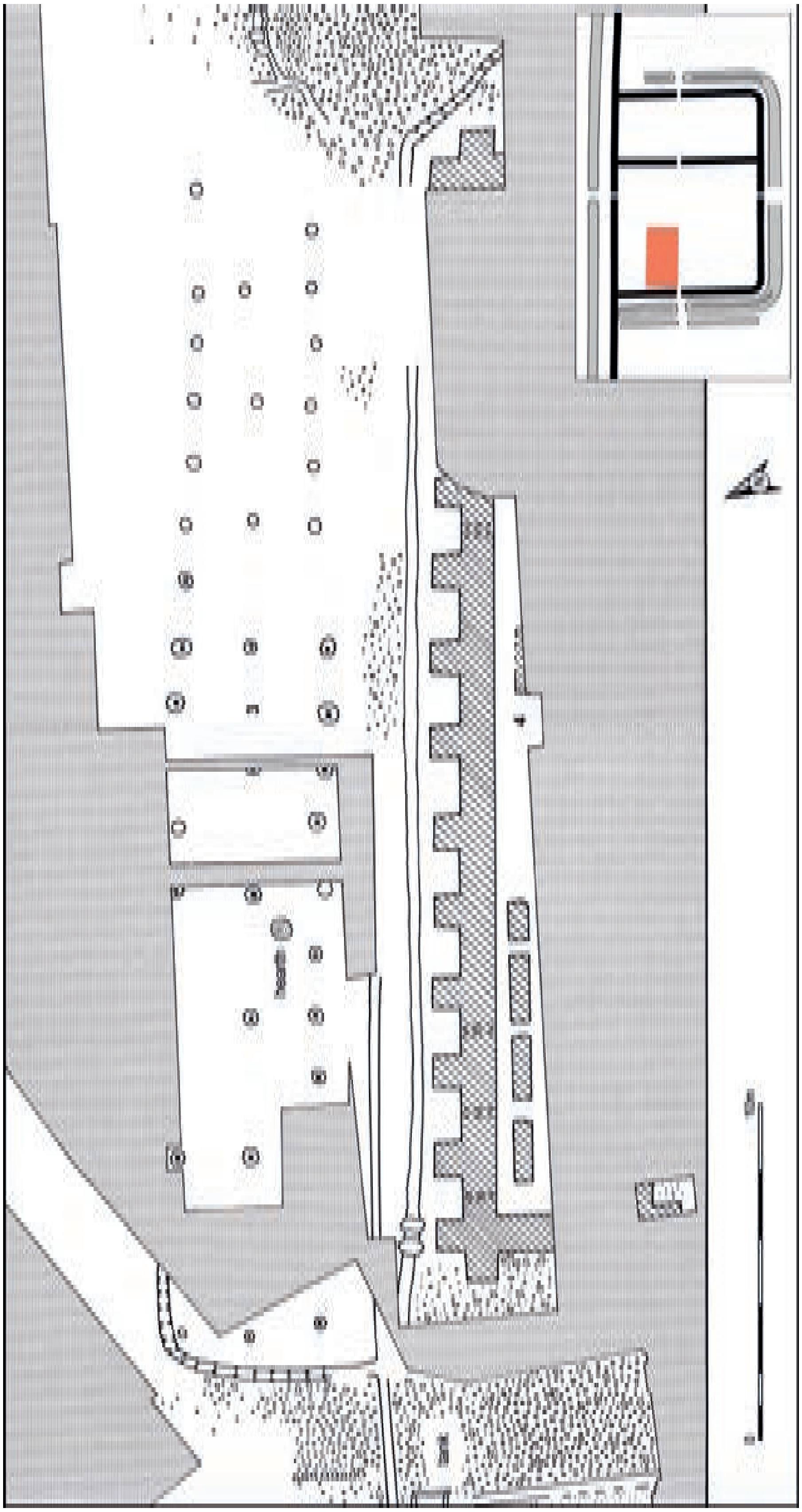


Illustration 3.2.30
Plan of buildings 3 and 4.

Illustration 3.2.31
A post-hole in building 3.

rooms: seven internal post-holes were recorded, and an eighth is presumed to lie beneath a baulk (the rooms were numbered from west to east 0–8). As the building narrowed from west to east, the rooms varied in size (table 3.1). The third room from the west (room 2) contained a hearth set into the base of a globular amphora (illus 3.2.32); it contained a fragment of samian, of window glass, and a coin, probably a *denarius* of Mark Anthony (7.1.2.9; 9.2.58; 12.1). The officer's quarters (room 0) produced fragments of a glass vessel and room 1 of a glass ?flask (9.2.32; 9.2.5).

An open gulley was noted outside the north wall of the building at the north-west corner but it did not reappear to the north of the east half of the building (illus 3.2.33). Another gulley was recorded outside the south wall of the building, and again this did not appear to run along the whole length of the block. The northern gulley lay very close to the north wall of the building, as in buildings 1 and 2, but the southern gulley was set at a distance of 1.5m from the south wall of the building. A possible bench anvil was found in the gulley to the west (11.3.1.90) and possibly part of a staple to support a drop hinge in the gulley to the north-west of the building (11.3.3.118).

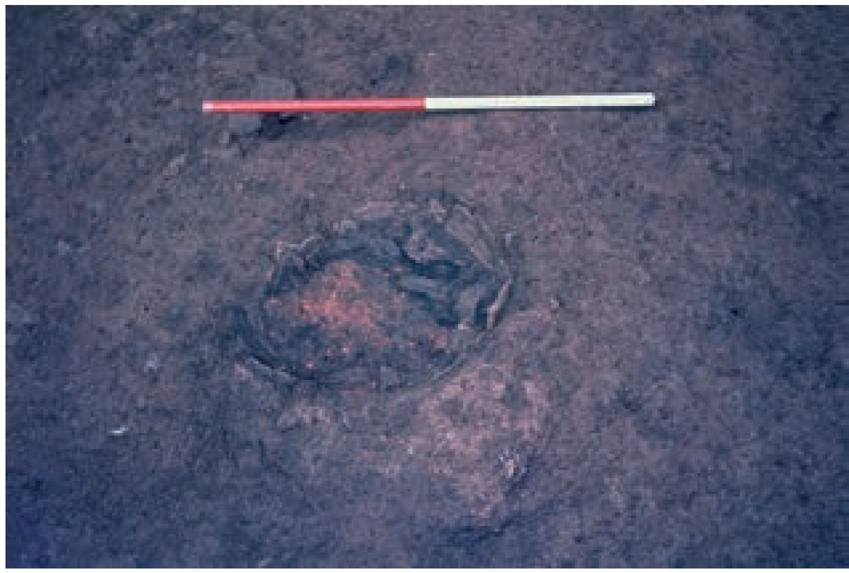


Illustration 3.2.32
The hearth in the base of an amphora.

Illustration 3.2.33
The north-west corner of building 3 showing the corner post-hole, drain and a patch of cobbling.

Table 3.1
Building 3: the size of the rooms

	From post-hole centres
0	5.2m × 4.0m = 20.8m²
1	4.0m × 4.3m = 17.2m²
2	3.5m × 4.3m = 15.0m²
3	3.6m × 4.0m = 14.4m²
4	3.5m × 4.4m = 15.4m²
5	3.6m × 4.2m = 15.2m²
6	3.4m × 3.4m = 11.2m²
7	3.2m × 3.4m = 10.9m²
8	3.0m × 3.3m = 9.0m²

Illustration 3.2.34
The north wall of the north granary looking west.

Building 4

A stone building, 32.7m × 5.5m externally (excluding buttresses), with walls varying in thickness from 0.9m to 1m (illus 3.2.30). Most of the north wall of the building was examined, and part of the interior by this wall, but otherwise only the north-east and south-west corners were located (3.2.34 and 3.2.35). Eleven buttresses were located along the north wall and a further three can be interpolated. The north wall continued at both ends in the form of a buttress, and presumably the same arrangement was followed on the south wall. A 2m length of the west wall south of the north-west corner was examined and no buttress was found: it seems probable therefore that there were only two buttresses on the west wall. This wall was set back from the intervallum street, while the east wall came right up to the *via praetoria*: it would appear therefore that the building was entered from the west, so the arrangement of buttresses on the east wall may not have been the same as on the west.

The buttresses, placed at intervals varying from 1.3m to 1.65m along the north wall, ranged in width from 880mm to 1m and in length from 780mm to 1m. In the three spaces between the four western buttresses were vents through the wall (illus 3.2.36). These vents, 100mm–140mm wide, started above the second course up and were at least three courses high. Both walls and buttresses were placed on clay and cobble foundations. The foundations of the walls were two cobbles deep, bonded with soft grey clay, while the foundations of the buttresses were three cobbles deep (about 200mm and 350mm respectively). Masons' chippings, mixed with soft grey clay, extended halfway up the second course above the foundations both inside and outside the building, and over this lay a layer of hard reddish-brown clay approximately 100mm thick.

The walls and buttresses survived in places up to five courses high. They were built of dressed sandstone blocks varying in length from 230mm to 410mm, and tapering back into the wall by 220mm to 420mm. The lower four courses had a uniform height of 160mm, but the fifth course, where it survived, was 220mm high. The joints were up to 150m wide. The occasional diamond-broached stone was used in the wall. This form of construction might best be described as coursed rubble (Hill 1981). The core of the wall was formed of rough sandstone pieces, up to the size of the facing stones, bonded in clay.

Comment

This building would be best interpreted as a barrack-block, with an officer's room at the west end and eight smaller rooms for the soldiers. The greater distance between the building and the gulley to its south in comparison to the north suggests that the building faced south.

Illustration 3.2.35
The north wall of the north granary looking south.

Illustration 3.2.36
The western end of the north granary looking south; the vent between the two buttresses is visible.

Within the building all or part of four short, low walls were located, 470mm–540mm from and parallel to the north wall. From the west, these were 1.8m, 1.9m, 2m and at least 1.2m long, and measured 600mm–660mm in width. The west wall survived to a height of three courses, 260mm. All these walls were more roughly built than the main walls of the building. The breaks between the dwarf walls were placed opposite the vents through the main walls. A layer of burning, 100mm thick, covered the red clay surface around the low walls and between them and the main walls (this was analysed, but with no result). There was, however, no trace of burning on the walls themselves. No evidence survived to indicate the form of flooring of the building.

To the north of the building lay a drain or gulley. Placed between 100mm and 300mm north of the buttresses, it measured between 300mm and 450mm in width and 160mm at its deepest. The drain lay wholly within the layer of red clay laid down over the masons' chippings. Along the edge of the drain, though not uniformly, lay waterworn cobbles, of various sizes and shapes. Opposite the west buttress of the north wall two capstones survived. These rested on roughly dressed stones, placed on top of the cobbles lining the drain. At the west end the drain continued in a westerly direction to pass through the intervallum road and the fort rampart. At the east end it turned in a south-easterly direction to cross the *via praetoria* (illus 3.2.37).

Illustration 3.2.37
The east end of the north granary looking south.

Comment

The plan of this building and the form of construction indicates that it was a granary. The floor, of timber or stone, would have rested on the low internal walls. It is likely that the deeper fifth course marked the top of the vents, the purpose of which was to introduce air to the space below the floor in order to help keep the food stored there dry and fresh.

Thirty fragments of tile were found in and around the building with a further 20 in the adjacent part of building 3 to the north. The implication would appear to be that the roof of the granary was of tile.

The capstones at the west end of the north wall are noteworthy. Open gulleys elsewhere within the fort were not lined with stones, which might be taken to imply that this drain had been covered throughout its length with capstones. However, the purpose of such a drain might be thought to have been to collect water draining from the roof and carry it away and so would have been open; perhaps the drain only had capstones at this particular point in order to aid foot or vehicular traffic in this area. It has already been noted that the substantial road at this point suggests the location of the loading bay at the west end of the granary.

The rubble from the granary yielded an inscription recording building work by the century of *Quint*. of the Twentieth Legion (5.2.1.1) and a quern (5.3.2.2), and the drain to its west an intaglio carved with a shrimp (10.2).

Building 5

A timber building 35.8m × 4.2m externally, though widening to 4.6m for its 4m long western section (illus 3.2.38). It was not possible to investigate all this building, two sections of the eastern part of the building being unavailable. The west end of the east part of the building examined failed to yield traces of post-holes. There had been modern disturbance of the ground here and as a result Roman features could have been removed; alternatively building 5 may have been two buildings.

The spacing of the posts in the western half of the building ranged from 1.6m to 2m. Three internal posts were

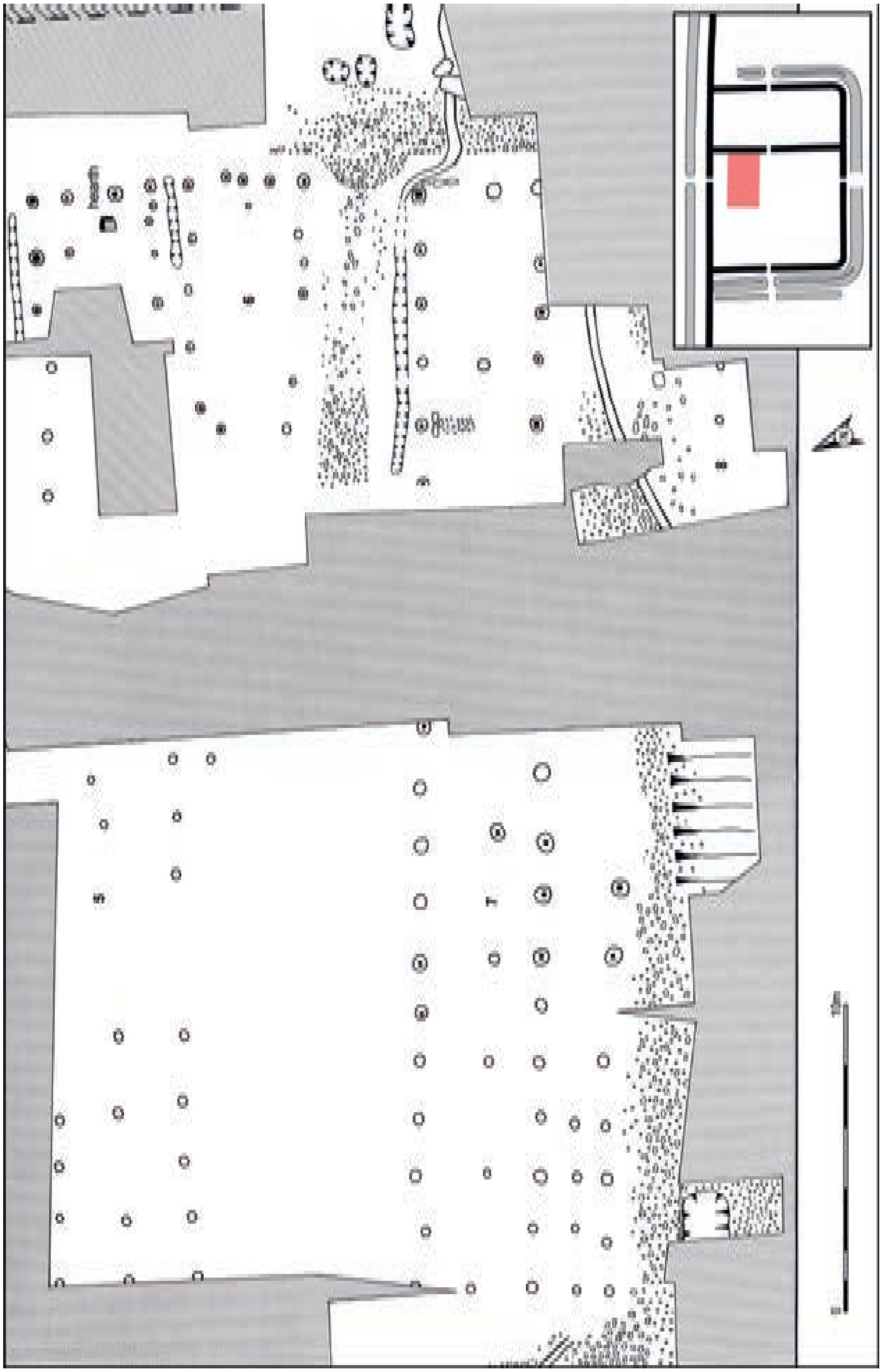


Illustration 3.2.38
Plan of buildings 5, 6, 7 and 8.

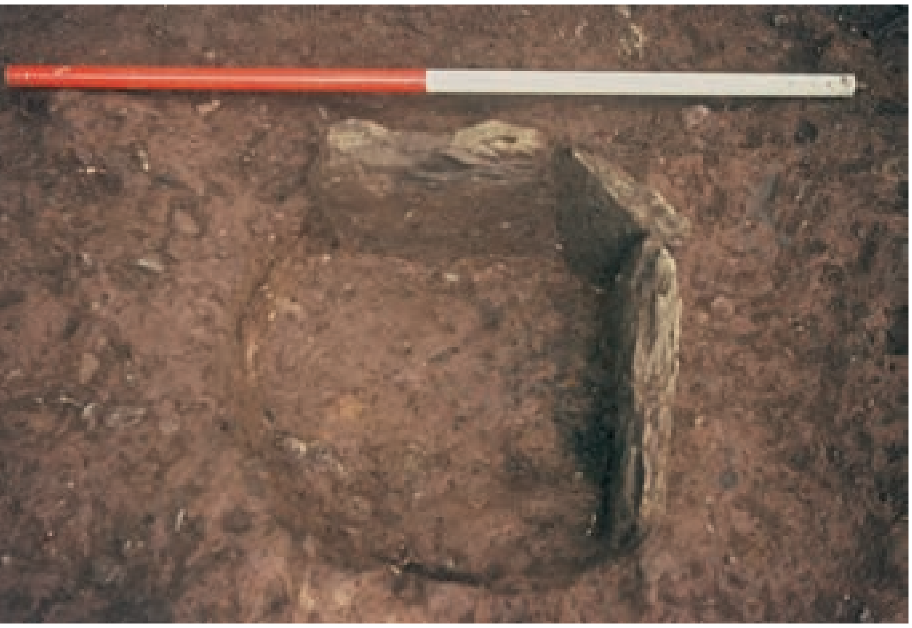


Illustration 3.2.39
The hearth at the east end of building 5.

noted, suggesting the existence of internal partitions, though irregularly spaced. The posts at the eastern end of the building were set closer together, with four posts instead of the normal three forming the end wall of the building. The distance between the posts varied from 1.1m to 1.9m. In the western part of this eastern end of the building, three possible post-holes were noted on the line of the north wall. These were no more than vestigial clumps of stones, which could have been the bottoms of post-holes. Within the eastern end of the building was one post, pointing to the existence of an internal division or structure, and a small hearth. This hearth was formed of a base stone, embedded into the surface of the natural clay and four upright stones surrounding it, two of which survived (illus 3.2.39); it contained a fragment of samian (7.1.2.12). There was a single post-hole to the south of the building on the line of an internal partition.

A gulley was located on the north side of the eastern end of the north wall of the building. It was severely reduced in size, and did not extend beyond the end of the building.

Illustration 3.2.40
Part of building 7 looking south-west.

Comment

The main problem with the interpretation of this building is the random nature of the partitions. While one 'room' was of normal width, the two each side were half the width. The single post-hole south of the building, in other circumstances would have been interpreted as evidence for a verandah.

Building 6

A timber building measuring externally 8.6m × 2.85m at the west end, widening to 3.9m at the east (illus 3.2.38). Careful examination failed to reveal any westward continuation of the lines of post-holes, with the single exception of a post-hole on the line of the north wall beyond the limit of those plotted on the plan. However, no post-hole closing the west end of the building was found. It is assumed that this was a shorter building than usual, the whole of it being revealed in the excavated area.

The distance between the posts varied considerably from 0.9m to 2.1m, the spacing being most irregular in the south and east walls. There were five posts in the east wall rather than the more usual three, though the second one south was only about half the normal depth, 180mm in contrast to 370mm–400mm. A single post-hole was located within the building.

Comment

The building was unusual in being so small and irregular. Various possibilities may be offered: it may not have been completed; it was part of the officer's quarters of building 5; it was a small stable or storehouse.

Building 7

A timber building, 36.2m × 4.2m externally, with posts set at intervals of 1.6m–2.0m in the north and south walls, with the exception of one long gap of 2.4m; the average between the post-holes was 1.85m (illus 3.2.38). All the building, with the exception of a central strip 7.5m wide, was excavated (illus 3.2.40). The building was divided into rooms, on the same lines of building 3, numbered from east to west 0–8 (table 3.2). A small patch of gravel floor survived in room 1. Most of the western half of room 0 was covered with a pink packed clay, partially overlain by burnt daub. Fragments of a glass cup or small bowl and part of a glass handle were found in this room, a coin in room 1 (12.6) and pieces of a glass flask or jug in room 6 (9.2.1; 17; 4).

Table 3.2
Building 7, the size of the rooms

	From post-hole centres
0	5.4m × 3.7m = 20.0m²
1	3.8m × 3.6m = 13.7m²
2	3.9m × 3.6m = 14.0m²*
3	3.9m × 3.7m = 14.5m²*
4	3.7m × 3.7m = 13.7m²
5	3.9m × 3.8m = 14.8m²
6	3.2m × 3.7m = 11.8m²
7	3.5m × 3.7m = 12.9m²
8	3.7m × 3.4m = 11.6m²

* The figures for these rooms have been interpolated

South of the western end of the building lay two rows of post-holes. The northerly row consisted of four post-holes, each opposite one of the main uprights of the building, while the southerly row contained seven post-holes, again opposite the main uprights: an eighth post-hole had probably existed, but was not located. The gap between the building and the southern row varied from 2.1 to 2.6m and the intermediate row was placed a little south of the central point of the gap.

South of the post-holes lay a metalled surface, generally formed of small sandstone pieces. This metalling approached closer to the eastern end of the building. Here, part of a drain survived, leading in a south-westerly direction from Room 0, and forming the south-east edge of the metalling. The drain was choked with burnt debris, which included rushes.

A gulley was traced along the outside of the north wall of Room 0. This turned southwards round the north-east corner of the building, before resuming an easterly course to pass through the intervallum road and the rampart.

Comment

This building is best interpreted as a barrack-block containing an officer's quarters at the eastern end and eight smaller rooms. The clay area within the officer's quarters may have been a floor, though this might seem unlikely in view of the gravel surface in the adjacent room.

The main additional row of post-holes at the west end of the building may have supported a verandah and the lack of a gulley immediately outside the south wall of the building may support this interpretation, though in that case it would be expected that the posts continued along the length of the building. The second row of posts may have been a replacement or an additional support for the building. The wider gap between the building and the gulley to its south compared with that to the north suggests that the building faced south.

Building 8

Two post-holes were located, 1.85m apart (illus 3.2.38).

Comment

These may have formed part of a small building between building 7 and the *via principalis*. However, the building could not have extended over the whole space between the intervallum road and the *via praetoria*, owing to the existence of two open depressions in the west part of this area. The post-holes were dug into the clay fill of the pre-Roman east–west depression.

Building 9

A stone building, only partially examined, and calculated as measuring 22m north–south by 5.5m east–west, excluding the buttresses (illus 3.2.42). The building was only located at two points, the south-east corner and the middle of the east side, in both places a buttress being revealed (illus 3.2.41). The east

Illustration 3.2.41
The south granary looking south.

Illustration 3.2.42
Plan of buildings 9, 13 and 14.

wall of the building was 1.05m thick and the south wall 1.1m. The buttresses were 1.62m apart, 1m wide and projected from the main wall by between 900mm and 1.05m. The walls and buttresses were constructed of sandstone blocks, similar in size and dressing to building 4. Only one course of wall, at most, survived, and this was placed upon a clay and cobble foundation. At the south-east buttress the only surviving facing stone projected for 130mm beyond the line of the foundations.

No walls or structures were discovered within the building, though an L-shaped mortar-filled trench, possibly a foundation, was attached to the inside of the east wall. This projected for 800m into the building and then turned south, this arm being 2.6m long. The east–west section was 800mm wide, and the north–south length 240mm: the depth varied from 50mm to 220mm. At the south end of the building a layer of cobbles, 1.3m wide ran parallel to, and 200mm north of, the south wall of the building. This strip of cobbles had well-defined edges, and was similar in construction to the foundations of the walls. Elsewhere a small patch of cobbles was noted, and here and there lay small areas of burnt debris. Two small, shallow (200mm deep) pits were also recorded.

Comment

The plan of this building proclaims its function as a granary. The strip of cobbles inside the south wall of the building may have been the foundations for a wall placed in the wrong location and/or subsequently moved, perhaps the south wall of the granary, or, as Geoff Bailey has suggested to me, it may have been related to the loading bay.

Building 10

This area lay in the centre of the fort (Bearsden 2), where, it might be expected, the headquarters building would have sat (illus 3.2.1; 3.2.44). Little of the area was available for excavation. At the north-east corner of the gap between buildings 9 and 11 lay a narrow open space surrounded by rhododendron bushes and conifers: this area was partially examined in two seasons and then in an effort to understand the surviving features was completely stripped in one season, together with small additional corners. The area contained a number of post-holes, a drain and a gulley, both running west-east.

Four post-holes lay in a line running north–south on the east side of the area (illus 3.2.44). Two post-holes were only 400mm apart. The southerly of the pair, which had a better stone packing than its neighbour, was clearly the primary post-hole for it was equidistant, 1.75m, from the next post-holes in the row and it lay below the fill of the east–west drain. The appropriate distance to the south, where a further post-hole might have been expected, was cut through by a modern field drain. A number of 'stake-holes' were also recorded in this area but they made no pattern. Nine such holes were recorded, each about 100mm–120mm deep and 100mm or less in diameter.

The post-holes of the second row were on an east–west alignment extending westwards from the centre post-hole of the north–south alignment; they were at the 'double distance' apart, 3.66m and 3.8m. The central post-hole lay on the northern edge

Illustration 3.2.43
Part of building 10 looking north showing the relationship between the post-holes and the gulley.

of the drain but was not covered by an edging stone so its post could have been contemporary with the drain. It was covered by a small patch of burning. A further post-hole lay 1.2m north of this middle post-hole.

The presence of stone packing in several post-holes, and in one instance a post-pipe measuring 100mm × 120mm, demonstrates that timbers once stood in these post-holes and had not been removed by rocking to loosen them.

In the southern part of the area damaged cobbling with some overlying gravel survived. The cobbles extended eastwards up to the west wall of building 11. Smaller patches of cobbles and gravel were noted to the north of the drain, including to the east of the most easterly row of north–south post-holes.

Running east–west through this area were a drain and a gulley (illus 3.2.43). The drain, which fell to the east, varied in width from 1.4m to 2.5m, and was formed of roughly dressed sandstone blocks, about 250mm × 300mm × 150mm high, laid on the clay sub-soil. The fill of the drain varied. In one section it consisted of compacted brown sandy gravel; elsewhere a patch of burnt daub overlying the drain and the area immediately around it also formed the fill of the drain; while in a third place the drain was filled with loose silty soil. A number of Roman pot sherds were recovered from the drain. At one point three small flagstones covered the compacted brown sandy gravel filling the drain. It continued for 1.4m westwards from the most westerly post-hole hinting that there may have been one or more posts to the west.

About 1m south of the drain, and not quite parallel to it, ran a shallow gulley, some 250mm wide and between 20mm and 50mm deep. This was traced for a distance of 10m, both west and east ends within the trench unfortunately being damaged by

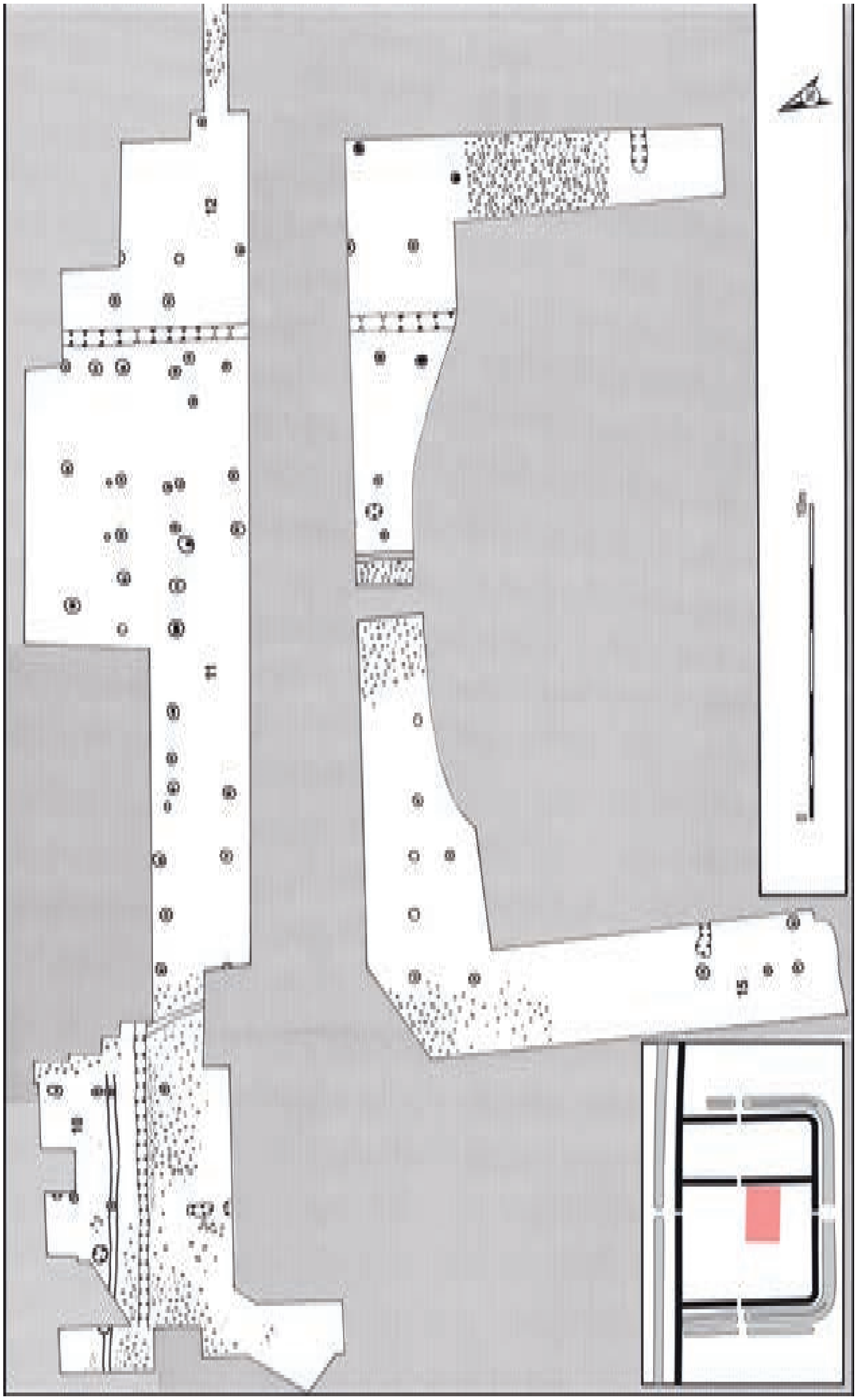


Illustration 3.2.44
Plan of buildings 10, 11, 12 and 15.

later disturbances. Two slight depressions, 3.2m apart, were noted within the gulley, 100mm and 140mm deep. No function can be suggested for this gulley, which, in view of its insubstantial nature, is unlikely to be structural.

Comment

The posts running through this area presumably form part of a timber building. All that can be said about the lay-out of this building is that it was aligned with the other fort buildings. The gulley may have been an eavesdrip along the southern wall of the building. Cobbling survived south, north and east of the post-holes and gulleys. The remains of the building were too fragmentary to allow any interpretation of its function. Further comment lies in the discussion of building 15.

Illustration 3.2.45
General view of the building 11 looking west, with two post-holes of building 12 in the foreground.

Building 11

Three areas, little more than trenches, were opened up south of Roman Road in the centre of the large enclosure (3.2.1 and 3.2.44). Their size and location were governed by the adjacent modern features, the car-park, the trees and shrubs and the north boundary wall of Maxholme (illus 3.2.45). The pattern of the post-holes was interpreted as belonging to two buildings, 11 and 12.

The northern area was distinguished by a complexity of post-holes with the three main lines running east–west but others north–south (illus 3.2.45 and 3.2.46). Many post-holes were the normal 1.8m–2m apart, but 1.4m separated some. Two substantial posts in the centre of the main east–west row were 2.6m apart. An unusual feature was a small additional post beside four uprights. This area was bounded to the west by an area of cobbling and to the east by a gulley. The area to the south and west contained a main row of post-holes aligned east–west, but with two post-holes further south. The clay surface contained many small stones, but an area of sporadic cobbling at the north-west corner of the trench did not extend east of the post-holes. At the east end of the trench was a second area of cobbling.

Running through the right-angular area to the west, on a roughly north–south alignment were two modern intrusions up to 190mm deep, containing modern glazed pottery and interpreted as possible bedding trenches. These were not deep enough to have definitely removed all traces of post-holes should they have been present on this line, but none were found. The main line of four post-holes aligned east–west was continued by a possible post-hole, much shallower than the other main post-holes, differently filled and, although in line, not at the correct spacing.

The right-angular area to the east contained a number of post-holes, the eastern edge of the presumed building being defined as a continuation of the north–south gulley noted to the north. At the west end lay a patch of cobbles bounded to the east by a gulley.

Comment

The complex of features in these three areas was interpreted during the excavation as a timber building consisting of three ranges surrounding a courtyard of gravel edged by an eavesdrop, measuring 19.2m east–west at its northern end and 19.80m to the south. It is unfortunate that the restrictions on the areas excavated resulted in so many problems of interpretation.

The west range was 3.6m wide at the north end and 3.9m at the south and at least 8.3m long. This may have formed one room, or have been divided into two: the evidence lay under trees. There is some evidence to suggest that the range continued southwards. One post-hole was at the correct distance to the south of the western external wall, but a second post-hole on the eastern wall was only 1.1m south. This, however, was only slightly smaller than the 1.3m between two post-pipes on the eastern wall of the building and elsewhere within the building. Unfortunately, modern intrusions obscured the possible site of a post-hole in the western wall; indeed they may have removed three post-holes. Against that was the relative shallow depth of the modern cut and the fact that the post-holes ought to have lain on the edge of the intrusion and have been at least partly visible, as was the post-hole towards the northern end of the intrusion. It is not clear, therefore whether ‘building’ 15 formed part of building 11.

Illustration 3.2.46
The north-west corner of building 11 looking west.

The eastern range was of the same dimensions as the western, though as the post possibly forming its north wall was eccentrically placed, the room may have continued to the north wall of the building. Again, a single post-hole on the outer wall of the building and south of the east–west partition suggested that it extended further to the south.While it could not be ascertained that the whole of the north range was uncovered, what survived was sufficient to indicate a range 3.6m wide, the difference being that this range was divided longitudinally.

There is some evidence to suggest that the south limit of the building lay on a line with the south end of building 12. To the south of building 12 a strip of cobbling was interpreted as a road surface. This would be in the appropriate location for the *via quintana*. Support for this interpretation lies in the gap between the west walls of buildings 11 and 15 where no post-holes were found, coupled with the fact that the suggestion that they were removed by modern intrusions is not wholly satisfactory. The northern range had its own complications. It appeared to contain a longitudinal partition and the addition of smaller post-holes adjacent to the main uprights. The two northern corner posts of the veranda were paired by such small post-holes on the inside of the colonnade, and three of the four posts forming the south wall of the north range were similarly paired. The subsidiary post-holes were both narrower and shallower than the adjacent main uprights. Geoff Bailey has suggested to me that they may have held door frames. To the east the exterior wall of the building, towards its northern end, seems to have contained more post-holes than usual. Two post-holes, 1.6m apart, lay 2.15m parallel to and outside the east wall of the building. These post-holes were of average depth. The existence of these posts might suggest the presence of an upper storey at that point, but otherwise, their function is unknown.

Four post-holes survived which indicated that the east and west ranges of the building surrounded a veranda. The two posts were missing which would have confirmed that the veranda also ran along the north range. In the south-east corner one stone kerb survived, bounding the gravel surface of the courtyard, with an eavesdrip beyond.

The (main) entrance to the building from the courtyard appears to have lain in the centre of the putative north veranda for the gap between the two centre posts was greater than normal at 2.6m with the spacing to each side about 1.4m.

There was considerable variation in the depth of the post-holes in the building. Generally the deepest were those forming the verandah colonnade. This might suggest that they supported a greater length of roof on one side of a ridge running along the centre of each wing. However, elsewhere there was no clear relationship between load-bearing and depth of post-hole, so the suggestion must remain unproven.

No pits, hearths, or other features were located within the building.

In the absence of internal features the only clue to the function of this building lies in its plan. The courtyard arrangement and its position in the central range of the fort and to the right of the normal location of the headquarters building at first suggested that this was the commanding officer's house. However, even the smallest commanding officer's houses normally appear to have contained four ranges of rooms round a courtyard, not three. In plan, the closest parallel to this building is the workshop at the legionary fortress of Lambaesis in North Africa though the two buildings are very different in size. Both buildings consist of three ranges round a courtyard, and this arrangement is reflected in the workshop at Inchtuthil in Perthshire, where, though, there is a wing of different plan along the fourth side of the courtyard (Johnson 1983: 184, figs 138 and 139). The conclusion was therefore reached during the excavation that this building was likely to have been a workshop, notwithstanding the lack of evidence for industrial activity within it.While the post-excavation work was being undertaken, Geoff Bailey suggested that the structure examined was the courtyard of a headquarters building placed in the centre of the original enclosure (Bearsden 1). Further discussion of this interpretation is below under the comments on building 15.

Building 12

A timber building measuring 3.8m east–west by at least 11m north–south, with the post-holes 1.9m apart (illus 3.2.44). One internal feature was noted, a post-hole situated by the east wall towards the south-east corner. An open gulley lay between buildings 12 and 11 and between the gulley and building 12 were two post-holes, 1.7m apart. A single post-hole appears to mark the southern wall of the building and its interpretation as such was strengthened by the existence of a metalled surface 6.3m wide to its south (illus 3.2.24). It is not impossible, however, that the post-hole and the metalling lay within the building, though this is unlikely in view of the fact that the metalling appeared to extend beyond the line of the projected eastern wall of the building.

Comment

The building is devoid of features which might aid interpretation. Similar long narrow buildings are usually interpreted as storehouses.

Buildings 13 and 14

The area of these putative buildings was excavated over two seasons in difficult conditions among the greenhouses of Maxholme (illus 3.2.42). The surface was very compacted making recognition of the post-holes difficult and this was compounded by the unusually narrow diameter of many of the post-holes and the frequency of modern post-holes and other intrusions (omitted from this plan). Furthermore, while lines of post-holes can be recognised, their interpretation is fraught.

All definite and possible post-holes are included on the plan. The possible post-holes included four shallow examples which were aligned with other definite features, rendering their interpretation as post-holes more acceptable. Six east–west lines of post-holes were recorded. These fell into two groups. The southern two rows were the normal 1.6m apart, while the four northern rows were only about 1m apart. The two northern rows ended within the area of the excavation, not continuing up to the west baulk, in spite of the lack of modern intrusions. The four south rows appeared to continue westwards under the baulk. A single post-hole lay 2m to the north of the northern row, and a further 1m to the north lay a shallow east–west gulley, broken at one point, where two lines of stones led south.

To the east of the post-holes lay a road surface. At one point this was overlain by a thin layer of burnt wattle-and-daub (illus 3.4.47). There was a clear edge to this, on a line with the second row of post-holes from the south. Elsewhere, three areas of metalling survived, though all were badly decayed. One lay between the third and fourth rows of posts, the second around the middle post-hole of the sixth row and the third just south of the gulley and to the east of the eastern row of stones.

Comment

These rows of post-holes do not clearly define one or more buildings. There is some indication that two buildings are represented by the post-holes, insofar as the posts in the two buildings are differently spaced and there is metalling between the two groups. However, the burnt wattle and daub, presumably the remains of a wall, lines up with the second row from the south and may indicate that this is the edge of the building. As it overlies the road, it is likely to be the east wall of building 14. The two southern rows may therefore represent one building. The close spacing of the third row from the south is similar to that in building 13 and therefore may be part of that, notwithstanding the metalling between the third and fourth rows from the south. The northern collection of post-holes is reminiscent of the plan of a timber granary, the closely spaced post-holes containing the supports for a floor.

In conclusion, it is not possible to be certain about the extent of buildings 13 and 14 though the two groups of posts do appear to represent two buildings.

The metalling to the east of building 14 was interpreted as the *via decumana*. It was 9.2m wide, appropriate for one of the major roads of the fort. The metalling between buildings 13 and 14 would therefore be a path leading off the *via decumana*.

Building 15

Four post-holes forming a right-angle were located to the south of building 11 (illus 3.2.44). To the east of the most northerly post-hole lay an irregular depression which extended eastwards under the baulk. It was 600mm wide and 180mm deep and contained dark grey soil flecked with charcoal and flecks of orange burnt daub and was overlain by a patch of burnt daub.

Comment

The posts may be part of a building running east–west. Such a building must have been a minimum of 3m wide, but it did not extend into the trench 7.5m to the south. Traces of the building were also sought in the next trench to the east, though without success. Here a depression, 440mm wide, lay immediately south of the metalling south of building 12 in the eastern part of the trench. Filled with grey-brown clayey soil, it was covered by large

Illustration 3.2.47
The *via decumana*, following the removal of the burning, with the post-holes of building 14 beyond, looking west.

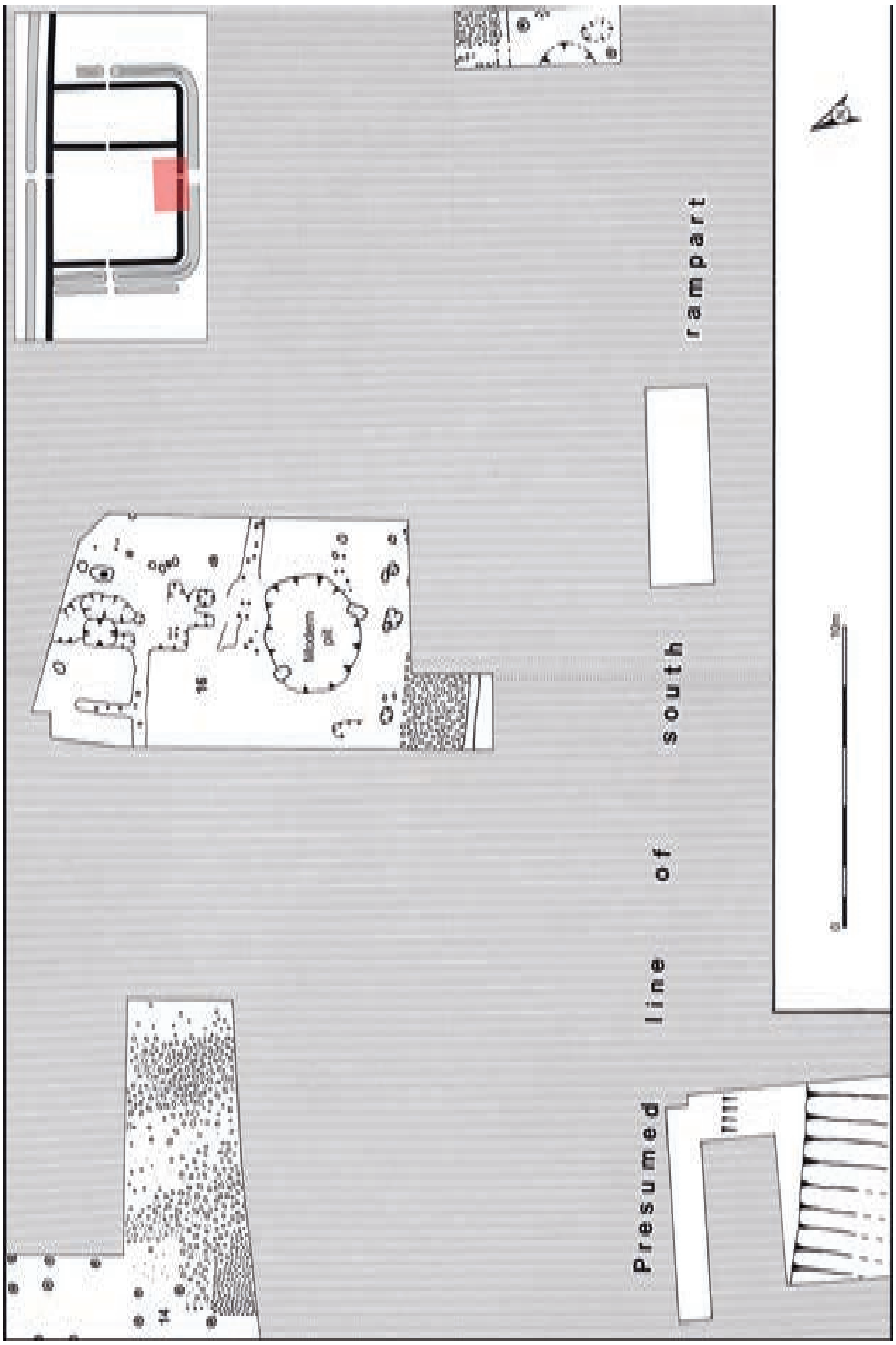


Illustration 3.2.48
Plan of 'building' 16 and the south intervallum.

rounded stones. It did not appear to have been part of a building, and perhaps could be interpreted as a gulley. The *via decumana* presumably formed the furthest possible limit of the building to the west.

The alignment of the irregular ?gulley on the most northerly post is suggestive of a construction trench, but its contents gave no indication of its function, though the charcoal and daub in its contents may suggest a late date.

Comment on buildings 10, 11 and 15

The linking of building 11 and 15 as proposed by Bailey has much to commend it. The corner termed 'building' 15 is due south of the west wall of building 11. The northern post-hole of building 15, Bailey suggests, could define the north wall of the range of rooms at the rear of the headquarters building. There is ample space between buildings 11 and 15 for a cross-hall. The overall dimensions of the building would have been 23.5m north–south by 19.7m east–west.

There is clearly a courtyard in the normal position for a headquarters building. The unusual feature here is that it appears to be surrounded by ranges of rooms to the west, east and north. At Mumrills, Balmuildy and Cadder the courtyard is flanked on two opposing sides by such ranges, but not on the north. Bearsden would therefore be unique. A further suggestion by Bailey may deal with this point; this is that the most northerly post-holes do not form a northern range but were part of a forehall which extended to the west to embrace building 10. A forehall usually consisted of a central nave with an aisle to each side and the location of the post-holes in both areas would allow such an interpretation. This proposal is discussed further below (21.3.6).

Building 16

This was the largest area examined in the south-east corner of the fort (illus 3.2.48). Clear evidence was found for Roman activity, but no recognisable buildings were located. The Roman levels were damaged by a large pit, field drains and modern services.

North of the modern pit and in the centre of the trench lay an area of decayed stone rubble. Consideration was given to this being the floor of a building, but on excavation it proved to correspond closely to the areas of pits and gulleys, and may have survived through subsidence into these: it did not appear to have any structural significance. There were some small patches of burnt debris here, but the concentration of burning was greater south of the pit.

Removal of the stone debris and the burning revealed pits and gulleys at the north end of the trench, and several distinctive small pits at the south end (illus 3.2.48). Towards the north-west corner of the trench lay a gulley running east–west with, at right angles, a smaller gulley running north. Both contained a similar fill, dark soil with stones, decayed rubble and burnt debris. Both also contained stake-holes ranging in diameter from 50 to 80mm. If these were construction trenches, it is unlikely that they were original in view of their filling. No substantial post-holes, which it might be thought would have been required for a building, were located, and it seems possible that the stakes supported a fence.

A third gulley, lying immediately to the north-east of the large modern pit, also contained a mixed fill of dark soil with some burnt daub and charcoal. There were also several stake-holes in it and, at the east end, two possible post-holes.

The northern part of this area also contained several small pits, the larger about 1m square and 700mm deep. These pits contained dark soil, stone rubble and frequently burnt daub and charcoal.

The pits in the south part of the trench were different. They were smaller, but deeper, one achieving a depth of 760mm, and the proportion of burnt material was much higher than in the other pits (illus 3.2.48 and 3.2.49). The fill of four of these pits consisted wholly of burnt material including charcoal and daub. One pit, measuring about 600 by 680mm and containing a burnt fill, had a deeper and smaller pit in the corner with the same

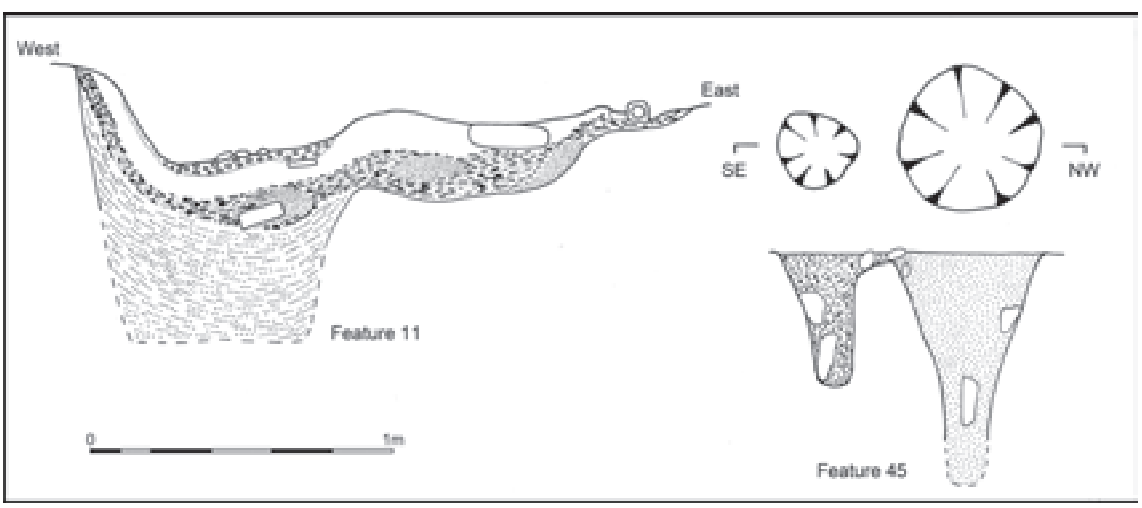


Illustration 3.2.49
Section of pits in 'building' 16.

fill. A little to the east, two adjacent deep pits contained, in one case, grey soil, and in the other a grey/black soil with burning.

Comment

No positive buildings could be identified in this area, though the occurrence of stake-holes in trenches may point to the existence of fences or palisades. The many small pits indicate some activity, but the precise nature of that activity could not be determined. The pits in the north part of this area are reminiscent of those recorded during the laying out of the gardens, described as being 'from 30 to 36 inches [760mm–914mm] in diameter and similar in depth. In the bottom there was usually or always some ashes or charred wood' (Macdonald 1911: 164; 1934: 325). Macdonald considered that they were probably post-holes and suggested that 'the description . . . is given from memory after the lapse of a good many years', and therefore possibly wrong.

3.3 THE ANNEXE

3.3.1 The bath-house

This building was discovered in 1973 and immediately offered into the care of the Secretary of State for Scotland (illus 3.3.1 and 3.3.2). As the developers did not wish consolidation to proceed until their plans were more advanced the building was placed under a protective cover. This was removed in 1979 when excavation of the building resumed and consolidation commenced. The excavation took two seasons to complete and thereafter small-scale examination continued sporadically for a further two years as required in advance of consolidation and when the area in care was extended to include the whole of the changing room (illus 22.37–22.39). The consolidation, landscaping and interpretation of the bath-house and latrine has been discussed elsewhere (Breeze 1983b; 1984a: 64–7).

The primary bath-house

Immediately north of the hot room of the heated range (the *caldarium*), an earlier stone structure was located in 1979 and excavated in 1980. This proved to be part of an earlier bath-house (illus 3.3.3, 3.3.4 and 3.3.5).

The room measured internally 4.24–4.3m east–west, above the offset – it widened slightly to the south – by 4.88m–5.08m north–south, widening to the east (illus 3.3.4). There was an offset 40–100mm wide on the inside face of the east wall, above the seventh course up. Elsewhere only two buttresses survived to sufficient height to retain evidence for offsets. Nevertheless it seems probable that some walls and buttresses were insufficiently wide to be reduced any further in thickness by offsets. The impression is that the construction of the walls commenced in a rather haphazard fashion, and then the correct internal size for the room was obtained by the judicious use of offsets: the maximum variation in the width or length of the room was 4%.

A short wall projected into the building on both the west and east walls. Externally there was a buttress in the middle of the east and west sides and two buttresses at each corner, with the exception of the south-west corner where there was only one. The lack of a buttress in the north wall is readily explained by the presence of a furnace. The lack of a buttress in the south wall is probably to be associated with the absence of a south-projecting buttress at the south-west corner and indicates that the intention was to attach the room to a building extending in a southerly or westerly direction. The construction of the later bath-house to the south may have destroyed buttresses in the south wall.

The foundations of this room were nowhere examined. The walls survived to a maximum height of ten courses, seven of which were below ground level (illus 3.3.7). Although the south wall had been severely robbed, at least one course of masonry still remained and this was not removed. The walls below ground level were built within a construction trench rarely 150mm wider than the wall itself. On the west side of the room, however, an irregular scoop, about 1.4m wide and 300mm deep had been excavated outside and along the wall in order to facilitate building.

The walls varied in thickness, below the level of the offset, from 670mm to 980mm. The east wall, above the offset, was 800mm wide. The buttresses projected from 720mm to 880mm from the main walls, and ranged in width from 780mm to 960mm. All walls were built of dressed sandstone blocks. The core was formed of sandstone pieces bonded with clay. Most courses had a uniform height of 200mm, but some were thinner. The beds were generally less than 10mm wide, but the joints were less well prepared and might be twice as wide. Longer stones were employed at the corners, some being the complete length of the buttress. Nearly all the stones used in this room were diamond broached. The standard of masonry displayed in this room was the highest seen on the site. Nevertheless this work is still best described as coursed rubble (Hill 1981).

The north wall was broken for what was clearly a furnace (illus 3.3.5, 3.3.7, 3.3.8 and 3.3.9). The sides of the opening were formed by large sandstone blocks measuring 650mm × 500mm × 250mm thick. To the west the first stone of the arch survived. Projecting northwards from both sides of the opening were the cheeks of the furnace, each formed of stones similar in size to those flanking the opening itself.

Two short walls, facing each other, projected into the room from the east and west walls. Smaller than the external buttresses, the western measured 700mm × 550mm wide, and the eastern 550mm × 660mm wide.

The natural clay, which lay at the level of the sixth and seventh courses up, was intermittently covered with mason's chips. Resting on these, a little to the south of the centre of the room, was a hearth (illus 3.3.10 and 3.3.11). This was formed of two base slabs, now fractured, and two or three smaller stones with small slabs set on edge forming the kerb. The base slabs lay on a skim of burnt debris which in turn overlay wedges of clay about 15mm thick used to level up the hollows below. Burnt debris lay within and around the hearth, up to a depth of about 100mm. A samian sherd was found below the flags and a further two, together with a sherd from a mortarium made by Sarrius, in the burnt debris (7.1.2.45; 46; 47; 7.3.7.49). Fragments of flagons lay on the floor of the room and in the robber trench

Illustration 3.3.1
A general view of the bath-house in 1973 looking south-east.

Illustration 3.3.2
A general view of the bath-house in 1973 looking north-west.

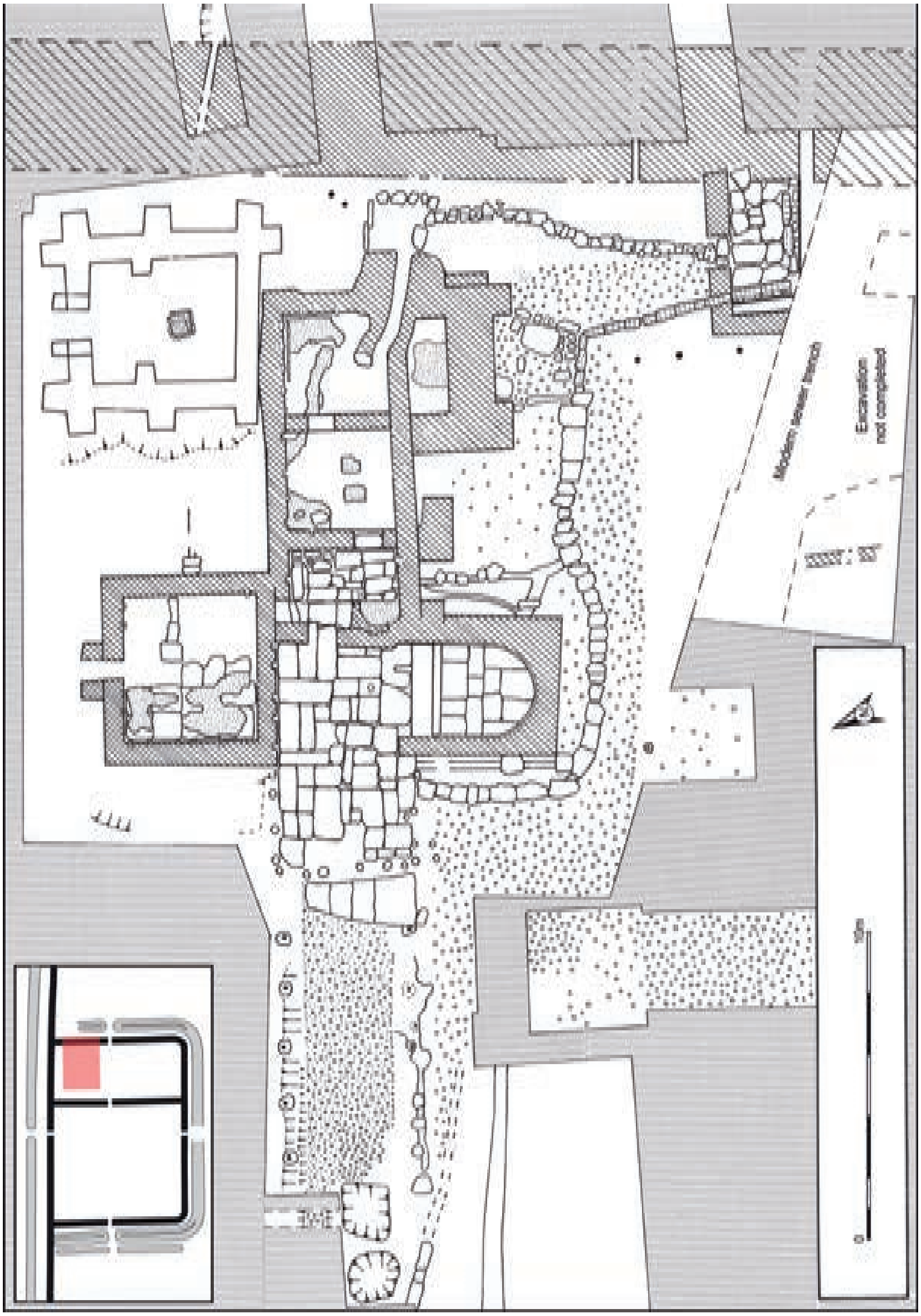


Illustration 3.3.3
Plan of the bath-house at floor level.

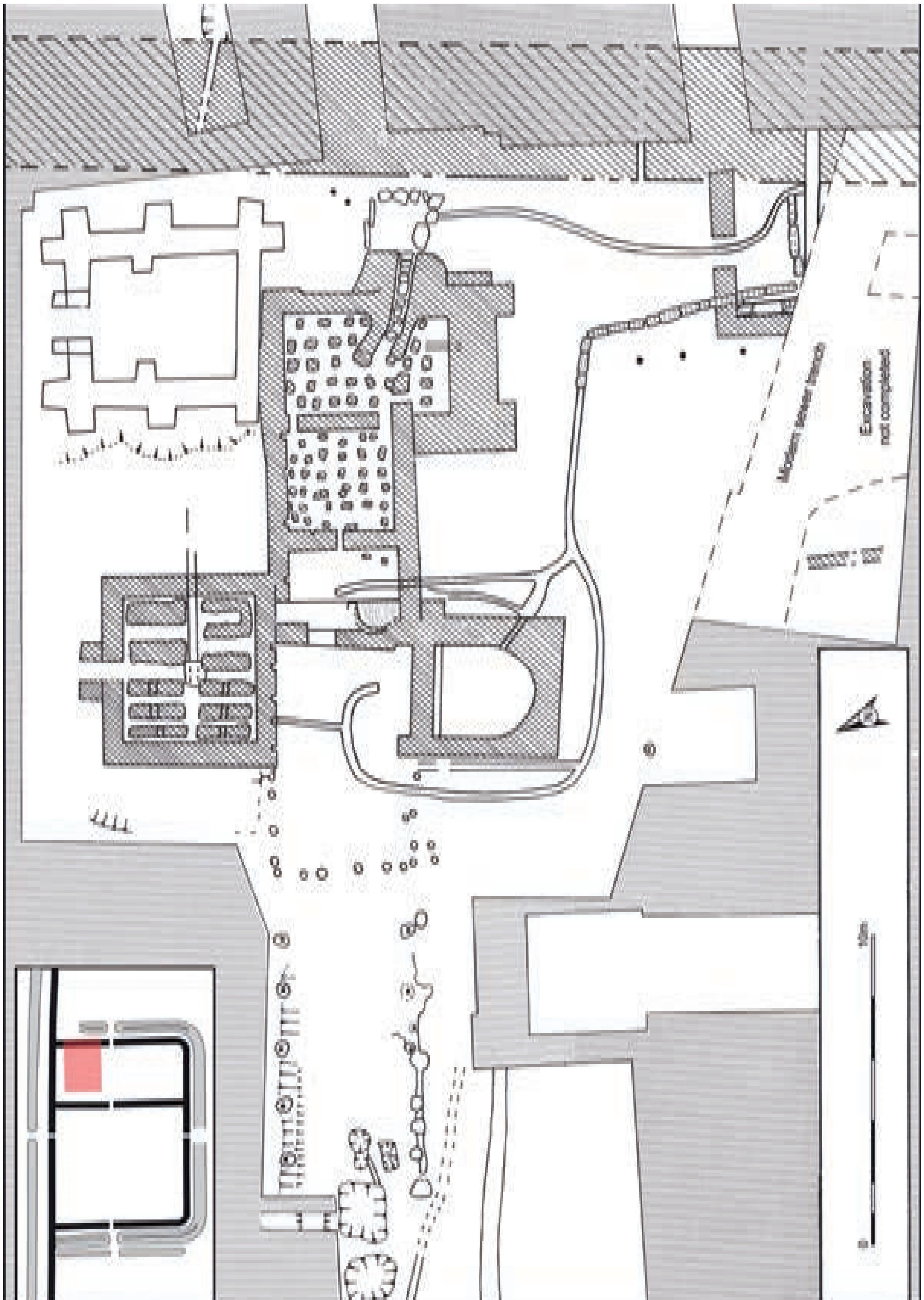


Illustration 3.3.4
Plan of the bath-house at basement level.

Illustration 3.3.5
The primary bath-house looking south following completion of the excavation.

Illustration 3.3.6
The north-east corner of the primary bath-house.

of the south wall, while the burnt debris included fragments of glass and the shank from a button and loop fastener (7.2.3.2; 3; 9.2.39; 40; 11.1.9). The south wall had been robbed down to the bottom course in places, and the southern parts of the east and west walls were robbed down to the third course up. The robber trenches were filled with sandstone chips, lying in grey clayey soil at the bottom and, above an iron pan level, in sandy soil (illus 3.3.27). This debris, consisting of packed sandstone chips and discarded dressed stone also filled the construction scoop to the west of the building. Finally, a layer of rubble covered the site of the room up to a thickness of 400mm–500mm. The rubble contained 38 voussoirs, 14 complete with the others damaged (5.2.2)

Comment

This was clearly intended to have been a heated room. The great depth of the walls, coupled with the external buttresses, at first suggested the possibility that this was to have been a watch-tower, but the discovery of the opening in the north wall, undoubtedly a furnace, indicated its function. The discovery of the voussoirs explained the existence of the buttresses; the roof of the room was a barrel vault of the type favoured by the

Romans in bath-houses. The fact that many of the voussoirs were found broken suggests that the roof had been erected before the building was demolished. However, the room was not completed for the basement had not been excavated. Instead, before that event took place plans were changed and the room put to a secondary use before demolition. The secondary use would appear to have been as a shelter, possibly even mess room. Although no cooking debris was recovered from the burnt material in and around the hearth, the presence of fragments of a flagon in the debris and of a second in the fill of the robbed wall suggests drinking. The room was then demolished, most stones being removed for use elsewhere, and debris left on the site. Thereafter the area seems to have been abandoned and not re-used by the Romans.

While the building has been referred to as a room, it is possible that it contained two rooms divided by the internally projecting walls. These may have marked a division between a hot room to the north and a warm room to the south (Bailey 1994: 302). The hot room would have been unusually small, even for an Antonine Wall fort, while no such walls appear in other bath-houses on the Wall.

Illustration 3.3.7
The stoke-hole in the primary bath-house looking south.

Illustration 3.3.8
The stoke-hole of the primary bath-house looking west.

The secondary bath-house

The main bath-house contained seven rooms, eight if the hot bath is considered as a separate room (illus 3.3.3 and 3.3.4). It was built of both timber and stone, the two westernmost rooms being constructed of timber. The land sloped from north to south and from west to east. Use was made of this by the builders. The hot dry room and the heated range were excavated into the north slope, while the cold bath to the south was built up from the original ground surface. The floor of the changing room was laid directly on the subsoil, being excavated into the slope on the north side. All the floors sloped a little to the east, which also aided the shedding of water. The main entrance to the bath-house appears to have been from the west, where a gravel path, 700mm wide, led to the north-west corner of the building. The stone walls were all bonded with clay.

Illustration 3.3.9
The stoke-hole of the primary bath-house looking east.

Illustration 3.3.10
The primary bath-house looking south showing the burning around the hearth.

Illustration 3.3.11
The hearth in the primary bath-house.

The bath-house was cruciform in plan. The main axis was 28m long externally, and the width varied from 4.5m at the west end to 5m at the east (minus the hot bath). The main spine fell into three roughly equal-sized parts: the changing room, cold room and heated range. The hot dry room and the cold bath were placed approximately in the centre of the building, to each side of the cold room. As the purpose of each room is self-evident, they have all been named rather than given arbitrary numbers.

The changing room (apodyterium)

This room was of timber throughout. It measured 9m or 10m by 4m. Two phases were recognised in this room, but building in individual post-holes rather than construction trenches prevented the satisfactory elucidation of its development.

Only one phase was found in the north wall, which contained five main timbers. These were embedded in well-constructed post-holes, up to 640mm deep, 1.7m–1.9m apart, with a gap of 2.2m between the east post and the east wall of the room (illus 3.3.12). The post-holes lay about 500mm north of the north edge of the internal gravel floor, the four west examples being placed on the steep slope rising to the north.

The south wall exhibited two phases (illus 3.3.13 and 3.3.14). Five post-holes of the first phase were traced, 2m–2.3m apart, and traces survived of a possible sixth. No packing stones were visible on the surface at any of these post-holes and excavation demonstrated that they contained a fill of brown soil and the occasional stone, but with no post-pipe visible. It would appear that the timber upright had been removed from each post-hole, assuming that it had ever been inserted. A small trench ran along this line. About 150mm wide and 70mm deep, it passed over the top of one post-hole indicating that it was later. Only four stake-holes were noted in this trench, two central and two towards the south side.

The second phase in this wall was represented by post-holes containing well defined post-pipes, at least at its eastern end. These post-holes were 1.6m–1.8m apart, though the gap between the east post-hole and the wall between this room and the cold room was 2.2m, all distances being similar to those in the north wall. The two west post-holes cut into the earlier trench.

The west wall of the room was less easy to locate (illus 3.3.4). Two intrusions lay on a line drawn between the west post-holes of the north and south rows. The more southerly was a roughly rectangular-shaped hollow, filled with stone rubble and dark brown soil and containing a central depression 240mm deep, but no post-pipe. To its north lay another small scoop, 80mm deep, cut to the east by a second hollow, 160mm deep: a short length of stone drain, damaged at its west end by a pit, led into the south-west corner of the earlier scoop. These two juxtaposed hollows lay below a secondary gravel floor, which also overlay the edge of the southerly intrusion; this feature was also overlain by the burnt daub. Neither intrusion was convincing as a post-hole; the southerly possibly meriting description as a socket. No other features were found which could be interpreted as forming part of the west wall of this room and no traces of a sleeper wall were recognised in the gravel floor.

In the southern part of this room three separate layers were recorded. On each side of the south wall, and extending a little way to the north and west, lay an area of crushed sandstone: neither phase of the south wall was covered by this surface. To the north the crushed sandstone gave way to a thin layer of gravel, little more than 10mm thick. Both the crushed sandstone and the gravel lay directly on the natural clay, and both were covered in the south-west part of the room, and beyond it to the west, by a deposit of burnt daub, also little more than 10mm thick. This in turn was overlain by a second layer of gravel, in which were embedded, at the east end, the remains of four slabs.

To the north the gap between the straight north edge of the gravel and the row of post-pipes was 600mm–700mm (500m in one instance where a post was out of line) and 600mm–800mm to the south. Both layers extended westwards beyond the west post-hole of the north wall for a distance of 1m, but lined up with the westerly presumed post-hole in the south wall, ending in a straight line immediately to the east of the eastern pit. There must therefore be a possibility that this was the western end of the room.

At the east end of the room, the north edge of the flags was nearly coincidental with the line of the gravel surface, but the southern flag projected beyond the gravel, extending beyond the adjacent post-pipe by a matter of 100mm, that is the width of the wall, and with the southern edge lining up with the edge of the flags in the cold room. Accordingly, unless the floor had been laid before the wall was constructed above it, the flag would appear to indicate the position of a doorway.

Outside the northern half of the west wall lay a path. Formed of gravel and 700mm wide, with a slight camber, its north side was aligned on the north wall of the changing room. To the south of the path and west of the changing room lay two pits. The west pit was almost rectangular, 1.5m × 1.8m and 400mm deep; the east was more irregular in shape, tending to circular with a diameter of 1.5m and about 200mm deep. The fill of both was similar, dark brown soil containing charcoal flecks, small chunks of concrete and daub, and fragments of tiles, totalling about 210 from the two pits. The west pit contained three sherds of pottery and several fragmentary iron objects (7.2.3.110; 114;

Illustration 3.3.12
The changing room in 1973 with the flags beside its eastern wall, and the flags of the cold room beyond.

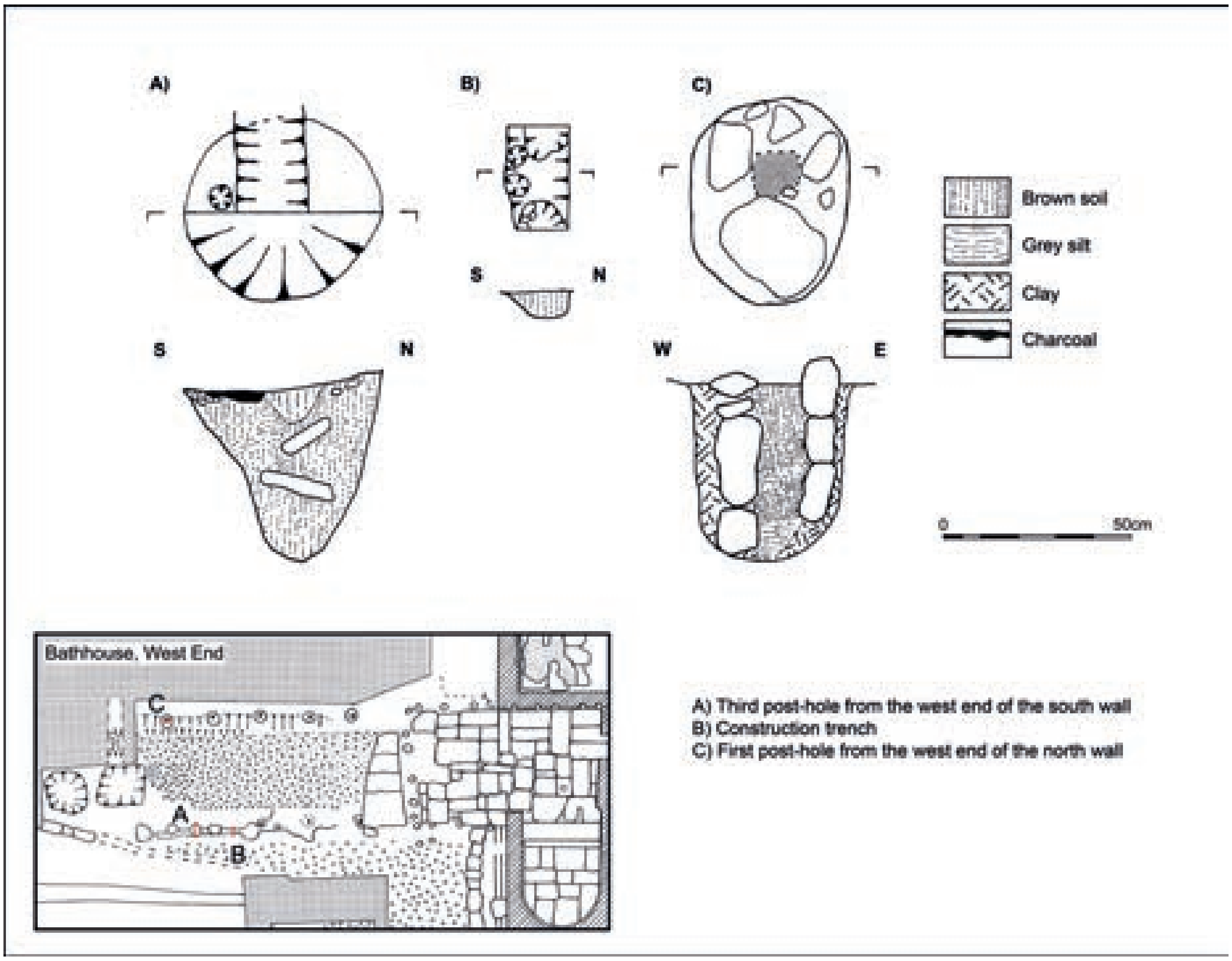


Illustration 3.3.13
Post-holes in the changing room.

243; 11.3.3.117; 146; 223). A drain crossed to the south of the pits and south-west corner of the changing room falling in a ESE direction but was not identified elsewhere. A coin dating to 153–5 was found in the back-fill over the south wall of this room (12.9).

Comment

Two phases in the floor and two rows of post-holes in the south wall were identified, but only one row in the north wall. There are some indications that the two rows of post-holes in the south wall are not contemporary. First, the west post-hole of the north wall lines up with the west post-hole of the second phase of the south wall, while the spacing of the post-holes in the north wall and the second phase of the south wall are similar, but different from the spacing in the first phase in the south wall. The lack of post-pipes in the post-holes of the first phase of the south row suggests that timbers were either removed or never inserted. Thus the north wall could be contemporary with the second phase of the south wall. Second, the two possible post-holes (-sockets?) on the line of the west row line up with the west post-holes of the north row and second phase of the south row. However, both intrusions are overlain by the upper gravel floor, which may form a third phase. It is possible that the two putative post-holes on the line of the west row never held timbers (they may, of course, not even have been post-holes), their life falling entirely within the period of modification. The secondary gravel floor could then be linked to the replacement of the south row. The existence of burnt wattle and daub between the two gravel floors, thereby indicating the existence of walls which had been demolished, however, renders this possibility unlikely.

A further problem concerns the relationship between the gravel floor and the post-holes. The floor does not extend up to either the north or south walls, but leaves a gap averaging 600mm–800mm wide. The unusual relationship is emphasised by the position of the north wall on a slope above the gravel surface. Geoff Bailey has suggested (pers comm) that the reason for these gaps is that the intervening space was occupied by furniture, such as benches or lockers. If this was the case, the earlier phase in the south wall may relate in some way to such furniture.

It was not possible to determine the west wall of the room with certainty. Although there was a clear west edge to the gravel, no post-holes were found on this line. It is possible that a baulk covered the most westerly post-hole on the north wall. In the face of this uncertainty, the length of the room could be either 9m or 10m.

The existence of a gravel path leading westwards from the north-west corner of the room would suggest the location of a door. The row of flags in the south-east corner of the room points to the existence of a second door here. This is supported by the way that the southern flag extends beyond the wall of the room and the gravel surface beyond this point. This door would have provided a quicker route to the latrine (see below).

The cold room (frigidarium)

This room measured internally 7m × 4.5m. The walls at the west end of the room were of timber, but of stone over the eastern half: the floor was flagged. A multitude of post-holes created difficulties in detailed interpretation, though the basic outline of the room is not in doubt (illus 3.3.3).

The west wall, that dividing the changing room from the cold room, had a slightly wider gap between the central post-holes

Illustration 3.3.14
The south wall of the changing room of the bath-house.

Illustration 3.3.15
The west end of the bath-house in 1973 looking north-west showing the changing room, cold room, cold bath and hot dry room.

Illustration 3.3.16
The threshold of the door between the cold room and the first warm room.

than to north and south suggesting the location of the door, 1m, or a little more, wide.

Along the north wall lay one row of post-holes, 900mm apart, and this spacing, though not so regular, was continued along the stone wall forming the east part of this north wall, that is the south face of the hot dry room, as far as the west wall of the first warm room. These five sockets were marginally larger than the post-pipes, ranging from 110mm × 120mm to 155mm × 170mm. The distance between these post-holes was about half that normally recorded on the site. At the west end of this row lay two post-holes a mere 400mm apart.

The south and west walls of this room both contained more post-holes than usual, the average spacing being 900mm. At the south-west corner there were two additional post-holes outside the building. The general arrangements are clear if the reasons elusive. Two periods have been identified on spacing grounds. The east half of the south wall formed the entrance to the cold bath (see below). The east wall of the cold room is of stone and forms the party wall with the first warm room.

The floor of the cold room was of flags of various sizes and thicknesses (430mm–820mm); a sherd of samian was found below the floor (7.1.2.48). The flags extended into the doorway of the first warm room. One slab was cut away at the south side to allow for the door jamb (480mm × 90mm × 25mm deep): no seating survived for a northern jamb (illus 3.3.16). On the north side of the room the flags were laid directly onto the natural clay. As the ground sloped to the south, the southern two-thirds were levelled with clay and masons' chips up to 100mm thick: this material covered a drain.

Illustration 3.3.17
The drain below the floor of the cold room looking north.

A stone containing a star-shaped hole was situated 1m east of the centre of the cold bath. This provided access to a drain, which started off running north, but turned in an arc to exit from the building to the west of the cold bath, continuing outside the west wall of the room to turn east towards the latrine (illus 3.3.17, 3.3.18 and 3.3.19). The drain started off two courses high, but the courses thickened and just beyond its junction with a second drain it gained an extra course. At its start it was 260mm deep, sloping to 520mm where it left the room. The cover slabs were laid on a thin skim of clay overlying the top course: the drain had a flagged bottom. The upper fill of the drain contained brown soil, decayed plaster and stone chips to a depth of 120mm; the lower fill was gravel. A second drain joined this main drain under the floor of the cold room. This drain led from one of the sockets in the north wall of the cold room. The drain was one course deep for most of its length, though it grew to two courses at its south end. It was covered by thin and broken slates. Above these was a

Illustration 3.3.18
The drain below the floor of the cold room looking south.

Illustration 3.3.19
The cold bath in 1973 looking east with the drain leading south from below the cold room in the foreground.

60mm layer of clay and a second cover, of sandstone. This seems to have been a repair. There was no flagged bottom to this drain. A third drain, one course high and with a flagged bottom, ran, at a higher level, along the outside of the west wall of the cold room and appeared to have drained the cold room (illus 3.3.19 and 3.3.20).

The floor of this room was covered in rubble and burnt debris, amongst which were two halves of an uninscribed altar, a fragment of a bench end or moulded plinth, fragments of a flagon, a glass fragment, an intaglio of Minerva, and a coin of Hadrian (5.2.1.4; 5.2.3.55; 7.2.3.1; 9.2.38; 10.1; 12.5).

Comment

This room lay in the centre of the bath-house and is usually called the cold room; the cold bath opened directly off the room. The line of timber uprights along the south face of the hot dry room requires comment. One possible explanation is that the walls of this room were higher than those of the surrounding rooms so that clerestory lighting could be provided. This might account also for the additional posts in the north, west and south walls of the room. Perhaps the multiplicity of posts could reflect two periods: it was not possible to determine if this was the case owing to the placing of the uprights in individual post-pits.

Illustration 3.3.20
The cold bath in 1973 looking north showing the steps into it and the drains to the left.

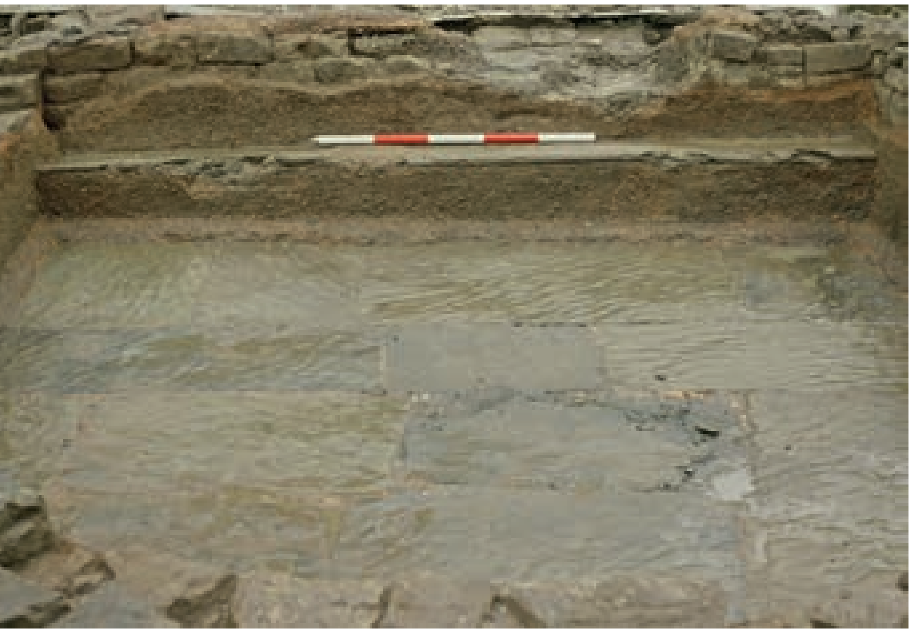


Illustration 3.3.21
The cold bath in 1980 looking north with the plaster visible.

Another possibility is that the whole of the room was originally built in timber as part of a simpler bath-house to which the hot dry room was later added and its southern wall wrapped round the posts.

The bottom fill of the drain may have accumulated during the occupation of the bath-house and the upper layer following its abandonment.

The cold bath

This apsidal room opened off the cold room (illus 3.3.19 and 3.3.20). The space within the bath measured 3m × 3m. The walls stood a maximum of five courses high and varied in thickness, 600mm to the west, 700mm to the north, 800mm to the south, and 900mm to the east, though here reduced in thickness by three offsets to 600mm, that is the same size as the west wall. They contained many stones dressed with diamond broaching.

On the north side two steps, set back from the front of the sidewalls, led down into a pool about 700mm deep. The threshold to the bath was one course higher than the floor of the cold room. Along its surface was a layer of *opus signinum* containing many amphora fragments. There was a step down of 460mm to a second step of slate 240mm wide. This was 300mm high, but as the floor of the bath sloped from west to east its height varied by 60mm.

The floor of the cold bath was of slate flags and the walls coated with *opus signinum* 20mm thick, with a quarter-round moulding 70mm–80mm in radius between walls and floor (illus 3.3.21 and 3.3.22). The rough surface of the plaster suggested that a finer outer surface had disappeared. The outlet (160mm long by 80mm high) lay in the south-east corner and, on excavation, was found to be plugged by a lump of clay. A drain covered by a flag led through the wall and then south to the main drain from the cold room (illus 3.3.23).

Illustration 3.3.22
The cold bath in 1980 looking south with the outlet visible to the left.

Illustration 3.3.23
The cold bath in 1980, detail of the outlet.

The bath was choked with rubble, which included the head of a female, possibly Fortuna, the bolster from an altar, a stone bearing a decoration of leaves and a fragment of a bench top (5.2.1.6; 5.2.1.5; 5.2.1.9; 5.2.3.50).

Comment

There can be no doubt that this was the cold bath.

Illustration 3.3.24
The heated range in 1973 looking west with the hot room in the foreground with its furnace to the left, the two warm rooms, cold room and cold bath (far left) beyond. The wall-jacketing is in position in the hot room while a bench end stands in the second warm room with the seat lying beside it.

Illustration 3.3.25
The heated range in 1980 looking east following excavation and prior to removal of the lower flagged floor of the first warm room.

Illustration 3.3.26
The north wall of the heated range looking west with the primary bath-house to the right.

The heated range

The three rooms of the heated range were built in different masonry to the hot dry room and cold bath (illus 3.3.24 and 3.3.25). The stones were not as well dressed and none bear the diagonal broaching of the stones of the other two rooms – and of the primary bath-house. The east end of the north wall was not faced and was perhaps built against the existing south wall of the primary bath-house; only this section was observed, being visible from the emptied robber trench of the south wall of the earlier building (illus 3.3.26, 3.3.27 and 3.3.28). The stones varied considerably in size from 140mm × 120mm to 320mm × 50mm to 570mm × 170mm. The occasional boulder was used as a facing stone. On the north wall of this range there was an offset above the third course on the inside face, with the floor level two courses above the offset.

The west end of the heated range bonded awkwardly with the hot dry room to the north and the cold bath to the south (illus 3.3.3).

The north wall of the heated range and the south wall of the hot dry room did not form a continuous line but overlapped. The narrowed north wall of the first warm room continued past the south-east corner of the hot dry room but with no facing stones on its north side. The facing stones of the south wall of the hot dry room stopped short of the south-east corner of the room.

The south-west corner of the heated range (the first warm room) was bonded with the north-east corner of the cold bath, the south wall of the heated range continuing up to the line of the top offset of the east wall of the cold bath, the arrangement being complicated by a kind of buttress in the external corner (illus 3.3.2). The floor of the hypocaust of the heated range was formed of sandstone fragments set in clay. This material also appeared to serve as the foundations of the adjacent walls. It is possible, therefore, that a raft of this material had been laid across this area before building commenced. It should be noted, however, that there was a step down of 80mm between the second warm room and the hot room.

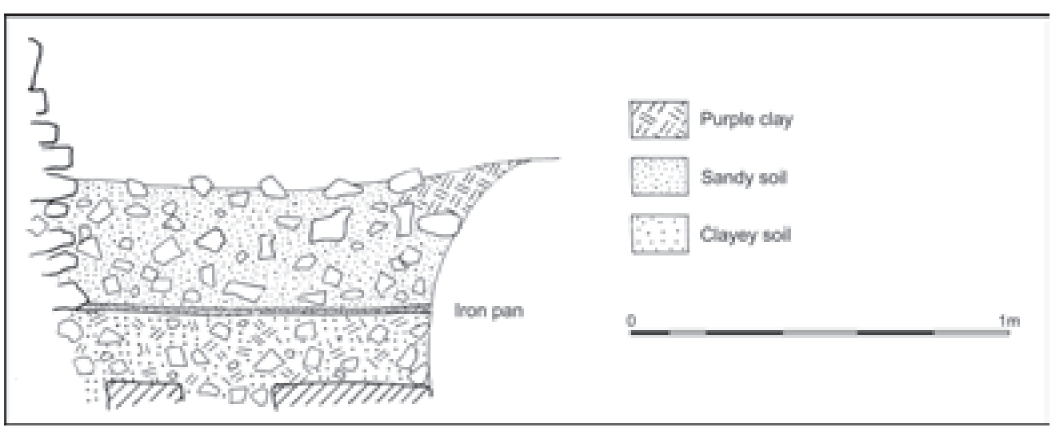


Illustration 3.3.27
Section across the south wall of the primary bath-house.

Illustration 3.3.28
The north face of the north wall of the heated range.

Illustration 3.3.29
The niche in the first warm room looking west with the unfinished 'daisy' visible to the right.

The first warm room (tepidarium)

This room measured internally 3.5m × 2.5m. The walls varied in thickness from 580mm to 770mm. The west wall was placed on the west side of a base 1m wide below floor level. At its south end the base supported a semi-circular niche, and this may have been the reason for its construction. This west wall separated the first warm room from the cold room. The door between the two lay towards the north end of this wall and has already been described (illus 3.3.16). The south end of the west wall of the room was bonded with the north-east corner of the cold bath, but the north end butted against the south wall of the hot dry room.

The north end of the wall between the first and second warm rooms was bonded with the north wall of the building, but the south end butted against it neighbour. The door in this wall lay towards the south end of the east wall. A hot air channel 170mm wide lay approximately in the middle of the east wall: its top was a little above the level of the floor. A flue, 110mm wide and 140mm deep, rose vertically up the north wall from the offset course. A drain, three courses high and with a slate bottom, led southwards from the room to join the drain from the cold room already described (and see below). It contained fine brown silty clay and two fragments of glass (9.2.9; 41). One projecting stone was recorded, on the east wall, the second stone north of the south-east corner, two courses above the second period floor: it projected 50mm. It did not appear to have been displaced as the core behind it was intact.

There were three phases to this room. The room had originally been provided with pillars to support a raised floor: only two pillars survived, both in the south-east corner. The semi-circular niche belonged to this period (illus 3.3.29). It was slightly recessed into the main west wall: its north wall projected into the room. The floor of the niche was formed of *opus signinum* retained at its outer edge by rough stones and at the rear by a small fillet: a small fill of clay separated the fillet from the surrounding wall of the apse. At the north-east corner of the niche was a small stake-hole.

At an undated time the floor was lifted, most of the pillars removed, the hot-air channel blocked and the basement filled with clay to a depth of 700mm (illus 3.3.30, 3.3.31, 3.3.32 and

Illustration 3.3.30
The first warm room following lifting of the flag floors showing the clay fill looking west.

Illustration 3.3.31
The first warm room following lifting of the flag floors showing the clay fill looking south.

Illustration 3.3.32
The first warm room following removal of the clay fill looking south.

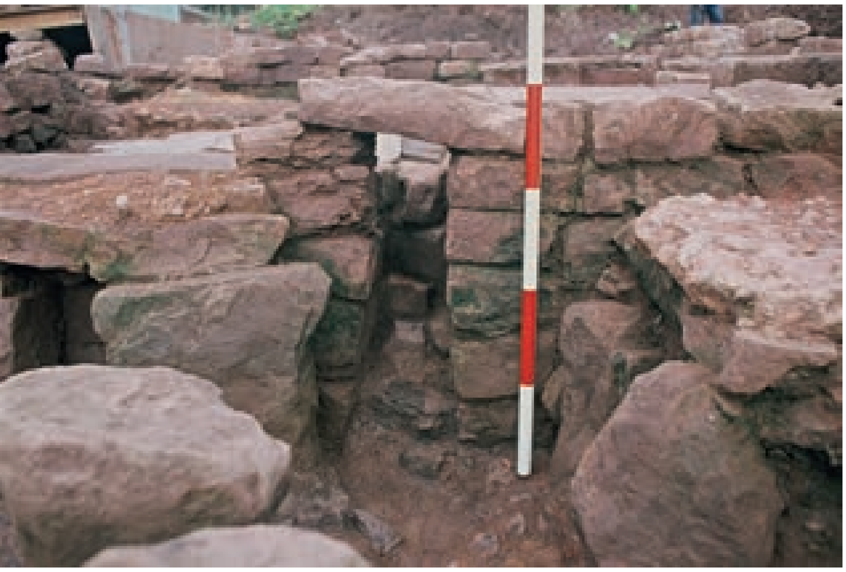


Illustration 3.3.33
The channel between the second and first warm rooms looking west showing the blocking.

3.3.33). The floor was replaced, or a new floor laid (3.3.25). The niche went out of use, with its north wall demolished, its bottom course forming part of the new floor. The flags forming the floor were of yellow sandstone or slate and were generally smaller than those in the cold room. One included a unfinished drain cover in the shape of a daisy. At the west entrance there was a step down of 160mm from the cold room, and a further drop of 50mm at the eastern edge of the broad foundation wall. Thereafter the floor sloped towards a depression in the south-east quarter of the room, presumably the result of subsidence. Against the north wall of this warm room lay a large stone, 1.2m × 320mm × 210mm high. It showed no obvious signs of wear, but was rounded at the front; it may have served as a low seat. A coin of Antonine Pius was found in a chink between two flags (12.8).

Subsequently a new flagged floor was laid, bringing the level up to that of the adjacent cold room. Owing to the unevenness of the earlier floor, the make-up for the new floor varied in thickness up to a maximum of 300mm. The packing was of grey and red clay and included much charcoal, decayed plaster and *opus signinum* as well as some fragments of amphora. The new floor was composed of flags, flat stones and hard grey clay. It was covered with a shallow layer of stone debris.

Comment

This room had originally formed part of the heated range, but sometime during its life had gone out of use as a heated room. Its subsequent function cannot be determined: it may have simply become a passage. The replacement of its floor may have been due to subsidence of its predecessor.

In its first phase the room contained a niche in the south-west corner. This may have held a water-basin or a statue, perhaps of Fortuna, a head possibly of her being found in the adjacent cold bath. A flue in the north wall would have helped create a through-draught. One flue would hardly have heated the walls and it is possible that the box-tiles located in a rubbish pit were used in this room and discarded at the end of phase 1. The lack of wall-jacketing in the second warm room, however, renders this unlikely.

The second warm room (tepidarium)

This room measured internally 3.5m × 3.1m (illus 3.3.3). The walls varied in thickness from 550mm to 700mm. The entrance to the room lay in the south-west corner (illus 3.3.34). The threshold was a large slab which contained no slots for jambs, but a shallow runnel had been carved across it to take surface water from the first into the second warm room. There were three flues in the north wall of the room, and one in the west wall about half-way between the central channel and the north wall (illus 3.3.35). The south wall was badly robbed and no evidence of flues survived. The flues were about 100mm wide and 150mm deep; the western went down to the top of the bottom course of the wall. There

Illustration 3.3.34
The threshold of the door between the first and second warm rooms.

Illustration 3.3.35
The second warm room looking north. The collapse in the north wall is around the wall flue.

were no certain projecting stones in this room. One fragmentary iron T-shaped clamp and a second possible example were found between the pillars (11.3.3.139; 140).

The east wall was separated from its north and south neighbours by hot air channels. The north channel was 380mm wide and probably 420mm high from two flags which rested on the ground to the floor level. No cover stones survived here but the fourth course up on the south side of the channel was corbelled out as if to support the covering stone of the channel. The south channel was 340mm wide.

The door into the hot room lay immediately south of the north channel (illus 3.3.36). It had a monolithic threshold, with no checks for jambs. A gap of 80mm, however, on the south side may have accommodated a door jamb. The threshold stone had a wide shallow groove, about 160mm wide at the top and up to 40mm deep, just south of the centre, presumably for drainage. No evidence survived on the south side, but two stones projecting from the north wall of the bath-house suggest that the dividing wall may have been bonded into the north wall.

The pillars, resting on the basement floor of sandstone fragments set in clay, were all sandstone monoliths 540mm high, with the exception of one which was composed of superimposed stone slabs (illus 3.3.35 and 3.3.41). The floor survived in the north-west and north-east corners. It consisted of flagstones up to 100mm thick on which rested *opus signinum* 50mm–60mm thick and which butted against the walls of the room. The combined thickness would bring the floor surface almost to the level of the threshold which is 200mm above the top of the adjacent pillar. A fillet of fine *opus signinum* placed 70mm–100mm out from the wall may indicate the thickness of the wall plaster (illus 3.3.39). A stone bench end still stood in the north-west corner of the room, probably only slightly out of position, with the stone seat lying beside it (5.2.3.51; 52; illus 3.3.37).

The basement floor was covered with a soft silty black material mixed with decayed plaster and *opus signinum*. Above this lay debris from the collapse of the building. The walls of the north channel were heavily burnt and blackened.

Comment

This room had apparently continued throughout its life as a heated room. There was no wall-jacketing as the *opus signinum* floor extended to the walls of the room. There were, however, three flues in the north wall of the room.

The hot room (caldarium)

Measuring 3.5m × 3.1m internally, this is the same size as the second warm room (illus 3.3.3). The hot bath abutted the south side of this room and the furnace lay to the east. The north-east

Illustration 3.3.36
The threshold of the door between the second warm room and the hot room.

Illustration 3.3.37
The second warm room looking west with the bench end standing and the seat beside it.

Illustration 3.3.38
The second and first warm rooms looking west following removal of the bench end and seat.

Illustration 3.3.39
Detail of the floor of the second warm room looking south.

corner was slightly thickened on its east side. The walls ranged in thickness from 550mm to 750mm.

The pillars in this room were usually 620mm high (one was 700mm), the basement being slightly deeper than that in the adjacent warm room. Several pillars were very burnt, discoloured and very friable. Two small, badly damaged fragments of flooring survived in the north-west and north-east corners. The floor at the north-east corner was 14mm thick. The flag at the north-west corner, 13mm thick, was overlain by a second flag which was surfaced with *opus signinum*, but this relationship may have been the result of the collapse of the building rather than reflooring.

In the north-east corner of the hot room there survived five flags of the wall-jacketing (illus 3.3.42, 3.3.43 and 3.3.44). The flags were held out from the wall by projecting stones and were held in by iron T-shaped clamps (11.3.3.132; 133; 138). One such clamp was recovered from the space between the flags forming the wall-jacketing and the north wall of the room. The bases of the flags

Illustration 3.3.40
The hot room and the second warm room looking west.

were 210mm below the top of the *opus signinum* which lapped up to their bases and they rested, not on the pillars themselves, but on chocking stones which in turn lay on top of the pillars. The surviving projecting stones on the north and east walls stuck out 70mm and 100mm; none survived on the other walls. The upright flags were only roughly dressed and were of varying sizes, ranging from 380mm to 960m across.

A deep layer of soot covered the bottom of the basement. Over this lay rubble from the collapse of the building. In the rubble were found two stone bench ends, of a different type to that in the second warm room (5.2.3.53; 54). The rubble fill of the room yielded fragments of a jug (7.2.3.204).

Comment

This was the hottest room in the sequence owing to its position next to the furnace. It was the only room in the heated range to be provided with wall-jacketing, remarkably some of the flags still surviving. Thus, in this room the floor and the walls would have been heated. The damaged state of the pillars (which was one reason why they were reburied when the building was laid out for display) is a reminder of the heat produced in Roman bath-houses. The thicker floor of this room may have reflected the greater heat generated here.

Illustration 3.3.41
The second warm room looking south.

Illustration 3.3.42
The hot room looking north showing the wall jacketing in position.

The hot bath (alveus)

The hot bath lay immediately south of the hot room (illus 3.3.45). It measured 2.5m by 1.25m. The walls were particularly thick and with the south wall, 1.5m wide but only surviving to a height of four courses, buttressed to the south. The wall between the hot room and the hot bath was broken by two flues. Monolithic sandstone pillars, 750mm high and now heavily burnt, supported the floor which was formed of flags about 50mm thick and *opus signinum* 110mm thick. No evidence survived of the arrangements for leading the water into the bath. The area below the floor was filled with rubble. The rubble covering the bath contained a coin of Antoninus Pius dating to 154–5 (12.7).

Comment

The unusual width of the walls of the hot bath, the provision of buttresses and thickness of the floor all presumably related to the requirement of the bath to hold considerable quantities of water. It may be presumed that there was a step up into the bath similar to that at the cold bath.

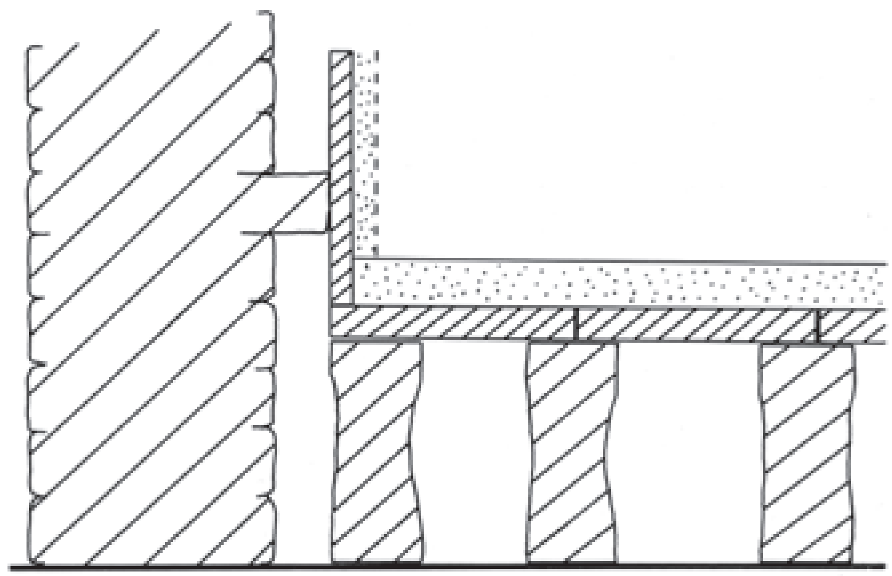


Illustration 3.3.43
A sketch showing the arrangement of the heating in the hot room. Drawn by Tom Borthwick.

Illustration 3.3.44
The hot room looking north with the furnace passage in the foreground.

Illustration 3.3.45
The hot bath and the hot room with the furnace centre left, looking south in 1973.

The furnace (praefurnium)

Immediately east of the south-east corner of the hot room lay the furnace (illus 3.3.46 and 3.3.47). It consisted of a channel, 550mm wide and 4m long, leading towards the centre of the hot room, flanked by walls roughly constructed using sandstone blocks and occasional natural boulders, especially in the lower courses. This stonework is bonded together with fire-reddened clay. The flue extended up to 1.2m beyond the east wall of the bath-house with which it is bonded. A large stone slab (670mm × 650mm × 120mm) standing at the mouth of the furnace was probably a fallen lintel. The base of the furnace was roughly flagged for its eastern 3.5m.

Butting up to the east side of the cheeks of the furnace was a stone-lined furnace chamber. It was defined on the north side by two sandstone slabs standing on edge, on the east side by large natural boulders; a large sandstone slab leaning against the south side could be a fallen lining stone, but could have fallen from elsewhere – if it is a side slab, there is no apparent entry point to the furnace house. A drain led south from the furnace house.

The stoke-hole area was filled with tumbled stonework, clay and sooty material; the burnt material spread to the south, to which it was partly carried by the drain.

Illustration 3.3.46
The furnace chamber in 1973 looking west.

Illustration 3.3.47
The furnace chamber after excavation.

Illustration 3.3.48
The hot dry room in 1973. Note that the flags do not reach the walls, nor the plaster the edge of the flags; the projecting stones to hold out the wall-jacketing are also visible.

Illustration 3.3.49
The hot dry room looking west in 1973.

Comment

The wide cheeks of the *praefurnium* may have been to support the boiler heating the water for the hot bath.

The hot dry room (laconicum)

This lay north of the cold room. It was almost square, measuring internally 4.75m × 4.25m (illus 3.3.1, 3.3.48 and 3.3.49). The walls survived to a maximum height of eight courses. They were more uniform in thickness than other rooms, varying from 650mm to 680mm, and were bonded with clay. The stones were more regular in size than those used in the rest of the building, ranging from 200mm × 140mm to 300mm × 140mm. Many of the stones had been carefully dressed. Patterns of tooling varied and included diamond broaching, diagonal continuous lines, diagonal broken lines and vertical broken lines. In general, the stones were very similar to those used in the primary bath-house. The north corners of the room were constructed with alternate long quoins.

The north wall was broken for the stoke-hole (illus 3.3.50). This was 570mm wide at base with the side walls 600mm wide and 700mm long butting against the north wall of the room. Large and small voussoirs were used in the arch. The floor of the stoke hole was flagged. There was little trace of burning here.

The floor of the room was supported on low stone walls, 580mm high (illus 3.3.50, 3.3.51 and 3.3.52). These dwarf walls were arranged in two rows, five in the north row and six in the south, separated by a gap running east–west varying between 300mm and 500mm wide (illus 3.3.52). A gap 100mm–120mm was left between the dwarf walls and the main walls of the room. In the east half of the room the walls were arranged so that the end of one wall faced a gap between two walls in the other row; this arrangement was not replicated in the west half of the room. The walls in the east half of the room were also wider than those to the west, the width of the walls in the whole room varying from 800mm to 450mm. There was a lateral gap approximately in the middle of each dwarf wall to aid the circulation of air (illus

Illustration 3.3.50
The hot dry room looking north during consolidation with the floor removed to show the arrangement of the dwarf walls below. The sockets for the timber uprights along the south face of the south walls are visible in the foreground.

Illustration 3.3.51
The hot dry room looking south during consolidation.

3.3.52; these were not noticed during the consolidation of the east half of the room and were presumably filled in at that stage). The two dwarf walls in the south-east corner were joined to form a u -shaped structure. The central four dwarf walls had been placed over a flag covering the end of a drain which continued eastwards under the wall of the room until it disappeared. The east wall of the hot dry room had broken its back over the drain (illus 3.3.53). The drain stood three courses high and was surfaced with flags. The natural clay formed the base. It contained silt including a few small stones. Flags appeared elsewhere on the ground surface between the dwarf walls.

The west half of the floor of the room survived and three flags of the east half (illus 3.3.48). The flags were all of sandstone, with the exception of one which was slate. The flags did not extend to the wall, but left a gap varying from 70mm to 100mm on the west side and 120mm on the north. The only exception to this was the second flag from the west on the south wall which touched the wall of the room suggesting that this was the location of the door. Some *opus signinum* plaster survived on the flagstones. The plaster nowhere reached the edge of the flags, leaving a margin of about 30mm.

Projecting from the inside wall of the room, in the second course above the floor, were a number of stones. On the north wall there were three west of the stoke-hole, projecting 110mm, 100mm and 90mm; one missing immediately east of the furnace and then two surviving, projecting 110mm. On the west wall five stones survived, projecting 90mm, 60mm and 90mm. Only one stone, at the south end, remained on the east wall; there were none on the south wall. An iron T-shaped clamp was found in the basement between two of the dwarf walls (11.3.3.141).

The natural slope of the ground had been cut away to the north and west to provide a level platform. The Roman surface was covered in charcoal fragments below a fill of tumble including many facing stones and fragments of burnt daub. Rubble, with a small amount of burnt debris, also covered the floor of the room. Two fragments of platters were found unstratified in the room (7.2.3.73; 76).

Comment

This was a single heated room and therefore presumably was the hot dry room (*laconicum* or *sudatorium*). The existence of the stones projecting internally, the gap between the floor and the walls, and the margin round the edge of the *opus signinum* all point to the previous existence of wall-jacketing similar to that in the hot room originally sitting on the edge of the flags forming the floor. As in the hot room, five sides of the hot dry room would have been heated. No evidence for the form of the roof was found.

No threshold into the room survived. Towards the western end of the south wall one flag nearly touched the wall face, but there was no wider gap between the timber sockets in the south face of the south wall to suggest the location of a door. The u -shaped dwarf wall in the south-east corner of the room may point to the location of the entrance, being provided to support a greater weight above. The entrance would therefore have led out of the first warm room.

Illustration 3.3.52
The southern row of dwarf walls in the hot dry room looking west showing the vents through them.

The 'buttress'

A rectangular block of stonework abutted the south wall of the bath-house about half-way between the cold room and the hot bath and opposite the wall between the first and second warm rooms (illus 3.3.2 bottom right). It was built of rough sandstone blocks with a rubble core and survived no higher than two courses. As found, it only touched the south face of the bath-house wall on the west side; on the east side it stopped about 300mm from it. This is probably due to robbing; the

Illustration 3.3.53
The blocked drain under the east wall of the hot dry room looking west.

adjacent bath-house wall was also badly robbed. The feature sits on its own sandstone foundations on a podium of earth about 150mm–200mm above the surrounding level. A sherd of samian was found in the rubble core (7.1.2.57).

Comment

The structure appears to be secondary. The bath-house wall is poorly constructed at this point and it is possible that the addition was built to provide support and was therefore a buttress. Another possibility is that this was the base to support a water-tank.

Drains

Six drains led south from the bath-house to the latrine (illus 3.3.4). One exited from the cold room (illus 3.3.17, 3.3.18 and 3.3.54), one drained the cold bath (illus 3.3.23), another the first warm room (illus 3.3.32) while one drained the furnace beside the hot room (3.3.47). These drains were generally two or three courses deep, though the main drain from the cold room was five courses deep, ranging in depth from 250mm to 540mm and in width from 140mm to 340mm; most had flagged bottoms. The fill was generally gravel, silt and brown soil, though the drain from the furnace contained much burnt material towards its north end. The drains from the bath-house combined into one main drain which turned into an open channel for the last part of its course to the latrine (illus 3.3.55, 3.3.56 and 3.3.57). To the south-east of the cold bath this drain had subsided into an earlier pit.

Illustration 3.3.54
The area to the south of the cold bath looking north showing the covered drain leading south from the cold room to the latrine.

Illustration 3.3.55
The area south of the heated range with the gulley from the cold bath to the latrine.

Illustration 3.3.56
The drain leading south from the bath-house to the latrine at the point where it moves from being a covered drain to an open gulley.

General comment on the bath-house

The main bath-house at Bearsden contained the usual range of facilities: changing room; cold room off which opened the cold bath and the hot dry room and heated range, itself consisting of two warm rooms, a hot room, and a hot bath. There appeared to have been two entrances to the bath-house, one at the northern end of the west wall of the changing room where there was a narrow path leading from the fort, and a second in the south-east corner of the same room where a line of flags would appear to have marked a door. The door between the changing room and the cold room lay in the middle of the wall between the two. The doors in the heated range were placed so that they did not form a single line. The entrance to the first warm room lay in the north-east corner, that to the second warm room in the south-east corner, and with the door to the hot room in the north-east corner. This arrangement may have been to prevent a through-draught, but was probably simply to aid movement as doors opposite each could have led to congestion.

Examination of the relationship of the primary bath-house to the heated range led to the conclusion it was still standing when the new range was built. The north face of the hot room did not appear to have been built free-standing but against something, and that was unlikely to be the loose fill of the robber trench of the south wall of the primary bath-house, but rather the wall itself. The differences between the simply dressed and more irregularly sized stones of the heated range and the better dressed stones of the hot dry room and the cold room have also been noted, as has the similarity between the stones in the walls of the hot dry room and those of the primary bath-house. This suggests that the stones of the earlier building had been reused in the hot dry room, and, to a lesser extent, in the cold bath.

The existence of a hearth within the primary bath-house on top of the interior clay unexcavated by the Roman builders, but beneath the rubble debris which covered this area, suggests that this building served as a mess-room for a period. The conclusion is that after the decision had been taken to move the bath-house, the existing building served as a shelter for the soldiers who had started work on the new building immediately to the south. Later the earlier building was demolished and the stones used to construct the hot dry room, with others used in the cold bath; of course it is not possible to know how the upper courses were completed nor whether other stones already dressed for use in the remainder of the previous bath-house were available.

The problems with interpreting the building are: the junctions of the heated range with the hot dry room and the cold bath, and the sockets for posts in the south face of the hot dry room. The sockets in the south face of the south wall of the hot dry room stop at the west wall of the heated range. It could be argued that they are a continuation of the north wall of the changing room, but it is difficult to see the necessity for them in view of the existence of the adjacent stone wall. Their existence implies a phase in the bath-house when the hot dry room did not exist. The sockets line up with the centre of the north wall of the heated range, while those of the south wall of the changing room similarly line up with the centre of the south wall of the heated range. This implies an original construction consisting of a heated range of three rooms with a timber cold room and changing room. yet, such an interpretation is complicated by the junction at the south-east corner of the hot dry room and the north-west corner of the heated range. The west half of the north wall of the first warm room was not built on the same alignment as the rest of the heated range but used the south wall of the hot dry room in an awkward junction. The implication is that the hot dry room was already standing or was contemporary with the first warm room. yet, the hot dry room does not appear to have been a free-standing structure as its south-east corner was not completed, a facing stone being missing from the east end of the south face of the wall where it is embedded in the north wall of the first warm room.It is not easy

Illustration 3.3.57
The path to the latrine looking south.

to determine the sequence at the junction of the hot dry room and the first warm room, but as the line of posts along the south face of the south wall of the hot dry room are best explained as forming part of the north wall of the timber changing room, the preferred explanation is that the hot dry room is an addition to the plan, its construction coinciding with the completion of the western end of the heated range, or that when it was constructed the north-west corner of the heated range was rebuilt. The suggestion that the hot dry room was added while the bath-house was being constructed gains support from the use of the diamond-broached stones of the primary bath-house in its construction. Alternatively, the awkward junction was the result of a botched job.

The south-west corner of the heated range and the north-east corner of the cold bath are bonded, which suggests that the cold bath was part of the original plan for the bath-house; the

Illustration 3.3.58
The latrine looking west from above.

Illustration 3.3.59
The latrine looking west.

Illustration 3.3.60
The latrine looking east.

junction is somewhat complicated by the existence of offsets and an external 'buttress', but the bonding is clear.

The original plan for the bath-house would therefore appear to have consisted of a long row of rooms aligned west–east with a cold bath to the south and this was amended by the addition of a hot dry room to the north

3.3.2 The latrine

Various drains and a path led to the latrine (illus 3.3.57). The metalled path was traced round from the south-west corner of the changing room to the south-east corner of the hot bath where it turned south to the entrance of the latrine. The path survived best immediately to the north of the latrine. Only here did its gravel surface remain. The path was nearly 2m wide and at its south end, beside the latrine, overlay the drain from the stoke-hole at the eastern end of the bath-house.

The latrine measured 5m by about 4.4m externally (illus 3.3.3, 3.3.58 and 3.3.59); the south wall had been destroyed so a slight element of doubt surrounds the north–south measurement. The eastern side of the building was formed by the west face of the east rampart of the annexe. The north wall extended 200mm–300mm over the rampart kerb. The latrine wall did not lie directly on the kerb stone, but on a layer of yellow/brown clay mixed with sandstone fragments 200mm thick which overlapped the edge of the kerb stone and which in turn lay on top of the underlying grey clay into which the rampart kerb had been cut (illus 3.3.62).

The walls of the latrine varied from 600mm to 700mm thick. They were formed of roughly coursed rubble. The entrance into the building lay in the north wall. It was placed 1.5m from the inside north-west corner and was 1m wide. The threshold was formed of three flags.

The entrance led into a paved area measuring about 3m × 1.5m. Between this paving and the west and south walls of the building lay two channels. Immediately inside the walls of the building lay the main channel. That on the west side was only about 50mm deep and a maximum of 400mm wide, with a slabbed floor. Although the south channel had been damaged by the modern sewer pipe, it could be determined that it also was shallow but was not flagged, its base being natural clay. This channel passed through the rampart in a well-constructed drain with a flagged bottom, sides two courses high supporting cap-stones.

Inside the latrine, and inside the sewage channel, lay an open channel cut into a series of long stones. This was fed by the open drain or gulley into which the five drains from the bath-house de-bouched, passing through the north wall of the latrine between the north-west corner and the entrance. Beneath the end of the channel, on the inside of the north wall of the latrine, a tile had been positioned at an angle so as to throw water into the channel below. It may be that the tile was able to be manoeuvred so that water could be directed into the main sewage channel or the open channel.

The floor of the latrine was bedded in orange/brown clay, in which lay, on the south side, masons' chips. The drain leading south from the stoke-hole was cut through this clay (illus 3.3.4). It entered the latrine under the door, crossed the building diagonally and sinuously to exit into the main channel at the south-east corner. This narrow drain was roughly constructed mainly with water-worn stones or rough boulders; it was 120mm deep. The bottom 70mm–100mm were fi lled with gravel, the upper 50mm thick orange/brown clay with charcoal flecks. There were no separate cap-stones; the flags above appeared to have been bedded in clay laid over the top courses of the drain.

Underlying the whole of the latrine was grey clay. This is similar to the grey clay found to the west of the latrine and may be the fill of the depression recorded inside the fort south

Illustration 3.3.61
The drain through the annexe rampart which carried the sewage into the ditches.

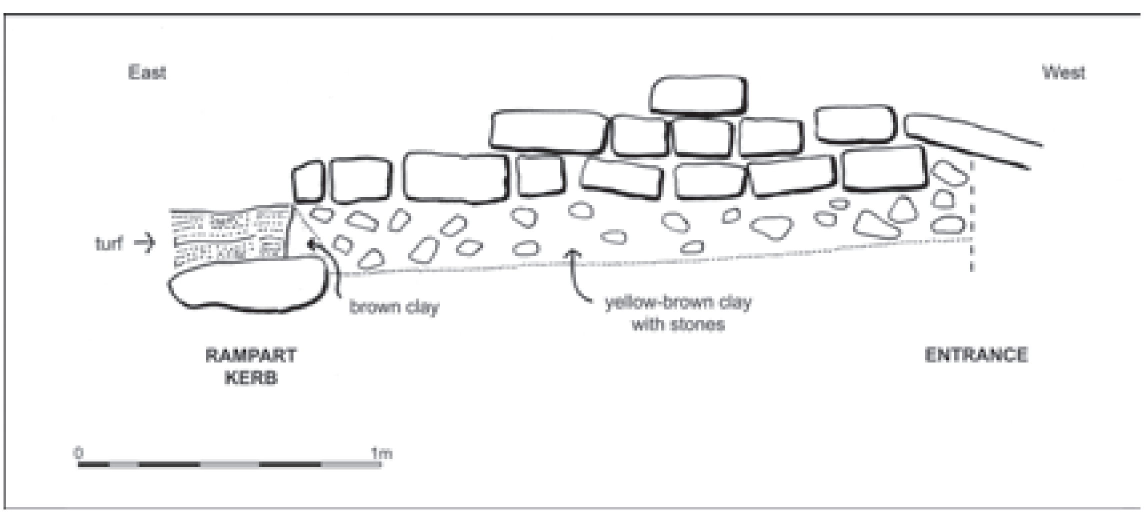


Illustration 3.3.62
Section along the north wall of the latrine.

Illustration 3.3.63
The area between the fort/annexe rampart and the bath-house south of the changing room looking north.

of building 7. Under the flagstones was found a fragment of a mortarium (7.3.6.5).

Immediately over the slabs forming the floor of the latrine was a soggy charcoal layer typically 20mm–30mm thick. It included wood originally 240mm in diameter and therefore presumably a structural timber, smaller roundwood of alder, hazel and willow, presumably the remains of wattle, and clay-covered burnt rushes, all possibly from the roof (13.9.8). The ghost traces of two charred planks 120mm wide were observed towards the south side of the latrine. The layer of charcoal was covered by a thin layer of rubble, lying thicker to the west end than beside the rampart. The main channel contained gravel, the normal fill at the bottom of the drains.

Illustration 3.3.64
The drain between the bath-house and the fort/annexe rampart.

Comment

This building is placed at the lowest point of the annexe. There can be no doubt that it is the latrine. It conforms to the normal plan and internal arrangements (Mann 1989). The only unusual feature is the shallowness of the main channel which was clearly the sewage channel. This would have been covered by seating of timber or stone. The two channels in the latrine were fed by water from the bath-house. The sewage channel passed through the rampart and emptied its contents into the annexe ditch. It is usually presumed that the second channel contained the water for washing the material used for cleansing (for further discussion see 21.4.2). The material on the floor contained rushes which are likely to have come from the roof.

3.3.3 *The annexe south of the bath-house*

The area north of Roman Road, bounded to the west by the rampart between the fort and the annexe, to the north by the bath-house and to the east by the annexe rampart, was examined over several seasons, though with little success. The path leading to the west wall of the bath-house has already been noted. There was also a gravelled surface to the south of the changing room which continued to the latrine. The only gap was to the south-west of the changing room. It is possible, however, that the presumed second door in the south wall of the changing room led to the path south of the bath-house and on to the latrine.

The area immediately south of the heated range and between the east wall of the cold bath and the west wall of the hot bath was hard bare clay containing the occasional cobble. Immediately to the south of the hot bath was a distinctive area of cobbles and flagging with clear west and east boundaries (illus 3.3.55). The west boundary was a long stone set on edge and worn on its upper surface, possibly as a result of pedestrian traffic. Its southern end coincided with the point that the drain changed to an open gulley formed of cut stones.

The area immediately to the south and south-west of the changing room of the bath-house was formed of soft silty grey clay and was very spongy: it may have lain over a continuation of the depression recorded to the west in the fort (illus 3.3.63). To the east of this area, and south of the easterly end of the changing room, the grey clay was more solid and contained many stones forming a rough surface (illus 3.3.65). In the western area, at a distance of 2m south of the changing room, parallel to it, and continuing westwards lay a channel 10m long, turning at right-angles to the south at the west end (illus 3.3.64). This defied interpretation. To its south, in a later season, a further length, which may be part of the same channel, was recorded to the east (illus 3.3.65). This ended at an east–west gulley and to the south of this gulley lay three post-holes 1.5m and 1.2m

Illustration 3.3.65
The cobbling south-west of the bath-house.

Illustration 3.3.66
The cobble foundation to the west of the latrine looking north.

apart. Two further, isolated post-holes, were recorded east of the north–south gulley. Both areas yielded considerable quantities of pottery.

South of the latrine a short length of cobbling, 550mm wide and running east–west, was located in a small trench. To the south-west of the latrine a second length of clay and cobble foundation, 2.5m long and 400mm wide was located, aligned roughly NNW by SSE. Its north half was one cobble thick and the south half two cobbles thick (illus 3.3.66). To the east lay a 40mm thick layer of yellow clay with small blocks of yellow

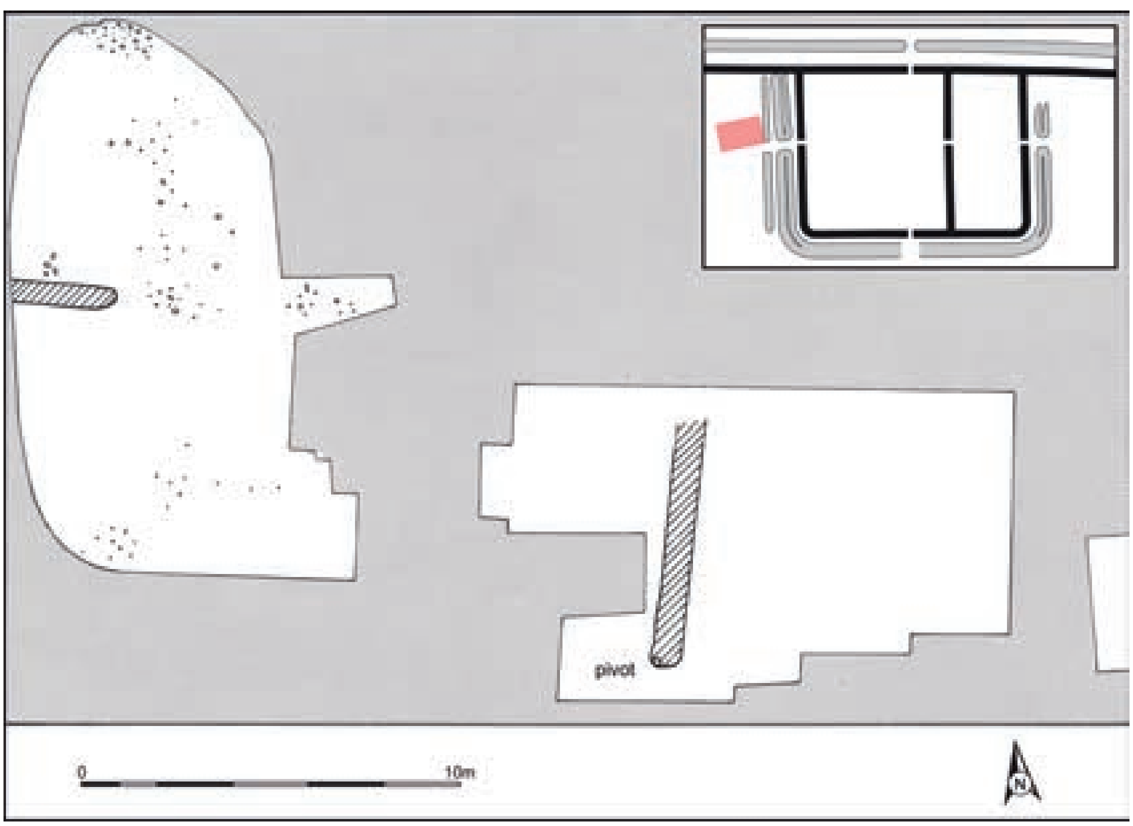


Illustration 3.4.1
Plan of the area west of the fort.

sandstone resting on a layer of dark grey soil of similar thickness. This in turn lay on the grey clay which appeared to form the fill of the east–west depression. This grey clay continued to the west of the clay and cobble foundation and accordingly, if the section of clay and cobbles formed the wall of a building, it is likely that its interior lay to the east.

About 1m west of the main drain into the latrine lay a line of three post-holes. The north two were 1.2m apart and the south two were 2m apart. No other post-holes were located in this area and there was no hint at their function.

The existence of a path to the east of the fort/annexe rampart has already been noted (3.2.4). This was the only feature located in the southern half of the annexe Below this section of the path lay three sherds of samian (7.1.2, 90; 91; 92).

Illustration 3.4.2
The clay and cobble foundation west of the fort looking south.

Comment

The remains in the annexe other than the two principal buildings were enigmatic. No coherent buildings could be constructed out of the fragments of clay-and-cobble foundations, post-holes and patches of cobbles recorded here. The ground towards the south end of this area, beside the modern road, was low-lying and was presumed to form part of the depression already noted within the fort south of building 7. Nevertheless it still seems to have been utilised. Evidence from both north and south of Roman Road indicated the existence of a path running north–south immediately along the outside face of the fort/annexe rampart.

3.4 EXTRA MURAL ACTIVITY

Areas to the west, east and south of the fort and annexe were examined for traces of possible extra mural activity.

West of the fort, two lengths of clay and cobble foundation were located (illus 3.4.1). One section, 650mm wide, ran approximately east–west. It was traced for a distance of 2.7m where it continued into the baulk. The other lay approximately north–south, projecting 7.5m into the excavated area (illus 3.4.2). It was slightly wider than the western length. At its south-west corner lay a stone with an indentation cut into the top; it was interpreted as a pivot (illus 3.4.3).

Several fragments of Roman pottery were found in the two excavated areas, some glass chips and a small fragment of late medieval green glazed pottery was recovered from the surface of the east clay and cobble foundation (7.1.2.95–7; 7.3.6.106; 9.2.33,

Illustration 3.4.3
The pivot stone in the clay and cobble foundation.

together with some body sherds not listed in the published report).

Three areas investigated in the area east of the annexe failed to reveal remains of any structures; the only discovery was a gulley leading roughly west-east, and some pottery (7.1.2.98–101).

South of the fort, two areas were examined. One area was opened up on the steep slope beyond the south ditch and a second at the bottom of the slope in the grounds of Jubilee Gardens. No traces of ancient structures were found in either locality.

Comment

Intensive excavation failed to reveal other sides to the presumed wall foundations located west of the fort. It is possible – assuming that these are parts of buildings – that the other walls were founded on timber beams resting directly on the ground, or in some other manner which has left no trace. No evidence was recovered which would indubitably determine their date. Their proximity to the fort is suggestive and the only fragment of non-Roman pottery apart from 19th- and 20th-century material found here, could have sunk through the soil before its descent was further prevented by the foundation. It seems likely therefore that the two foundations are Roman.

3.5 RESISTIVITY SURVEY

IAIN BANKS

In April 1995 Gu ARD was commissioned to undertake a resistivity survey to determine whether the ditch on the southern side of the fort was crossed by a causeway for access to the fort (Banks 1995). The survey was conducted using a Geoscan RM15 resistivity meter and readings were taken at 1m intervals across four 20m grids orientated east to west along the whole width of the gardens to the south of Maxholme (illus 3.2.1). The grids were truncated on the southern edge by a path and hedge, so that the actual surveyed grids were more like 20m × 17m. Conditions were not ideal, there being substantial root systems along the edge of the path from well-established trees, while the soil of the lawn seemed quite loose underfoot. This led to an expectation of generally low resistance across the entire survey area. It was hoped nonetheless that any causeway would be significantly different in consistency from the silts of a ditch fill that the presence or absence of a causeway would be relatively apparent (illus 3.5.1).

Illustration 3.5.1
The geophysical survey.

The results were stored and processed through Geoplotv2, a standard geophysical programme. Analysis consisted of an x –y interpolation on the data, one plot presented as a greyscale and the other as a dot-density plot.

Results and interpretation

As expected, the general levels of resistance across the survey were very low, with the highest reading as low as 161.5 ohms. As the plot shows, the main effect shown by the survey is the creating of the banking leading down into the garden level from the level of the house. Apart from this, the soil at the eastern end of the survey appears to have been more consolidated than the rest of the survey area. Nonetheless, three areas of interest are apparent. The first is a linear anomaly on the eastern end of the survey area that runs through the higher resistance soils; this appears to be a pipe and is probably part of the services of the modern building.

The second is an area of higher resistance which lies in the centre of the plot and partially in front of the steps down to the lawn but covers a large area. The third is a narrower strip of higher readings towards the western end of the survey. Either of these could have been the causeway, the higher readings indicating a firmer soil more resistant to electrical conduction.

The central anomaly covered a width of about 24m and seems reasonable for a causeway across the ditch, taking into account sites such as Cardean where the eastern gateway had a causeway of 23m width and the northern a causeway of 30 m (Jones 1975: 110).

The western anomaly is smaller and appears to be about 6m–8m wide. The most reasonable explanation for this anomaly is that it represents one of the trenches from the excavation, the location of which it appears to match.

The conclusion of this report must remain tentative because the conditions of the survey were not ideal. A seismic survey might work better in the conditions although the degree of disturbance means that good results could not be guaranteed. However, the resistivity survey did indicate alterations to the nature of the soil, demonstrating that, irrespective of the alterations to the soil through landscaping, there were areas which differed in the degree of their conductivity. Whether this represents the archaeological features sought would require confirmation through trial trenching, but the anomalous readings in the centre of the plot appear to correspond to the extent which might be expected for the causeway across a fort's ditch.

Chapter 4

SOILS

4.1 THE WEST RAMPART

IAN D MÁTÉ

This profile is a box sample of soil, 330mm × 190mm × 90mm, extracted from immediately below the western edge of the west rampart of the fort.

Physical description

The colour was uniform throughout the sample: medium brown with a slight pink tinge. The Munsell colour on receipt was 5y R 4/4 (reddish brown) in a slightly damp state; dry, its colour was IO y R 5/2 (greyish brown). There was no mottling though there were colour variations on coatings (see below). It was a silty clay with fine sand fraction and some pebbles. The pebble size present ranged from 2mm to 60mm and constituted 5% of the sample. The larger pebbles were rounded but a majority of the small stones were angular grits.

Granular structure was present with fine peds less than 2mm. In general, packing density was low, the sample of medium porosity, with some fine fissuring. The uppermost 50mm to 80mm were more crumbly with a lower packing density and increased porosity. The soil strength was weak, but cemented on drying. It was moderately sticky, very plastic and very poorly cemented.

Roots in the sample were mainly fibrous though occasionally woody; all are fine being less than 1mm in diameter. There were 1–15 roots per 100cm^2.

On receipt, there was a distinct physical difference between the upper section of the sample and the main part of the soil body with an irregular boundary between the two (illus 4.1). This seemed to be due to worm activity.

There were occasional iron concretions which became more visible when the soil had dried. Often these concretions had formed on rounded quartz grains. Iron salts had also replaced woody material and concretions in the form of pseudomorphs of wood were found in the profile.

Laboratory analysis

pH

Method: to 1g of soil in a test tube, 1ml of distilled water was added and mixed by machine. The liquid phase was poured on to a watch glass and tested with Merck Spezial Indikator paper.

Result: Sample 1 pH 5.6;
Sample 2 pH 5.7;
Sample 3 pH 5.8.

Conclusion: This is a weakly acidic soil. There seems to be a slight indication of decreasing acidity down the profile, but the

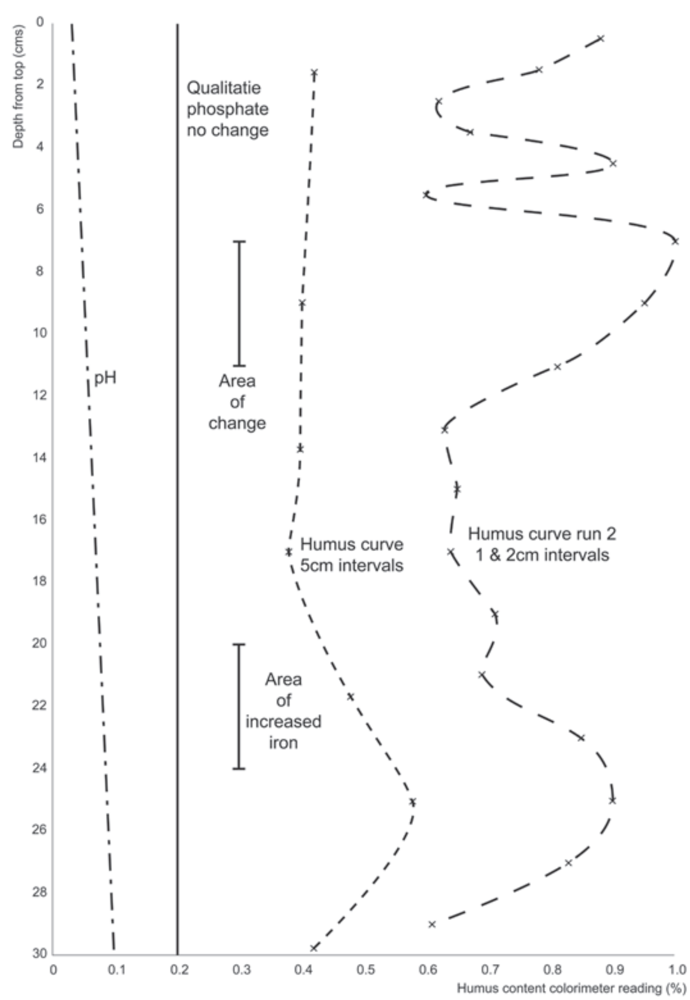


Illustration 4.1
Diagram of section below west rampart.

Table 4.1
Colouration of soil samples

Distance from top	*Colorimeter reading*
0–10mm	0.88
10mm–20mm	0.78
20mm–30mm	0.62
30mm–40mm	0.67
40mm–50mm	0.90
50mm–60mm	0.60
60mm–80mm	1 plus
80mm–100mm	0.95
100mm–120mm	0.81
110mm–140mm	0.63
140mm–160mm	0.65
160mm–180mm	0.64
180mm–200mm	0.71
200mm–220mm	0.69
220mm–240mm	0.85
240mm–260mm	0.90
260mm–280mm	0.83
280mm–300mm	0.61

tests were not indicative of any use of this soil as a habitation site and was much less than other habitation layers investigated by the analyst, for instance, of a Bronze Age hut circle at Tor Mor, Arran (Barber 1997). This leads to the belief that the land use, if any, was agricultural.

Discussion

The sampling method used in the tests on this soil presumed a vertically changing profile. There is some evidence of this visually as there is an apparently slightly enriched area of iron oxides 200mm–230mm from the top of the block forming a discontinuous poor pan.

The pH of the soil is such that the processes could have been self-initiating but it is unlikely that they would have progressed very far, especially as decreasing acidity is indicated downwards. However, throughout the profile there are iron oxide coatings lining root holes and worm holes as well as clay coatings of these channels. This suggests periodic changes in the soil water state, the increase of water content through the root and worm holes reducing the iron which is then reoxidised during dryer seasons. This seems to have been the predominant form of element mobilisation especially as the soil has retained a good clay structure. The clay coats are more predominant at the top of the soil where the soil is looser and crumbier. Most of the clay coatings are in the form of worm regurgitations rather than coats, so the soil cannot have been totally saturated.

Smaller pieces of charcoal were observed in the block, one piece at a depth of 130mm and another at a depth of 230mm. Its presence at points below the main zone of earthworm sorting suggests that the land was used agriculturally before the construction of the rampart and that the charcoal was not associated with the building of the fort in, say, a clearing operation.

The variation of humus content vertically through the profile was unexpected but can be accounted for. The top of the profile was an old buried surface so it should have had a higher humus content which would then have had decreased downwards. This is indeed the case, but there is a second peak which shows a variation over a few cm and coincides with the bottom of the looser soil at 60mm–100mm and an area of worm activity. There is also a third peak which is coincident with the highest concentration of visible iron oxide accumulation at about 250mm deep. This could represent the limit of interference from worms or man and be a zone of illuviation.

Conclusions

The profile as a whole suggests a wet meadow environment with seasonal changes in the water state and perhaps occasional saturation at lower levels decreasing the worm activity during these periods. It would support agriculture and is a brown earth soil. As the profile is sealed by the west rampart of the fort these conclusions relate to the pre-Roman occupation of the site.

4.2 SOIL SAMPLES FROM BUILDINGS

IAN D MÁTÉ AND SJOER D BOHNCKE

Fourteen samples were taken from the following locations to try to establish whether these was any positive evidence for the presence of horses: the gulley to the north of building 1; burnt wattle and daub in the gulley between buildings 1 and 2; the north-east post-hole of building 2 (two samples); patch of burnt wattle and daub in building 2; gulley to west of building 3; beside the same gulley; burnt wattle and daub overlying the west end of the gulley to the north of building 5 (four samples); pit to west of building 5; northern drain through east annexe rampart; gulley to east of annexe.

The soil samples were described, the pH and total phosphate content measured, the pollen content recorded, five samples tested with a view to determining whether fungi spores produced by dung inhabiting species might have been preserved, and the remains compared to modern horse droppings. It was not possible to draw any positive conclusions from the study of the micro-fossils but this could be due to the necessity to cook the samples in HF. There is an increase in phosphate especially in the drain around building 3, but this evidence in itself is not enough to confirm the presence of horses though it could point to the drain being used as a toilet run off for beasts. The acidic silty sandy soil, though at least occasionally wet, is not waterlogged, has organic activity and so would not be expected to preserve the kind of remains sought.

The gulley to the north of building 5 and the pit to the west of the same building yielded some pollen which presumably reflect the vegetation around the fort at the time the features were being filled. Both samples indicate grassland with the presence of alder and hazel trees. The presence of ribwort and Brassicaceae in both samples and of *trifolium repens* in the pit indicates that the grassland was likely to be in use as pasture. A Rosaceae pollen of the *alchemilla* type was found in the gulley and supports the idea of locally relatively wet grasslands and pastures.

The full report is in the archive.

Chapter 5

STONE

5.1 ANALYSIS

G H COLLINS†

Four specimens of stone from the bath-house were examined. Three are cross-laminated sandstones and the fourth a coarse yellow-sandstone. All the specimens can be matched with examples from the Carboniferous Limestone Series of the Lower Carboniferous (Macgregor & MacGregor 1948: 35). Outcrops of these rocks are to be found in the valley of the River Kelvin about 2.5km south-east of the site of the fort between NGRs NS 555 706 and NS 569 712.

5.2 THE STONE OBJECTS

LAWRENCE KEPPIE

Measurements are given in the order: height, width, depth, unless otherwise specified. The stone employed is normally a yellow-buff local sandstone. The descriptions of nos 5–9 draw upon entries in Keppie and Arnold 1984, and Keppie 1998.

5.2.1 Inscribed and sculptured stones

1. Inscribed building stone (illus 5.1 and 5.2), 125mm × 265mm × 290mm with tapering sides, having the outer face recessed in the shape of an ansate panel to receive an inscription which reads LEG XXVV / QVINT FEC. *Leg(ionis) XX V(aleriae) V(ictricis) (centuria) Quint(...) fec(it)* 'Of the Legion XX, Valiant and Victorious, the century of Quint ... built (this)' (illus 5.1 and 5.2). A single interpunct is visible in line 2, between the fifth and sixth letters. Letter heights: 1: 16mm–30mm; 2: 16mm–25mm. Published: Hassall and Tomlin 1977: 433 no 32, pl xxixA; *AE* 1977, 526; Keppie 1983: 401 no 12; Keppie 1998: 96 no 25; *RIB* 3506. The ansate panel is unusual in that the central rectangle is enlarged by triangles to left and right, into the latter of which the inscribed

Illustration 5.1
Stone 1, the inscription of the Twentieth Legion.

Illustration 5.2
Stone 1, photograph of the inscription of the Twentieth Legion.

text intrudes. The lettering is crudely cut; note in line 2 the unusual serifs, the long Q, I and F and the broadened N. The reduction in the size of the lettering at the end of the line 1 could suggest that the stonecutter had already realised that space was going to be insufficient for the information to be imparted in line 2. The stone belongs in the class of 'centurial stones', recording building work by the Roman army, especially the legions. Such stones are familiar from the line of Hadrian's Wall where they record the completion of lengths of the curtain wall, and elsewhere, including some

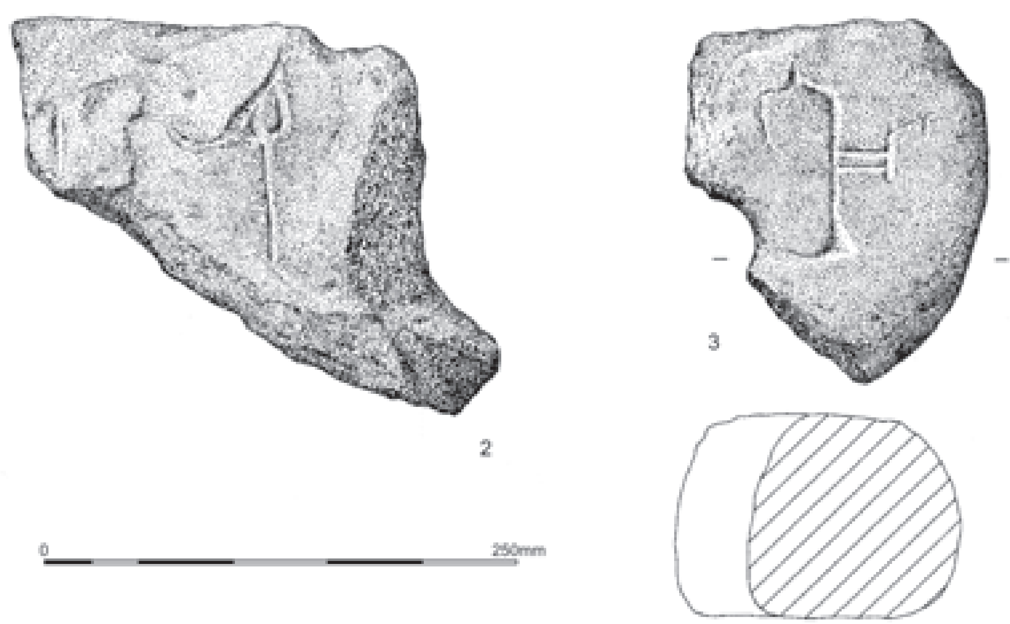


Illustration 5.3
Stones 2 and 3.

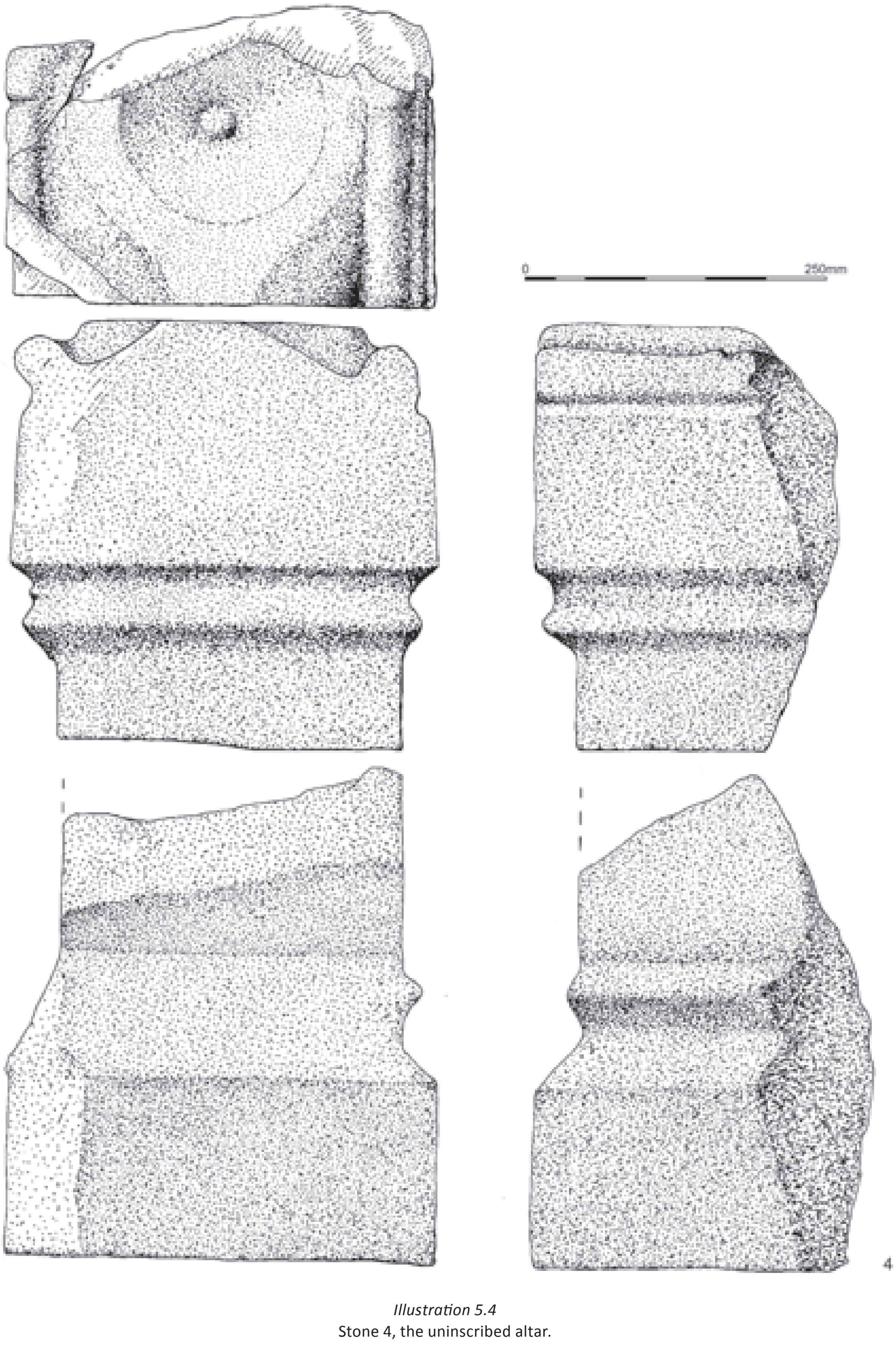


Illustration 5.4
Stone 4, the uninscribed altar.

Illustration 5.5
Stone 4, photograph of the uninscribed altar.

from forts in Scotland. Such inscriptions may identify the builders by naming the legion, or the cohort of an unnamed legion, or the century, or some combination of these three elements. For inscriptions combining the name of a legion and a centurion, as here, see *RIB* 1431, 1965, 2016, 2137.

The first line names the legion responsible, *legio XX Valeria Victrix*, the Twentieth Valiant and Victorious legion. The second begins with the name of the officer in charge, who may be presumed to have been a centurion. If a single name is used, this is most often the man's cognomen (surname); or if two names are given, these are the nomen (family name) and the cognomen (surname). Most probably Quint here is an abbreviated cognomen, eg Quinti, 'of Quintus', Quintiani, 'of Quintianus' or Quintini, 'of Quintinus'. Notice L Aurelius Quintus, centurion at Rome (*ILS* 4776) and Quintinus, centurion (presumably of II Augusta) at Caerleon (*RIB* 349); a lead-stamp from the same site, perhaps for bread, reads 7 *Quintini Aquilae*, 'the century of Quintinus (or Quintinius) Aquila' (RIB 2409.7). Quintianus, a centurion of *cohors I Frisiavonum*, is attested at Manchester (*RIB* 578). The name of the centurion in such texts is usually preceded by the notation 7, but this 'centurial' sign appears lacking here. The Bearsden stone commemorated construction work on a stone-built structure, presumably the north granary.

NG76CK; found in the rubble of building 4, the granary, unstratified.

2. Fragment of a flat slab, 200mm × 210mm × 90mm, with rounded top edge, rather worn, showing the possible remnants of one or more letters (left on illus 5.3) and what appears to be a leaf-tendril with a very long stalk. The orientation of the fragment is uncertain.

   NK73BT; building 3, topsoil.

3. Fragmentary block of stone, 185mm × 165mm × 120mm, with rounded edges, and part of a central perforation (right on illus 5.3). Visible on one surface is what could be a single letter F or two letters ligatured. Alternatively, if the fragment is reorientated by 90° to the right, it could show a stylised two-legged bird (Dr R S O Tomlin, pers comm, who compares *RIB* 1491 = Coulston and Phillips 1988: no 384). The stone seems most likely to have served as a counterweight.

   Bath-house, unstratified.

4. Uninscribed altar (illus 5.4 and 5.5). Two fragments preserve the greater part of an altar, in reddish buff sandstone. The first, 350mm × 360mm × 230mm, preserves the capital and the upper portion of the shaft. The capital is separated from the shaft by a plain triangular moulding round three sides; on the left side only there is a small, secondary moulding. The front of the capital is plain but worn, and damaged at the left side. The front of the right-hand bolster had broken away, but is now reattached. Damage has also been sustained at the front-left corner, matching that on the capital. The top of the capital is ornamented with plain bolsters, divided by an incised line half way along their length. Between them is a focus with high sides and a central boss, in imitation of a metal vessel. The second fragment, 380mm × 390mm × 300mm, preserves the base and a small part of the lower portion of the shaft which is separated from it by a plain moulding. Published: Keppie 1998: no 46.

   The two fragments together preserve about two-thirds of the altar, whose overall height can be estimated at *c* 800mm. The orientation of the fragments can be established by an examination of the chisel marks on the front and right-hand sides of both fragments. The bottom of the lower fragment has been slightly hollowed out in the centre. If the one well-preserved and carefully smoothed face has been correctly identified as the front of the altar, it seems most unlikely that any letters were ever carved upon it. The altar was found inside the bath-house, so was presumably in regular use; but we cannot say which deity or deities were being venerated.

   NK73BO; bath-house, cold room, rubble overlying floor.

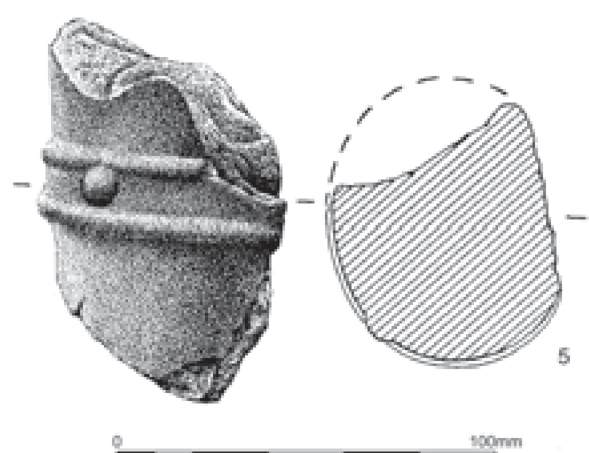


Illustration 5.6
Stone 5.

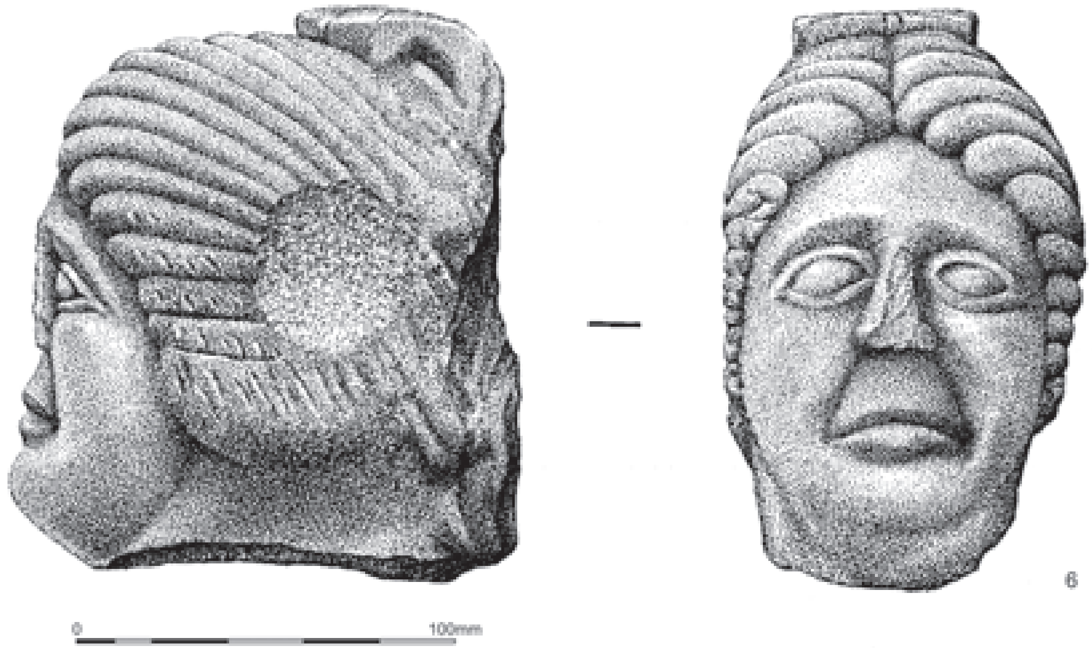


Illustration 5.7
Stone 6, the head of a goddess.

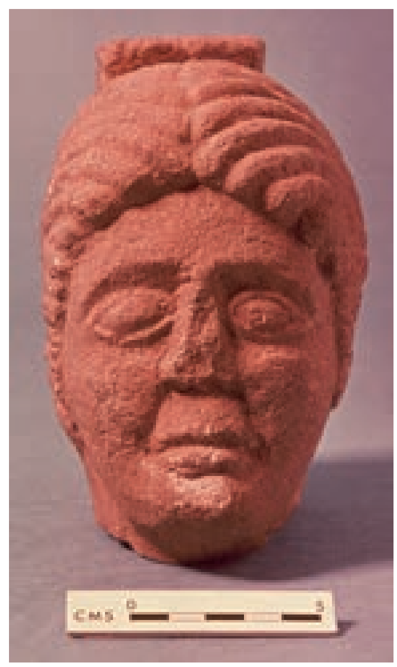


Illustration 5.8
Stone 6, photograph of the head of a goddess.

5. Fragment, 70mm × 105mm × 80mm, likely to be the central part of a bolster from an altar capital; it shows strapping decorated with a plain raised boss (illus 5.6). Cf *RIB* 2176. Published: Keppie & Arnold 1984: no 141; Keppie 1998: no 79.

   NK73, debris in the cold plunge of the bath-house.

6. Female head, 170mm × 110mm × 150mm (illus 5.7 and 5.8). The head, from a statue or bust of about half life-size, is only slightly worn but the nose is broken away. The face was sheared off at the moment of discovery, but was subsequently restored. There is damage at the right side and to the rear which is roughly finished off. The face, which is slanted slightly upwards, has broad, down-turned lips and lentoid eyes. The hair is neatly waved with a central parting and covers the ears. Rising from the top of the head, towards the back, is a roll of hair with a criss-cross binding on top. Published: Keppie & Arnold 1984: no 139; Keppie 1998: no 64.

   The waved hair is a familiar feature of Romano-Celtic portraiture. Compare, for example, a female head from the cold room of the annexe bath-house at Balmuildy (Keppie & Arnold 1984: no 133 = Keppie 1998: no 62); the water-spout from the bath-house at Duntocher (Keppie & Arnold 1984: no 151 = Keppie 1998: no 66); the statue of Brigantia from Birrens (*RIB* 2091 = Keppie & Arnold 1984, no 12); a head from York (Rinaldi Tufi 1983: no 71); the head of 'Luna Selene' at Bath (Cunliffe & Fulford 1982: nos 21–3); reliefs of the Mother Goddesses at Cirencester (Henig 1993: nos 116–17), and depictions of the Gaulish goddess Nantosuelta (Green 1995: 129). Notice also Espérandieu 1911: no 3379 and Howard-Davis 2009: 870 pl 230. The lentoid eyes are closely paralleled on a male head found recently at Binchester, County Durham. The findspot has prompted identification with Fortuna, often venerated in military bath-houses. However, no attributes of Fortuna survive here, so that a positive identification is not possible. The intact statuette

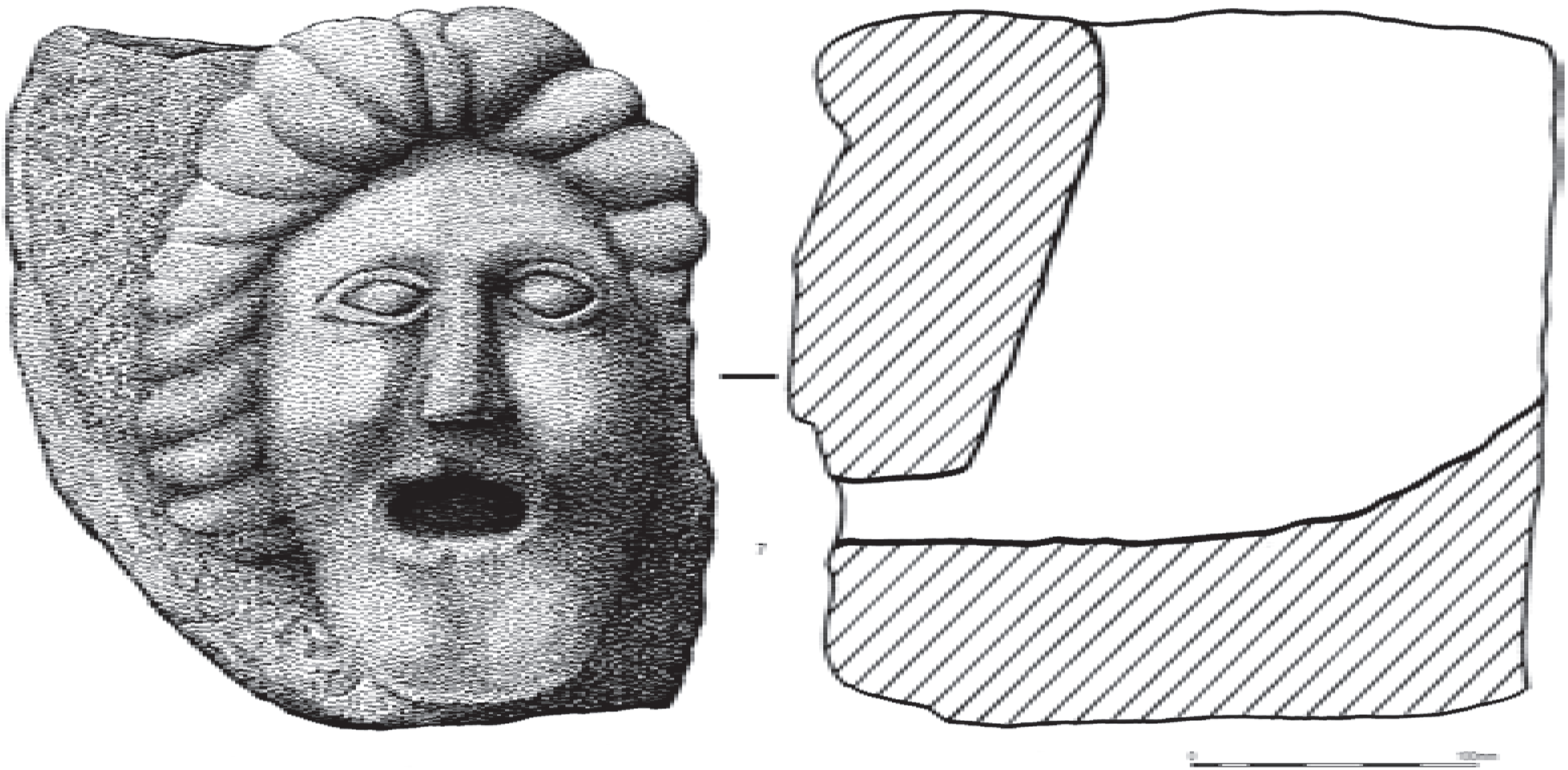


Illustration 5.9
Stone 7, the fountain head.

of Fortuna found in the commander's baths at Birdoswald on Hadrian's Wall has similar features (Coulston & Phillips 1988: no 15); cf Krüger 1970: no 192.

NK73DR; bath-house, rubble in the cold bath.

7. Fountain head, 250mm × 260mm × 290mm (illus 5.9 and 5.10). The front is carved to show a human head, with broad, gaping mouth, lentoid eyes, and thick loosely waved hair. The right-hand side is broken away, and slight damage has been sustained to the nose, mouth and chin. The back of the stone is hollowed out to receive water brought to it in a pipe or a channel-stone; water exited through the mouth, presumably into a basin below (cf Keppie & Arnold 1984: no 151). Published: Keppie & Arnold 1984: no 140; Keppie 1998: no 65.

Illustration 5.10
Stone 7, photograph of the fountain head.

The fountain head recalls those ornamenting public fountains at Herculaneum (Wallace-Hadrill 2011: 168), and is reminiscent of Graeco-Roman theatrical masks. A terracotta antefix from the roof of the legionary bath-house at Exeter exhibits a similarly gaping mouth (Bidwell 1979: 149 pl xviii). The treatment of the eyes and hair here reveals strong Celtic influence, in workmanship resembling no 6 above. Cf Espérandieu 1918: 5543.

NK73; south of bath-house changing-room, unstratified.

8. Building stone, 270mm × 185mm × 225mm, on which is a crudely incised human figure with a large head, a protruding ear, and deep-set eyes (illus 5.11). The left side of the stone is broken away. The legs terminate in short horizontal strokes representing the feet; the right leg is perhaps bent at the knee. To the right is a vertical pole from which protrude short lines, angled downwards. Published: Keppie & Arnold 1984: no 143; Keppie 1998: 128 no 75.

Illustration 5.11
Stone 8.

The figure has much in common with incised 'outline' figures usually held to represent Celtic deities. If so, the object on the right may be a tree; cf Brewer 1986, no 15, Coulston & Phillips 1988: no 360; Henig 1993: nos 126–7, 129; Coulston 1997: 119, figs 8.13, 8.14; *RIB* 3189.

NK73; among debris overlying the bath-house.

9. Fragment of the decorative border of a sculptured slab, 75mm × 145mm × 65mm, showing a frieze of leaves and tendrils (illus 5.12). Published: Keppie & Arnold 1984: 51 no 142; Keppie 1998: 130 no 80.

NK73DR; bath-house, cold bath.

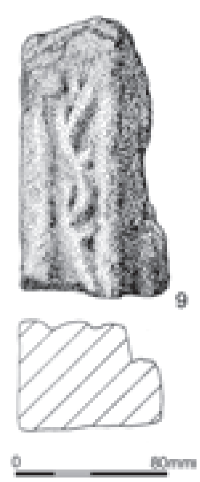


Illustration 5.12
Stone 9.

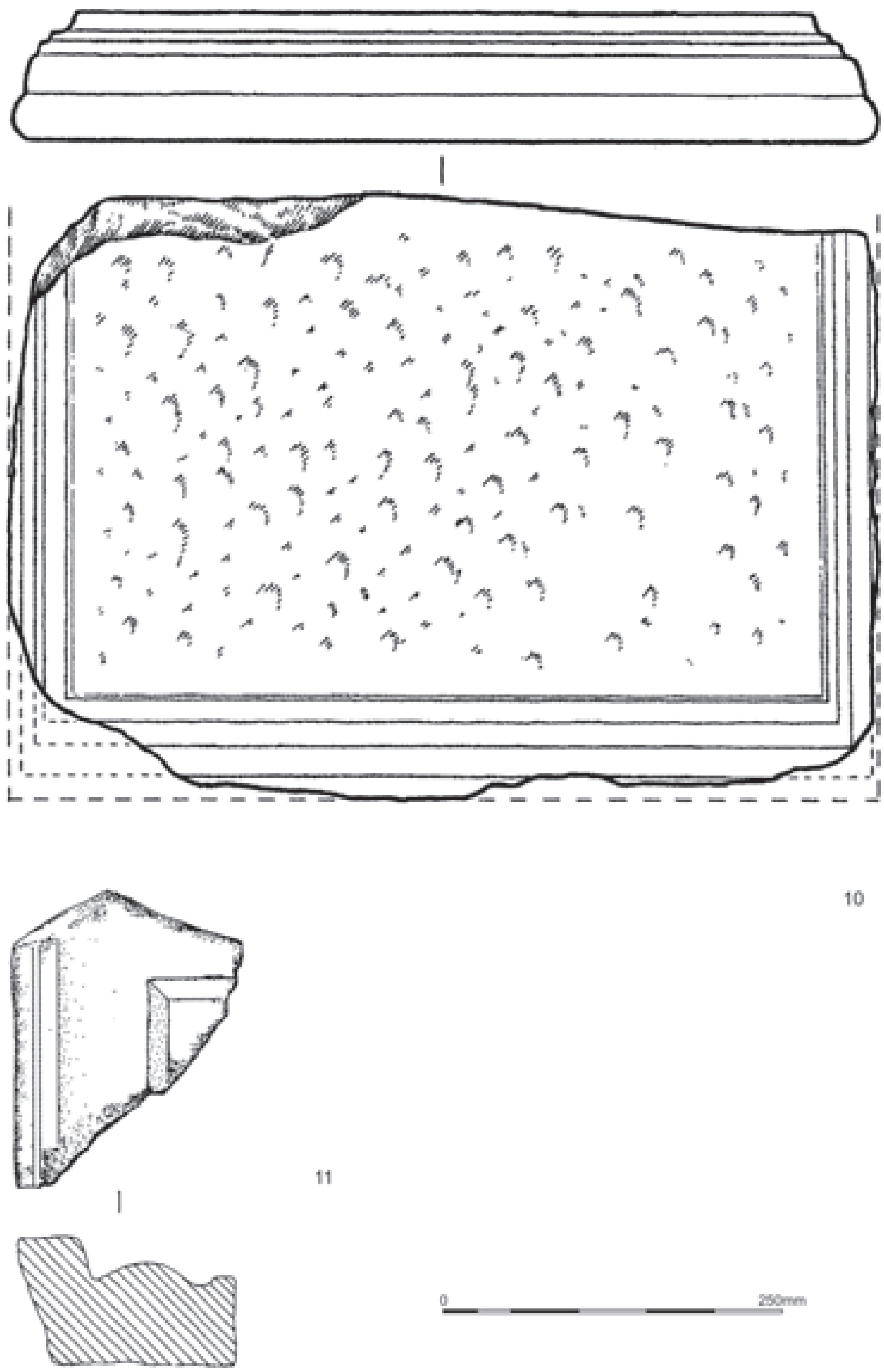


Illustration 5.13
Stones 10 and 11.

10. Plinth, 620mm × 410mm × 110mm, with plain mouldings round three sides, much damaged and chipped at the corners (illus 5.13). The fourth side, presumably the back which was not intended to be seen, is plain. On the underside two symmetrically placed holes, 20mm–40mm across and 30mm–40mm deep, close to front left and right corner were perhaps designed to receive wooden pegs. Very probably this plinth served as the base for an altar, perhaps for number 4 (above); but there is nothing in the chiselling or the style of mouldings to suggest that they are the work of the same craftsman.

    NK73BH; bath-house, topsoil.

11. Corner fragment of a moulded plinth or sculptured panel, 90mm × 220mm × 170mm (illus 5.13).

    NK73; bath-house, unstratified.

5.2.2 Voussoir stones

12–25. Fourteen complete or near-complete voussoirs (no 22 is illus on 5.14), mostly 370mm–390mm square and from 110mm–180mm thick at the widest point, tapering to 90mm–160mm (cf illus 5.15). Each has ledges at the top and is notched close to the bottom of each side to receive horizontal tiles, between which the heat circulated. Two stones are a different size, measuring 460mm × 380 mm × 130mm tapering to 110mm, and 400mm × 160 mm × 160mm tapering to 140 mm, while one exhibited no tapering. Two stones have a large x incised on one side-face (cf *RIB* III 3304, 3305, 3367–3369); one has an incised V. In one example, a groove 80mm wide and 10mm deep had been cut on the underside (no 20) and in another case there was a shelf 450 mm long and 10mm deep on the underside (no 23). Most were found in the debris overlying the primary bath-house; three (nos 16, 18, 19) overlay the adjacent hot room.

26–32. Seven larger fragments belonging to voussoirs, measuring between 235–370mm × 200–370mm × 100–130mm. Most were recovered from the debris overlying the primary bath-house; one was found in the hot room (no 27).

33–49. Seventeen smaller fragments, which from their shape, thickness or the presence of ledges or notches, seem to have been parts of voussoirs. Several fragments could belong to the same voussoir. They vary in size from 85–240mm × 100–200mm × 90–145mm. Two were of gritty sandstone (nos 39, 48). Most were found in the debris overlying the primary bath-house; one was in the cold bath (no 40) and another outside the south-east corner of the bath-house in topsoil (no 45).

Voussoirs were an integral part of the vaulted roofing of a bath-house (see Bidwell 1979: 51–5; Zienkiewicz 1986: 1, 10). On the Antonine Wall stone voussoirs have been found in bath-houses at Duntocher in 1775 (Keppie 2004: 186, 188, 194) and at Carriden in 2008 (G Bailey, pers comm with *Britannia* 40 (2009) 228). The former, to judge from antiquarian descriptions, resembled the Bearsden examples, while the

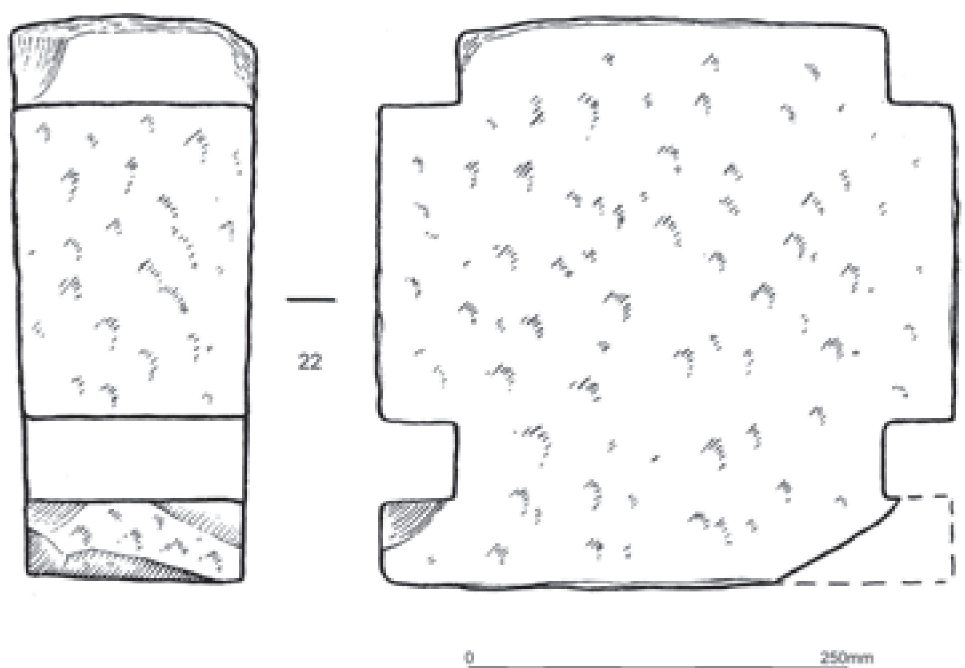


Illustration 5.14
Stone 22.

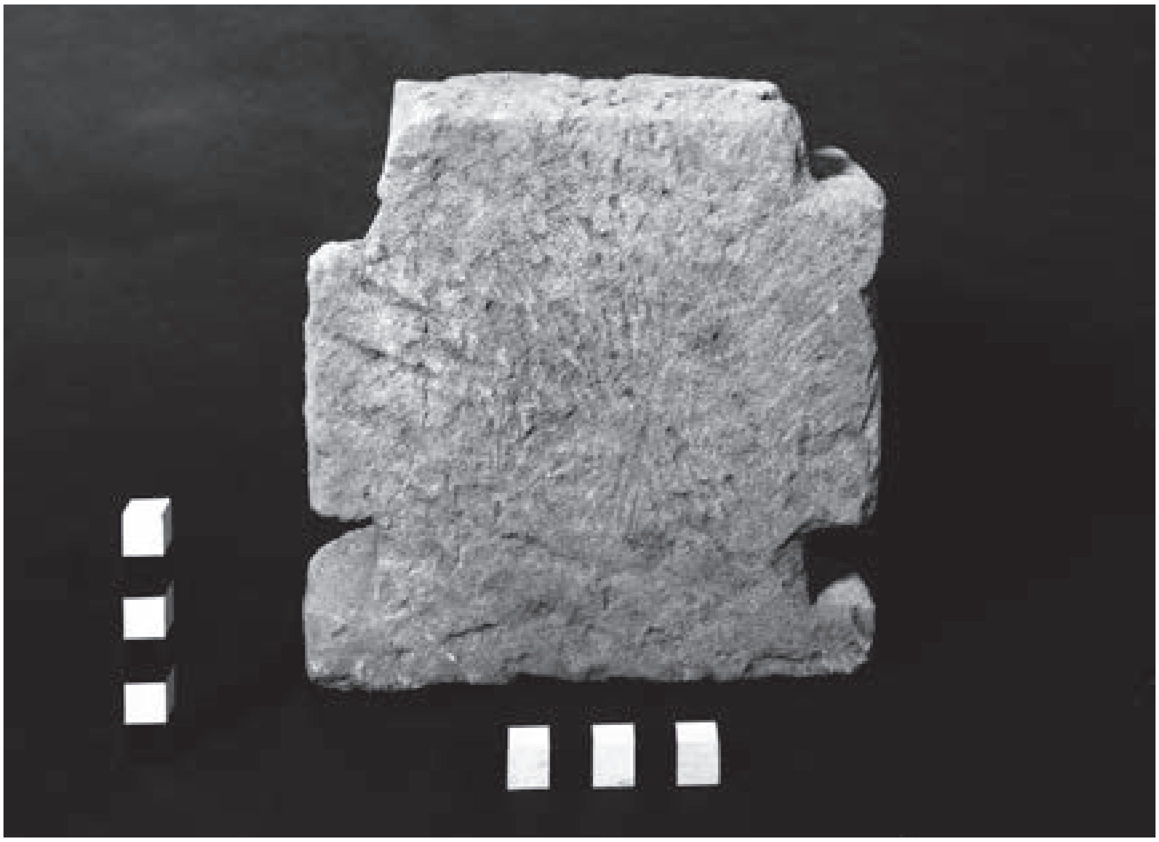


Illustration 5.15
Photograph of a voussoir.

voussoir from Carriden (and one from nearby Bridgeness; see Macdonald 1937: 383) lacked the lower notches. Both these types occur at Chesters on Hadrian's Wall, the former in sandstone (Macdonald 1931: 223 fig 2; 263) and the latter in lightweight volcanic tufa (Macdonald 1931: 280 with figs 7–8). Sandstone voussoirs were also used at Vindolanda and Great Chesters (Macdonald 1931: 282; Birley, A 2001, 27), and at Corbridge (Bishop 1998: 42). Tufa voussoirs are found in use at Roman villas in southern Britain, as are terracotta voussoirs (Lancaster 2012).

5.2.3 Bath-house furniture

50. Bench-top, 780mm × 370mm × 90mm, broken off at the corners and the back (illus 5.16). Centrally placed on the front is a blank ansate panel (350mm × 70mm) with plain borders. Cf Darde 1990, 176, no 2 for an inscribed table top in marble, at Nimes in France; *RIB* 1686 and 3181 for ansate panels carved on the fronts of altar capitals.

    Fill of cold bath.

51. Bench-top, 610mm × 400mm × 100mm, with rounded front edge and incised line on top; the front-left corner is broken away (illus 5.16).

    In the north-west corner of the second warm room, lying on the floor.

52. Bench-support, 430mm × 120mm × 380mm, with plain mouldings (illus 5.17 and 5.18).

    Found with no 51 upright in the north-west corner of the second warm room.

53. Bench-support, 530mm × 160mm × 300mm, with plain mouldings and dove-tailed ledges to support a seat; damaged at back (illus 5.17 and 5.18).

    In the basement of the hot room.

54. Bench-support, 530mm × 160mm × 300mm, with plain mouldings and dove-tailed ledges to support a seat; damaged at back (illus 5.17 and 5.18). A twin for no 53.

    In the basement of the hot room.

55. Bench-support or moulded plinth, 420mm × 230mm × 320mm.

    Cold room.

Stone benches and tables were a familiar feature of Roman bath-houses, matching the furniture in bronze, wood or marble which adorned private houses. Some bench-supports are

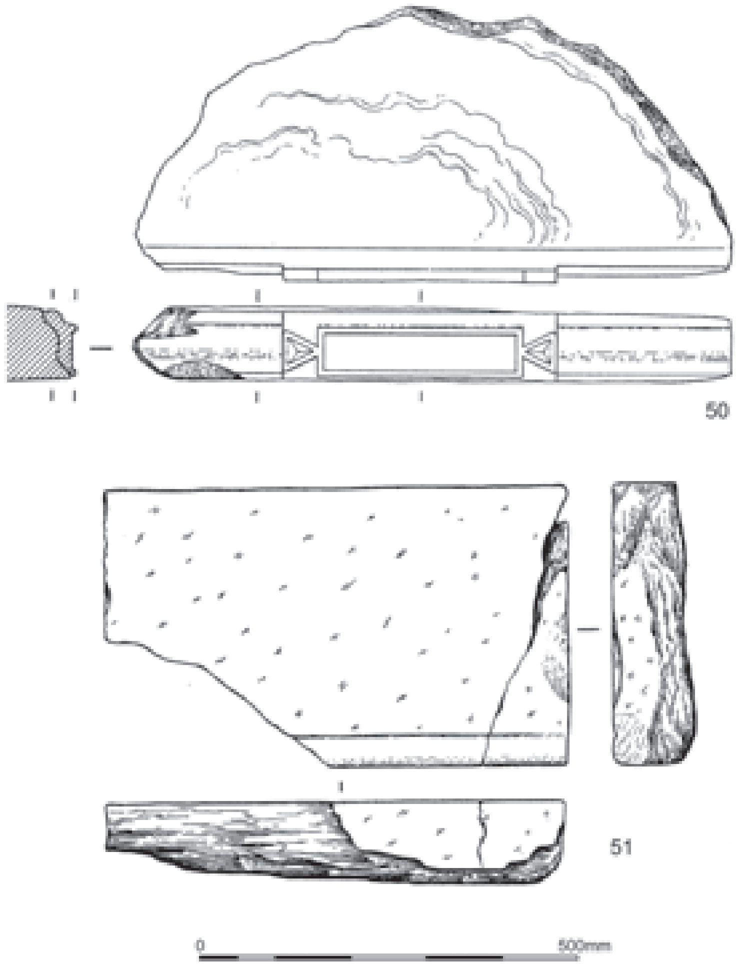


Illustration 5.16
Stones 50 and 51.

elaborately decorated, in the form of animal-legs (see Richter 1926: 141 with figs). Simple bench-supports are known on the Antonine Wall in bath-houses at Balmuildy (Miller 1922: 44, pl 18A) and at Mumrills (Macdonald & Curle 1929: 414, fig 11b, 453), as well as at Cramond (Holmes 2003: 122). Others are on-site at Corbridge and at Chesters. Notice also the elaborately ornamented 'sideboards' discussed by Cunliffe and Fulford 1982: xiv.

5.2.4 Worked building stones

Twenty-six building stones with particular features were individually recorded.

56–65. Ten simple building stones measuring 90–175mm × 180–650mm × 205–370mm. Some have the front face decorated with diamond-broaching.

66–72. Seven stones with one edge bevelled, measuring 105–190mm × 210–350mm × 130–370mm (illus 5.19).

73. Building stone, corner block, 120mm × 320mm × 220mm.

74. Building stone, 120m × 305mm × 230mm, with two adjacent edges bevelled, perhaps from a base or a plinth.

75. Building stone, 270mm × 120mm × 190mm, with moulded edge.

76. Tapered building stone, 135mm × 280mm × 275mm, in whitish buff sandstone, having front face chiselled with vertical and horizontal lines, in a pattern of squares, and criss-cross lines incised on upper and lower faces (illus 5.20).

77. Building stone, 145mm × 375mm × 270mm, in whitish buff sandstone, having front face chiselled with vertical and diagonal strokes.

78. Building stone, 195mm × 135mm × 150mm, with parallel mouldings on one side.

79. Block of reddish-buff sandstone, 270mm × 230mm × 120mm with deep hollow in one end.

80. Shaped block, 200mm × 360mm × 310mm, with possible embossed human head or roundel, and with one side hollowed out.

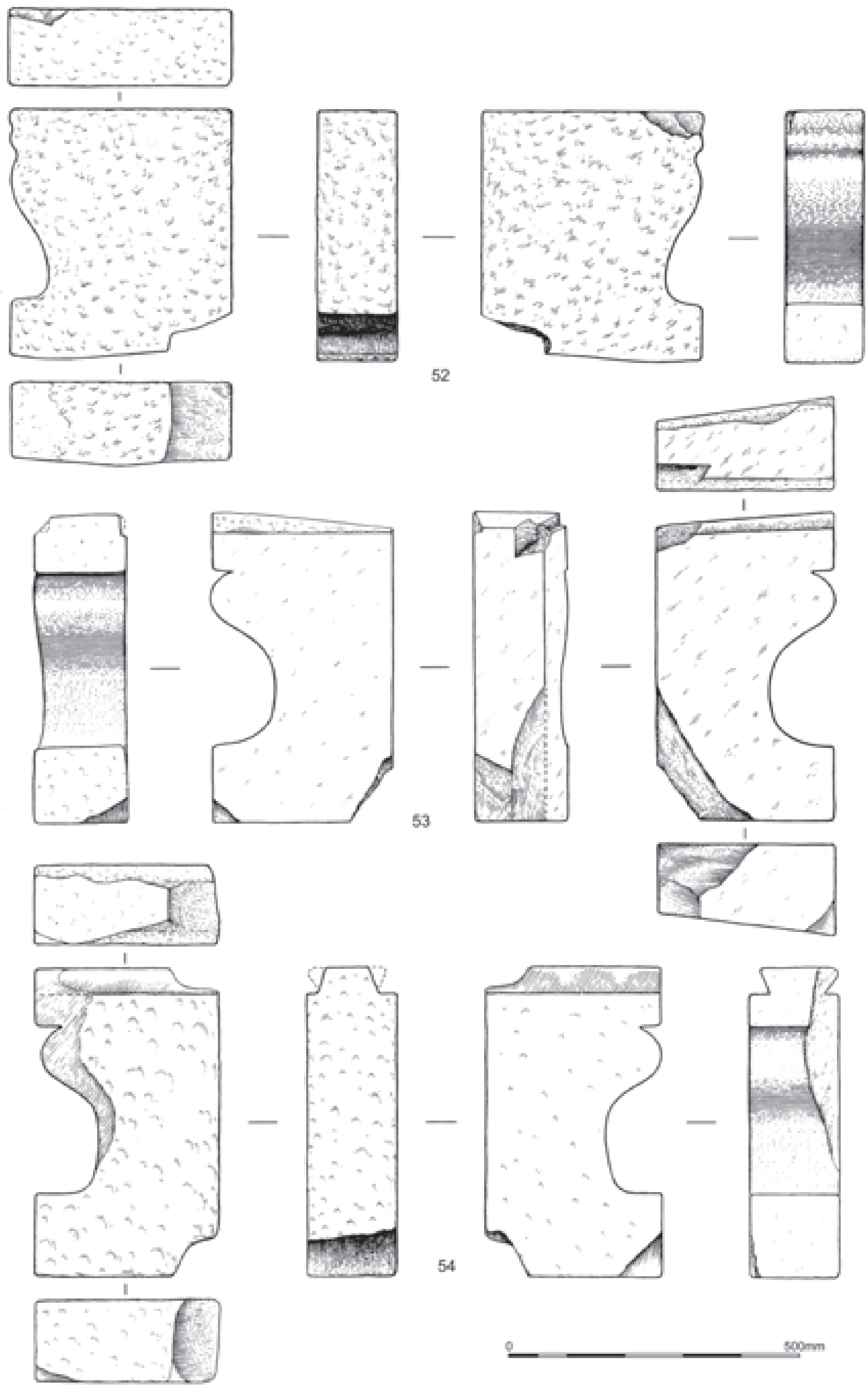


Illustration 5.17
Stones 52–54.

81. Circular stone, diameter 145mm, with domed surfaces, smoothed by water action.

    All these stones were found in and around the bath-house, unstratified.

5.2.5 Slabbing, flooring and paving

82. Fragment of flat slab, 160mm × 140mm × 30mm thick, scratched with diagonal lines to create a frame-work for playing a board game, probably *ludus latrunculorum* (the 'bandits' game') (illus 5.20 and 5.21). Such 'gaming boards', often incised on slabs or fragments thereof, are found at many sites, including Inveravon (Dunwell & Ralston 1995: 562, illus 26), Birrens (Robertson 1975: 100 no 55, fig 26), on Hadrian's Wall, and at Exeter (Holbrook & Bidwell 1991: 279, fig 135). For the game, see Austin 1934; Liversidge 1968: 349–50; Crummy et al 2007: 187, 217, 352–75.

    NK75Cy; building 4, rubble.

83–5. Three paving slabs, one complete 540mm × 700mm × 80mm thick; two fragments of others, one with fossil fern impressions, identified as lepidodendron (of the Carboniferous Age, *c* 330 million years ago).

    Bath-house, second warm room.

86. Fragment of paving slab, 200mm × 180mm × 80mm, with man-made hollows in top and bottom faces, perhaps the beginnings of a perforation.

Illustration 5.18
Stones 52–4, bench-supports.

87. Fragment of slab, 200mm × 150mm × 110mm, with raised border and bevelled edge.

88. Fragment of channel stone, 110mm × 220mm × 200mm.

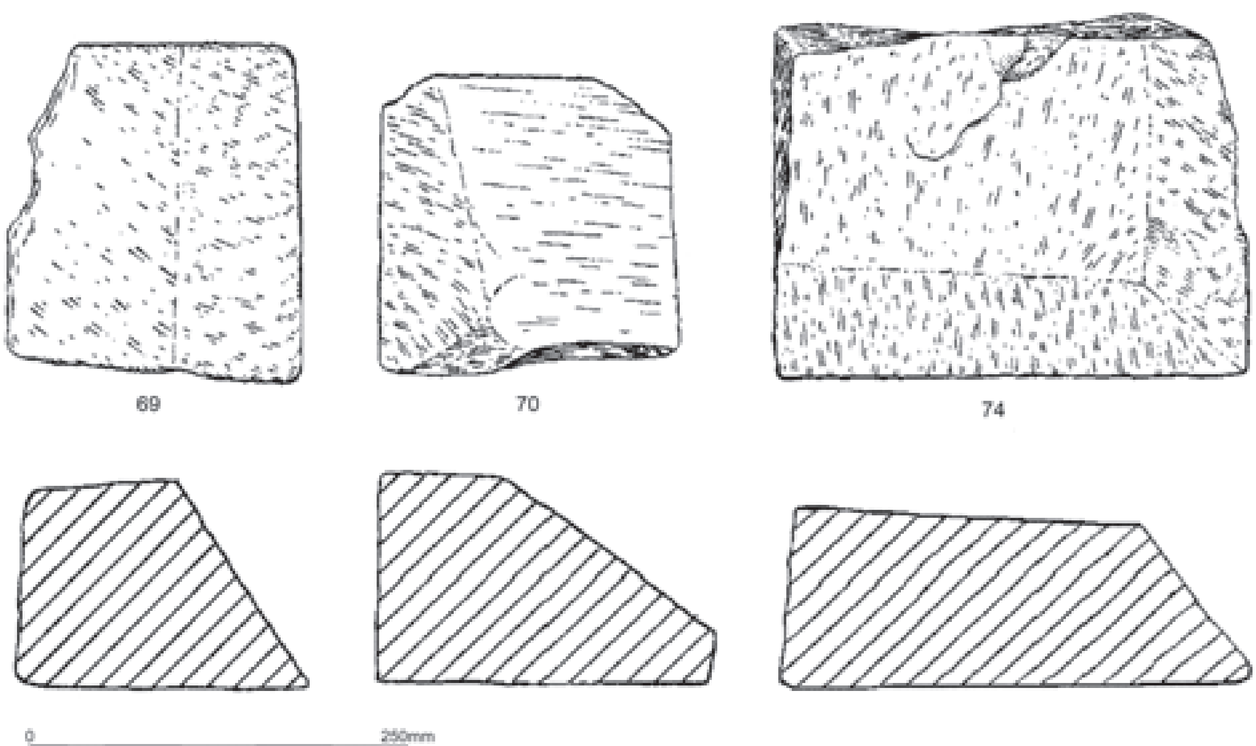


Illustration 5.19
Stones 69, 70 and 74.

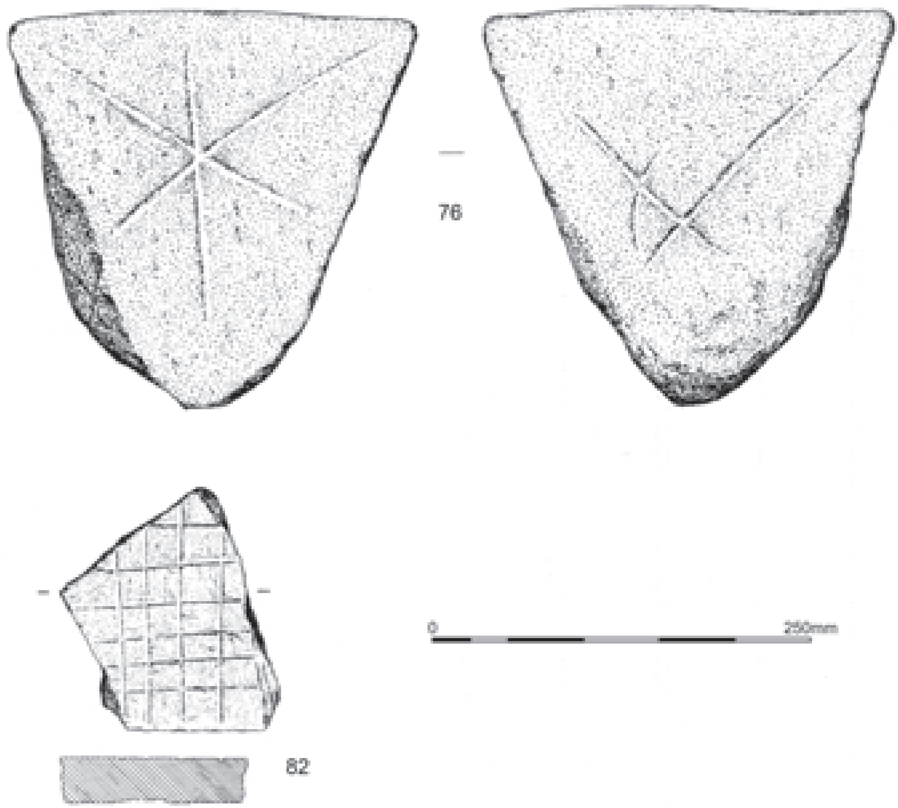


Illustration 5.20
Stones 76 and 82, a worked stone and the gaming board.

89. Fragment of ?channel stone, 160mm × 150mm × 280mm.
    Drains south of the bath-house.

5.2.6 Miscellaneous

90. Shaped keystone for arch, 430mm × 180mm × 120mm, tapering to a point.

Illustration 5.21
Stone 82, photograph of the gaming board.

91. Fragment preserving half of a roughly finished circular block, 120mm × 310mm × 190mm, with a central semi-perforation 30mm wide at the top narrowing to 10mm, and a second perforation begun from the bottom. The stone, which may have broken during the work of perforation, could have been intended as the upper stone of quern.
92. Block, 170mm × 450mm × 300mm, with subcircular edging, 250mm in diameter with depression 100mm deep on the upper surface, perhaps to receive a door pivot.
93. Building stone, 110mm × 250mm × 280mm, with chisel marks on outer face, and rough hole gouged in top, 80mm in diameter, 35mm deep, perhaps for a door- or post-pivot.
94. Counterweight, 300mm × 300mm × 150mm, tapering to 65mm (illus 5.22), with central, subcircular perforation, 100mm × 80mm (cf above no 3). There is evidence of wear by ropes in two places.
    Bath-house, unstratified.

5.3 THE MILLING STONES

ADAM T WELFARE

5.3.1 Introduction

Six fragments of quernstone were retrieved from disparate locations within the fort and annexe, but upon inspection, two

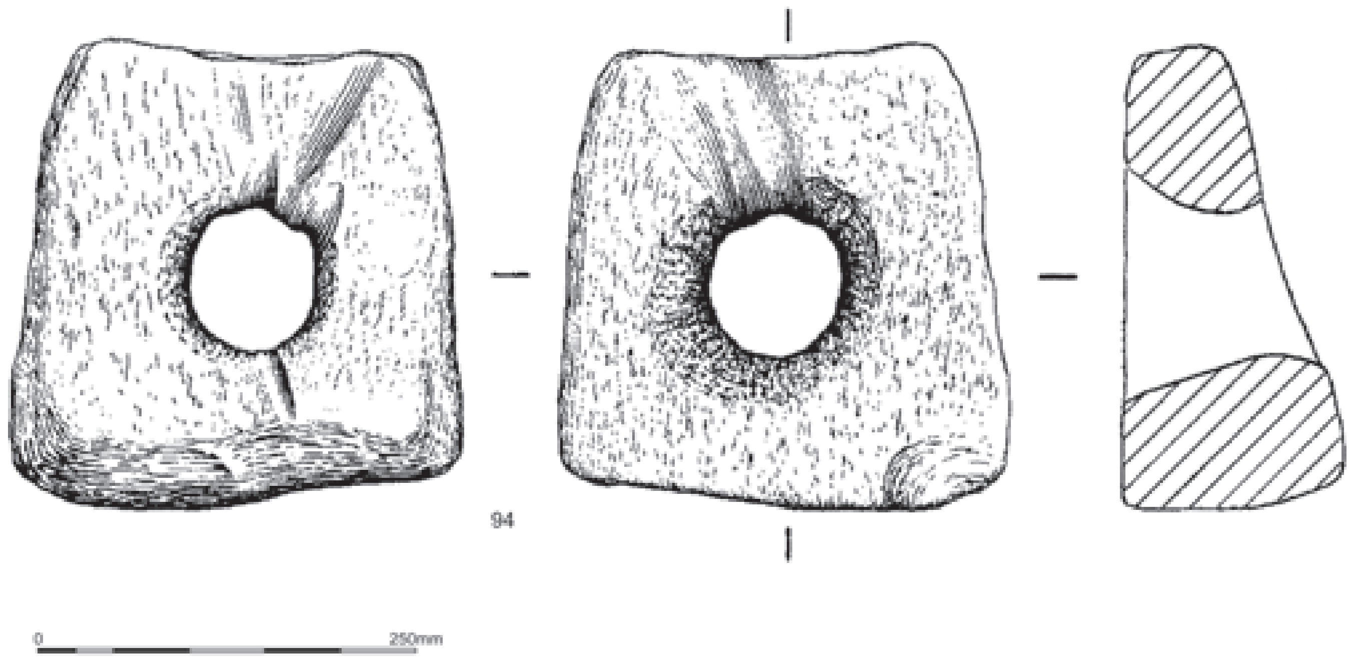


Illustration 5.22
Stone 94, the counterweight.

of these were found to be conjoining (4). In addition, a further fragment of worked stone which was cautiously identified as a milling-stone upon its recovery possesses too few characteristics to sustain this classification with certainty (6). Thus the collection consists of only five distinct quernstones, of which, three are upperstones (1, 2 and 5) and two are lowerstones (3 and 4).

5.3.2 Catalogue

Imported continental manufacture

UPPERSTONES

1. A single fragment representing about 26% of an upperstone, having an estimated diameter of about 460mm (illus 5.23.1). Thickness at the circumference 91mm–95mm. Part of a sub-rectangular socket measuring 40mm × 23mm is inset from the raised margin that circumscribes the hopper. It is 23mm in depth, and the side proximate to the hopper is slightly undercut. No traces of a lead fixative are evident within it. A single striae on the raised margin adjacent to the socket is all that survives of the original pattern of dressing once present over the upper surface. At the bottom of the hopper is part of the central circular eye; estimated diameter about 88mm. Here the thickness of the stone is reduced to 35mm–40mm. Faint traces of vertical striae survive about the side of the stone, while the dressing on the depressed face takes the form of furrows set in rudimentary harps. The maximum wear is found about the eye, where two light concentric score-marks are etched into the face.

   Hand specimen: a blue-grey vesicular lava, with a large quartz inclusion (62mm × 20mm) present upon the raised margin (Mayen).

   Condition: very weathered and friable.

   NK75BT; incorporated in the east intervallum road next to buildings 6 and 7.

2. A single fragment representing about 15% of an upperstone, having an estimated diameter of about 400mm (illus 5.23.2). Thickness at the circumference, 56mm–64mm. The raised margin circumscribing the hopper has an estimated diameter of about 310mm. The eye and every trace of the original dressing upon all of the surfaces of the stone are lost. The grinding face is depressed.

   Hand specimen: a blue-grey vesicular lava (Mayen).

   Condition: very weathered and friable.

   NK76AH; building 4, topsoil.

LOWERSTONES

3. A single fragment representing about 45% of a lowerstone, having an estimated diameter of about 400mm (illus 5.23.3). Thickness at the circumference, 36mm–40mm. The elevated face is set with furrows arranged in rudimentary harps and these remain sharply cut. A portion of a biconical eye survives at the centre of the face, estimated diameter about 43mm. Thickness at the eye, 53mm. Much wear has occurred about the eye and this has led to the development of a pronounced boss; but the lands at the skirt are also

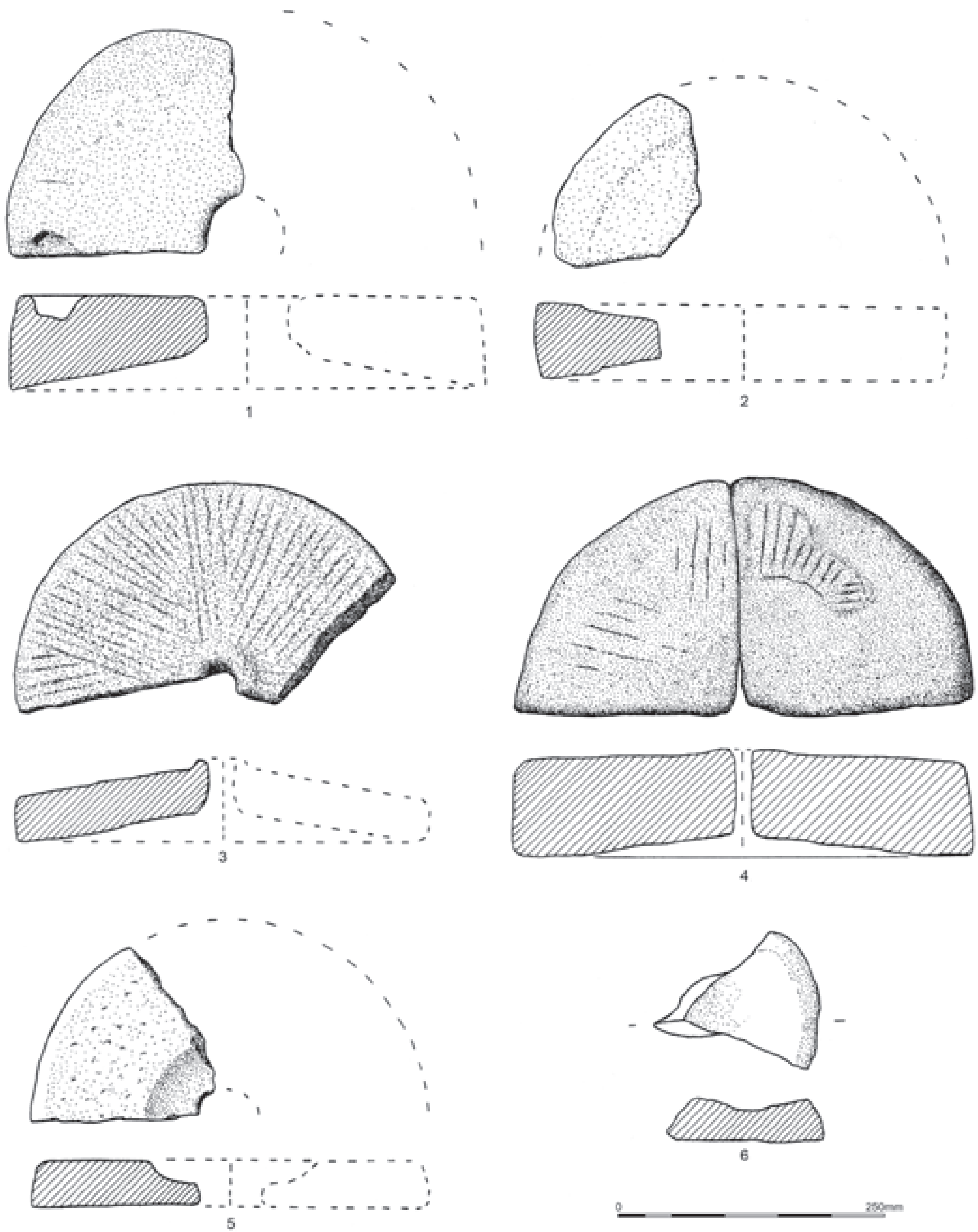


Illustration 5.23
Querns.

much rubbed, displaying a flattened profile. A sequence of well-defined vertical striae are etched about the side of the stone, but these do not conform to the furrows engraved upon the face. The depressed base is neatly dressed to shape.

Hand specimen: a blue-grey vesicular lava (Mayen).

Condition: unweathered.

NK78CP; outer west ditch, silt.

4. Two conjoining fragments representing about 50% of a lowerstone, having an estimated diameter of about 460mm (5.23.4). Thickness at the circumference, 85mm–94mm. The elevated face is set with furrows arranged in rudimentary harps, and at its centre is found the remnants of a biconical eye. Thickness at the eye, 85mm. The wear appears to have been evenly distributed over the face. Traces of the dressing of vertical striae survive around the sides of the stone. The depressed, convex base is neatly dressed to shape.

   Hand specimen: a blue-grey vesicular lava (Mayen).

   Condition: both fragments are very weathered; the surface of the face is in an advanced state of exfoliation.

   NK78BD; the two fragments were found divorced from one another in the turf tumble of the west rampart just south of the water tank in the intervallum west of building 4.

Roman-British Manufacture

5. A single fragment representing about 16% of an upperstone, having an estimated diameter of about 400mm (illus 5.23.5). Thickness at the circumference, 40mm. The upper surface is neatly dressed with pock-marks, but this has been subsequently erased or smoothed adjacent to one fracture of the fragment. Estimated diameter of diminutive circular hopper, about 180mm. Estimated diameter of fragmentary eye, about 70mm. The sides of the stone are slightly convex and pock-dressed; but, as on the upper surface, small areas have been subsequently smoothed. Traces of iron oxide adhere to the surface. The almost horizontal face is dressed with furrows, but they only stretch to within 45mm of the eye due to subsequent wear. Within the furrow-free zone are lightly etched concentric striae, but the maximum wear appears to have occurred at the skirt where the profile of the lands is severely abraded.

   Hand specimen: a fine-medium grained, yellow-brown gritstone.

   Condition: a chip has been detached from the upper edge of the stone, immediately above the iron–staining.

   Bath-house, unstratified.

Miscellaneous

6. A fragment of worked stone displaying a smoothly dressed outer edge, akin to the upper surface of a beehive upperstone (illus 5.23.6). Thickness, 35mm–50mm.

   Hand specimen: a fine-medium yellow-brown gritstone.

   Condition: unweathered.

   NK73CE: in rubble above bath-house.

5.3.3 Discussion

Four of the fragments are fashioned from a blue-grey, vesicular lava (1–4), and this, together with their design, mark them as typical products of the great quarrying industry centred upon Mayen in the Eifel. By contrast, the remaining stone in the collection is fashioned from a more local gritstone (5), although direct analogies for its design can be found in Northern Europe. It is also likely to have derived from a formal quarry.

Although the collection is small, it is not devoid of interest. The two designs represented are perhaps the most common within the assemblages from military sites in northern Britain; and, despite their differences of detail, both incorporate the most crucial of the technological developments made upon the continent (Welfare 1985). That so few milling-stones were retrieved, in spite of the size of the area investigated, is more curious. Watermills were already current in the province, but there is no evidence that these were to be found so far north at such an early date; and while it would perhaps have been possible to import meal or flour from further south, the problem of its transport and its keeping-properties would hardly have justified the necessary infrastructure. In addition, there is nothing to indicate that other forms of geared mill were available to the garrison. Doubtless, many of the milling-stones employed and discarded during the occupation of the site may have been taken away during episodes of robbing after abandonment; but, equally, the very shortness of the duration of the occupation may be a significant factor. The lengthy and complex historical sequences witnessed at many of the military installations that provide the fullest assemblages of milling-stones, in combination with the problems associated with the nature of the occupation and the suitability of a stone for re-use as raw material, serve not only to disguise and displace the floruit and longevity of a design, but also to obscure the relative frequency with which such were discarded. Thus, it may be that the dearth of discoveries here provides a more accurate index of incidence than can normally be perceived. Plainly, all the fragments derived from querns that were in use in the mid-second century, but such is the wear exhibited by most of the Mayen examples that they must have already seen lengthy service and were close to the end of their working life. Those that were still useable at the end of the occupation will have been taken away upon orderly withdrawal unless conditions were exceptional.

Unfortunately, most of the Rhenish fragments have suffered from weathering in the soil (1, 2 and 4); but the lowerstone retrieved from near the bottom of the silt within the outer west ditch of the fort is unusual in that its fabric has maintained its original character, allowing the surface detail to remain sharply defined (3). Originally, each of the lava fragments will have constituted a part of a quern which would have been broadly comparable in design to those from Binchester and Newstead, (Hoopell 1891: 40; Curle 1911: 145–6; Plate x VII). Neither of the upperstones, however, now discloses any trace of the iron-fittings with which such stones were generally equipped. The larger of the fragments (1) does exhibit a portion of a sub-rectangular socket within its raised margin – a position where the 'elbow-shaped' perforation provided for an iron spike-loop handle-fitting is typically found. However, too little of this survives to discount the possibility that it may have formed part of a socket for a simpler kind of upright handle, or alternatively a sinking intended to hold one terminal of a heavy bar-rynd of the type that can be seen in a stone of comparable design from Housesteads. In addition, the fragment exhibits two light concentric scorings on its face around the eye, which are likely to have resulted from the quern being poorly set-up and carelessly maintained in the latter part of its life. Both of the lava lowerstones (3 and 4) display the same wear pattern around the eye of the spindle in the centre of the face; but that in the larger fragment has developed into a pronounced boss (3). This is a feature that can either arise from careless maintenance, or from the gross miss-match of stones. However, the performance of neither quern is likely to have been seriously compromised.

The smaller of the two fragments (4) is of interest in one further respect: the vertical striae decorating its circumference bear very little relationship in their number and disposition to the layout of the furrowing displayed upon the face. This is relatively unusual in Mayen stones where the correspondence is often close, allowing the inference to be drawn that such striae were sometimes used as a guide when recutting the furrows in their rudimentary harps. In this instance, the vertical striae have not been used in this way.

The upperstone of Romano-British manufacture seems typical of its design, but also lacks any clear indication of the fittings with which it was equipped. The rubbed areas about its circumference and the traces of iron oxide in the vicinity could imply that it was formerly fitted with a handle attached to an iron hoop. However, such stones were often provided with a lateral handle-chase inset from the upper surface.

5.4 THE FLINT FLAKE

EUAN W MACKIE

Description

This is a narrow, parallel-side struck flake – technically a blade of honey coloured flint; the top end, including bulb of percussion and striking platform, appears to have been snapped off. Both long edges have been secondarily trimmed by fine pressure flaking, using the flake surface as a platform, to give the flint a neat D-shaped cross section and convert it into a small knife blade, presumably of Neolithic age.

Dimensions: length 51mm; max width 17mm; max thickness 6mm.

NK78AG; drain through annexe east rampart.

Chapter 6

BRICK AND TILE

6.1 INTRODUCTION

DENNIS B GALLAGHER

The excavations produced a total of 115.45kg of ceramic building material, most of which was associated with the bath-house. The main concentration was found in the pits immediately west of the bath-house changing room. There was, however, a scatter of fragments across the fort. Placing aside deposits of less than three fragments, there were seven fragments in building 1, 14 on the east intervallum, 20 at the west end of building 3, 30 in and around building 4 (the north granary), and 85 in the area of 'building' 16 with a further six on the intervallum to its east. It is not surprising that so many fragments came from what appears to have been an industrial area, building 16, nor that some were found with the other material apparently dumped on the east intervallum of the fort. The more interesting collection is from the north granary and the fragments from the adjacent area to the north may be related. The implication is that the granary had a tile roof. The much smaller area of the south granary which was excavated provided only one fragment.

Most of the tile was in a soft orange-red fabric, with a grey core, similar to pottery Fabric 4. There was a small amount in a

Illustration 6.1
Photograph of box tiles.

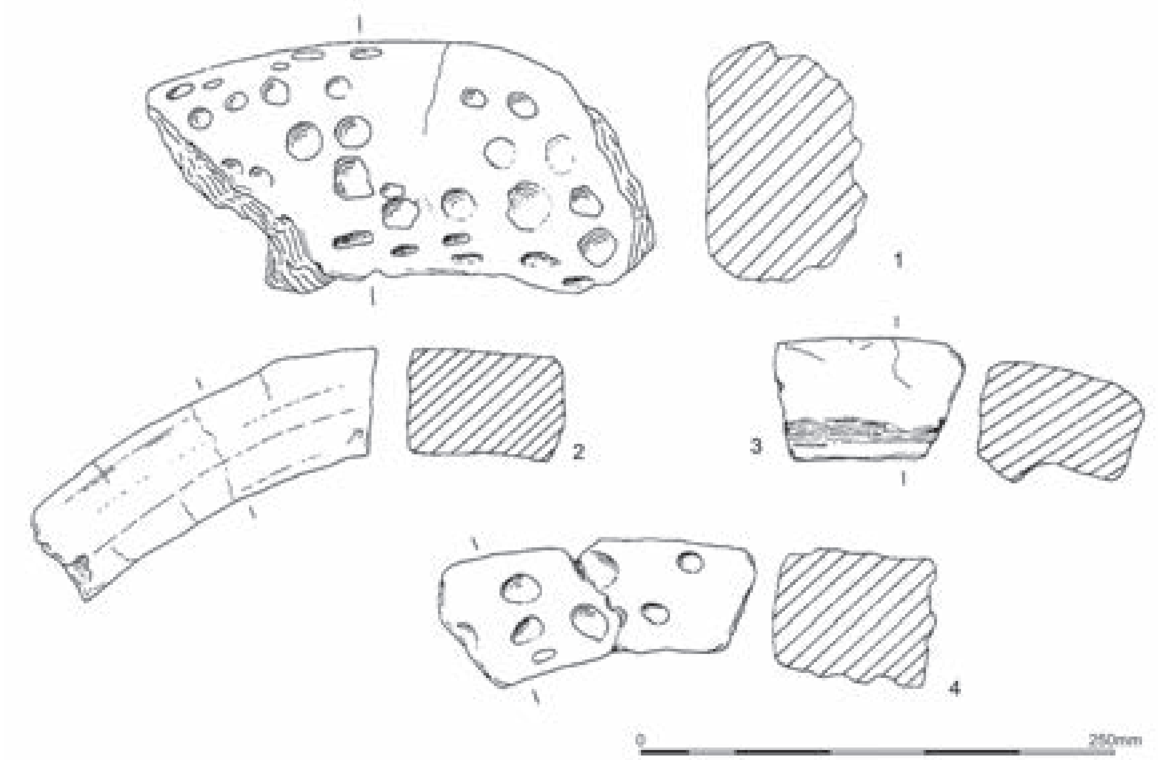


Illustration 6.2
The curved bricks.

Illustration 6.3
Photograph of the curved bricks.

hard buff-coloured fabric and several brick fragments in a very hard purple/red fabric.

6.2 TYPES

All the ceramic building material was very fragmented and no complete tiles were recovered. The fragmentary nature of the material meant that it was difficult to distinguish with certainty between box tile and *tegula*.

Imbrices

Only a small fragment of a possible *imbrex* was noted in the ceramic building material. One must conclude either all the *imbrices* were removed before demolition or, more likely, that the roof construction consisted only of overlapping *tegulae*.

Tegulae

No complete *tegula* was found; restored examples had a length of 302+mm and a maximum width of 154mm.

Box Flue (tubulum)

About 350 fragments of box flue were recovered, with the exception of five, all from the bath-house area (illus 6.1). Restored fragments indicated a length of 302mm. Widths varied between 132 and 145mm at the front, and back and 104 and 111mm at the sides. The average thickness of the fabric was 12mm. Many fragments were incised with a lattice pattern, to provide a key for mortar. This keying was mostly produced in a series of single lines, using with a narrow implement such as a stick. Another method involved the use of a comb; three and four-toothed combs are recorded.

Unflanged tile

Restored tiles measured 290mm by 280mm, with a thickness of 30<35mm. The estimated weight of a single floor tile was 4.2kg. A total of 41.34kg was recovered during the excavation, which represents about ten tiles, a fraction of the number needed for the bath-house. The similarity of width with that of the box flue suggests that they were designed to fit as infill tiles between the

Illustration 6.4
Marks on tiles.

stone voussoirs, as part of the vault structure. Tiles of a similar width, 303mm, which may have served the same purpose were found at Stanton Low (Woodfield & Woodfield 1989: 250). There were also a number of fragments of smaller, unflanged tile in a hard buff fabric.

Curved brick

The brick and tile assemblage included a number of distinctive curved bricks which were likely to have been architectural elements such as door or window surrounds (illus 6.2 and 6.3). Their total weight of the fragments was 5.8kg. They were in two widths; one fragment had a thickness of *c* 120mm, while the others were *c* 60mm. A projected reconstruction of the largest fragment (illus 6.2.1) indicates that it could form an arch with a 0.58m interior span. It had one flat face, which was probably intended to be seated flush against a wall. This fragment was coated with soot, which may indicate that it may have been part of a stoke hole or situated in the upper part of the heating system, although it could have occurred after the building was dismantled. This and a smaller example (illus 6.2.4) were indented with numerous sockets where the potter had thrust his fingers deeply into the brick, possibly as a seating for plaster. The smaller fragment may have been part of a different opening or, if situated with the former example, it could have formed an inner moulding. Similar curved fragments with depressions are recorded from the bath-house at Wiggonholt, Sussex, now in the collection of Worthing Museum (E Black, pers comm). Here, the furnace flue was lined with tile, of which only the lower courses survived (Winbolt & Goodchild 1940: 58).

Other brick

There were a few fragments of brick which were thicker in width than the normal floor tile. Some were in a hard purple-red fabric. Their total weight was 3.1kg.

6.3 SIGNATURE MARKS

Stamps

Two stamped tiles were found. One was a fragment of a *tegula* stamped on the edge with a cross motif (illus 6.4.5). The other was a fragment of a box flue with a T-shape impression near its vent (illus 6.4.6). It had a maximum thickness 12mm. It was a deep, sharply defined impression, possibly made by a metal instrument; a letter y was noted in a similar position on a box tile from Beaufort Park, Sussex (Brodribb 1979b: 149–50).

Signatures

A fragment of a box tile was incised with a cross composed of three strokes (illus 6.4.7). This signature is identical to that incised on a stone voussior from the bath-house (5.2.4.76).

Graffiti

There were several examples of deliberate graffiti. These included a fragment of a *tegula* lightly incised with a letter S (illus 6.4.8), with a maximum thickness of 30mm; a *tegula* fragment with a lightly incised triangular mark, possibly a letter A (illus 6.4.10); and a fragment of a *tegula* lightly incised possibly with the letters TI (illus 6.4.9). There were examples of concentric grooving with fingers on a *tegula*, possibly a personal mark by the potter (ills 6.4.11); this form of concentric marking is very common on British *tegulae* (Brodribb 1979a: 215–16).

Faunal

Faunal impressions included part of a shoe print, with hobnails (NK73CO; annexe, south-west of the bath-house) (illus 6.4.13). The dense nail pattern is typical of military footwear, as seen in the shoe fragments from the site (19.1). There was one example of a dog pawprint (NK73CN; bath-house, unstratified) (illus 6.4.12).

Chapter 7

POTTERY

7.1 SAMIAN WARE

BRENDA DICKINSON

7.1.1 Introduction

The samian assemblage consists of 188 sherds, mostly less than 60mm across, and weighing a total of 2,850kg. The dating evidence provided by this group of samian comes almost entirely from a relatively small number of decorated bowls and stamped plain vessels. The rest is so severely eroded that most of the plain forms are hard to identify and virtually impossible to date closely. All the potters represented by decorated ware and stamps are already attested in Scotland, but Secundus v appears for the first time in an Antonine context.

The South Gaulish form 27, assessed as 'probably Flavian or Trajanic' seems to be from La Graufesenque rather than Montans, and so is likely to be a Trajanic survival; cf a stamp of L.Ter(tius?) Secundus at Castlecary (Hartley, B R 1972: 7, no 10). This comes from a die used at La Graufesenque on vessels from a kiln which was in use in 116 (Vernhet 1981: 34, no 17).

There are no certainly late-Antonine forms, such as Dr 45 and Walters 79, and the rouletted dishes are consistently form 18/31R, rather than 31R, ie before 160, or so. The material from Montans, Les Martres-de-Veyre and some of the Lezoux ware is unlikely to have reached the site, or to have been in use, as late as 158.

The only East Gaulish vessel (52) comes from one of the early potteries and is probably pre-Antonine. Unfortunately, it cannot be assigned to a precise kiln-site.

7.1.2 Catalogue

The Fort

BUILDING 1

1. Form 31, Central Gaulish. Antonine.
   NK74BB; west end, topsoil.
2. Two sherds of form 33(?), Central Gaulish, Antonine.
   NK74BN; east end, topsoil.
3. Fragment from a dish, perhaps shaped as a counter, from Les Martres-de-Veyre. Hadrianic-Antonine.
   NK74AV; west end, overlying natural.
4. Two fragments from a dish or bowl, perhaps form 37, to judge by the footring. The pale fabric resembles ones in the second-century Montans range. *c* 115–45.
   NK78EQ; burnt daub in gulley between buildings 1 and 2.

BUILDING 2

5. Form 31, Central Gaulish. Antonine.
   NK74Ax ; west end, topsoil.
6. A Central Gaulish sherd. Hadrianic or Antonine.
   NK74BM; central area, topsoil.
7. A Central Gaulish fragment. Hadrianic or Antonine.
   NK78BE; west end, modern intrusion.

BUILDING 3

8. Form 37, in the style of Cettus of Les Martres-de-Veyre, with his small medallion (Stanfield & Simpson 1958: pl 144, 49) and border of squarish beads. *c* 130–60.
   NK74CN; topsoil in the officer's quarters.
9. Form 33, burnt. Central Gaulish. Antonine.
   NK73CI; in hearth in base of amphora in room 3.
10. Two sherds of form 18/31R, Central Gaulish. Antonine.
    NK73Au ; by wall between rooms 4 and 5, patch of burning.
11. Form 18/31R, Central Gaulish. Antonine.
    NK73GE; topsoil.

BUILDING 5

12. Form 33, Central Gaulish. Antonine.
    NK74DD; hearth at east end of building.
13. Form 37, Central Gaulish. Hadrianic or Antonine.
    NK77BT; topsoil at east end of building.

BUILDING 6

14. Form 18/31R, Central Gaulish. Hadrianic or early Antonine, to judge by the pale fabric.
    NK75AS; topsoil.
15. Form 33, Central Gaulish. Antonine.
    NK74CQ; in topsoil above pit at east end of building.

16. Form 37, Montans ware. *c* 120–45.
    NK75BA; topsoil.
17. Two sherds from a barrel-shaped beaker, Central Gaulish. The neck is decorated with a series of mouldings (cf Stanfield 1929: 133, nos 30–2). Presumably Antonine.
    NK77BS; immediately over burnt daub.
18. Form 18/31 or 31 wall and sherd which might be from the same vessel, Central Gaulish. Hadrianic or Antonine.
    NK74CG; topsoil.
19. Two sherds of form 33, Central Gaulish. Antonine.
    NK77Cu ; topsoil.
20. Form 37, Central Gaulish, apparently with a row of beads below the decoration. Hadrianic-Antonine?
    NK74AE; topsoil.

BUILDING 7

21. Two large sherds of form 33, stamped MΛ·CRINFE retrograde by Macrinus ii of Lezoux (Die 6a: Hartley & Dickinson 2009: 190). This stamp has so far been recorded only on forms 31 and 33. Macrinus ii also made forms 18/31, 18/31R and 27. Many of his stamps occur in the Rhineland, suggesting activity before the middle of the second century. *c* 120–50.
    NK77EV; black organic fill of gulley to north of building sealed by burnt daub.
22. Form 33, stamped CROBISOM by Crobiso of Lezoux (Die la: Hartley & Dickinson 2008b: 206). This stamp occurs on forms 18/31R, 27 and 38. There is one example from Bothwellhaugh. Crobiso also made forms 18/31 and 42. *c* 135–65.
    NK73DO; in sand fill of gulley to north of building.
23. Form 18/31 or 31, from Les Martres-de-Veyre. Hadrianic-Antonine.
    NK75CK; in soil overlying rubble to south of room 1.
24. Form 37, with details used by Cettus of Les Martres-de-Veyre (illus 7.1). The decoration includes ovolo Rogers B263 and a zone of double festoons containing a lion (O.1404) and bear (D.820). Two, and probably all, the festoons are separated by seven-petalled rosettes (Rogers C37). The ovolo and animals are on a bowl in Cettus's style from London (BM; Stanfield & Simpson 1958: pl 141, 16) and all the details, with the exception of the (unidentified) motif below the decoration, are on a bowl from Corbridge (Stanfield & Simpson 1958: pl 142, 32). About 130–60.
    NK74BZ; south-east corner of the officer's quarters, immediately over burnt wattle and daub. Other fragments of the same vessel were found immediately to the east: NK77AL and DG.
25. Form 27, burnt, South Gaulish. Probably Flavian or Trajanic.
    NK76DI; immediately south of west end, topsoil.
26. Form 18/31, Central Gaulish. Antonine.
    NK75AB; room 1, topsoil.
27. Two sherds of form 31, Central Gaulish. Antonine.
    NK74BP; south-east corner of officer's quarters, topsoil.
28. Two sherds of form 33, Central Gaulish. Antonine.
    NK74Ay; south-east corner of officer's quarters, topsoil.
29. A Central Gaulish flake. Hadrianic or Antonine.
    NK73BF; central area, overlying natural clay.

BUILDING 8

30. Rim of form 30, Les Martres-de-Veyre. Antonine.
    NK76BH; unstratified.
31. Form 33 fragment, Central Gaulish. Antonine.
    NK76DG; topsoil.

BUILDING 9

32. Form 18/31 or 31, Central Gaulish. A rim sherd, one other sherd and a flake, probably all from the same vessel. Hadrianic or early Antonine.
    NK77Cy and DK; under rubble within granary.

BUILDING 11

33. Two adjoining fragments, Les Martres-de-Veyre. Hadrianic-Antonine.
    NK76AM; topsoil.

BUILDING 12

34. Form 36 or Curle 11, Les Martres-de-Veyre. Hadrianic-Antonine.
    NK76ED; on road surface south of building.

BUILDING 16

35. Form 33, South Gaulish. Flavian-Trajanic.
    NK77AB; topsoil.

INTERVALLUM AREA

36. Form 31, Central Gaulish. Hadrianic-Antonine.
    NK78AE; intervallum north of building 1.
37. Form 33, in exceptionally pale fabric with a chocolate-brown slip. Both are reminiscent of first-century Montans ware, but the form is second-century. Hadrianic-Antonine, probably from Lezoux.
    NK74AR; burnt deposit in intervallum east of building 6.
38. Form 37, perhaps Montans ware. The upper zone of decoration includes satyrs, one with a hare, the other with grapes (larger and smaller versions of types used originally at La Graufesenque: Hermet 1934, pl 19, 87 and 80 or 81, respectively). *c* 120–45?
    NK73AO; topsoil overlying rampart between fort and annexe east of building 6.
39. Two joining base sherds of form 18/31 or 31, stamped AVITI·[MA] by Avitus iii of Lezoux (Die 1d: Hartley & Dickinson 2008a: 376). This stamp is already attested in

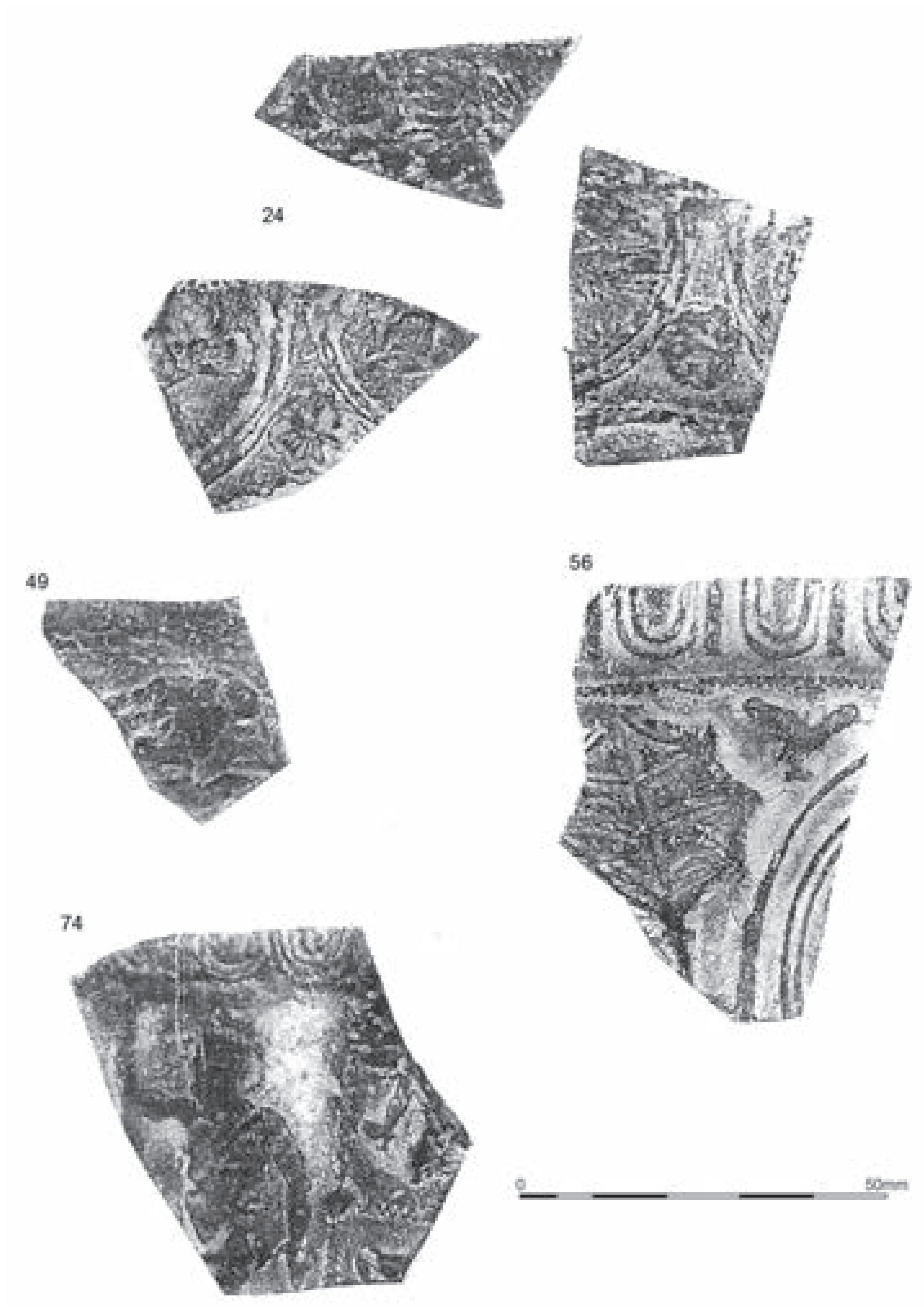


Illustration 7.1
Samian.

Scotland (two examples from Mumrills), as are several of his others, from different dies. His most common forms are 18/31 and 27 and his decorated ware is Hadrianic. About 120–50.

NK77AE; intervallum east of building 7, topsoil.

40. Fragments of form 37.

NK77AE; BL; EE; intervallum east of building 7, topsoil; NK77BQ; burnt patch between intervallum road and rampart.

41. Form 31.

NK74DE; intervallum east of building 8.

42. Form 33, burnt.

NK74CL; intervallum east of building 8, topsoil.

43. Forms 18/31 or 31, Central Gaulish. Antonine?

NK77CI, intervallum east of building 12 topsoil; NK77CR; unstratified; NK77CM; below cobbles of intervallum road east of building 12.

The Annexe

PRIMARY BATH-HOUSE

44. Dish footring, Central Gaulish. There is an owner's identification mark, in the form of a nick, across the underside. Antonine.
    NK80EE; construction trench.

45. Form 38 (?), Central Gaulish. Hadrianic or early Antonine.
    NK80EP (with NK80DI); from below hearth flags inside building.

46. Form 30 or 37 rim, Central Gaulish. Antonine.
    NK80DI; burning on floor of building.

47. Form 37, with the ovolo chiefly associated with the Cerialis ii–Cinnamus ii group at Lezoux (Rogers B144). The scroll decoration includes an eight-petalled rosette (Rogers C53) and a large leaf (not precisely identifiable). *c* 140–70.
    NK80DI; burning on floor of building.

BATH-HOUSE

48. Form 37, Central Gaulish, with a Venus at an altar (D.184) in a double medallion in the lower concavity of a scroll. Almost certainly by Cinnamus ii; cf Stanfield & Simpson 1958, pl 162, 59. *c* 150–80.
    NK81AJ; under flagged floor of the cold room.

49. Form 37, in the style of Cettus of Les Martres-de-Veyre (illus 7.1). The decoration includes his smallest ovolo (Rogers B97) and a lion (not in D. or O.), which appears on a bowl in his style from Les Martres (Terrisse 1968: pl x x II, 251b). For a discussion of this potter's date see Hartley (1972: 34). *c* 130–60.
    NK73CD; fill of cold room.

50. Form 37, Central Gaulish. The scroll decoration includes an eight-petalled rosette (Rogers C53), which was used by Cinnamus ii and some of his associates. *c* 140–70.
    NK73CD; fill of cold room.

51. Form 33(?), Central Gaulish. Antonine.
    NK73DF; clay and charcoal overlying flags of cold room.

52. Two sherds of form 46 (with Curle 23-type rim), East Gaulish. The footring is very shallow. The slip, though orange, is not a normal East Gaulish one. Probably pre-Antonine.
    NK79BC; warm room.

53. Form 37, burnt, Central Gaulish. The decoration includes an athlete (D.359) which Cinnamus ii used. Antonine.
    NK79DC; furnace of hot room.

54. Two joining sherds of form 37 and one other (AA), Central Gaulish, with panels: (1) A mask? (2) A crane (D.1001) and pygmy (D.442).

55. The figure-types were used at Lezoux by both Hadrianic and Antonine Lezoux potters. The slip suggests Hadrianic or early Antonine date.
    NK80AF and NK80 BE; hot dry room.

56. Form 37, Central Gaulish, with scroll decoration (illus 7.1). The ovolo (Rogers B145), leaf (Rogers B1) and bird (O.2239B) in the upper concavity and double medallion in the lower concavity are all on a bowl from Lezoux with one of Cinnamus ii's small label stamps. *c* 140–60.
    NK73CW; overlying floor of hot dry room.

57. Form 18/31R, Central Gaulish. Early to mid-Antonine.
    NK79CM; core of 'buttress' against the south wall.

58. Form 37, Central Gaulish. The ovolo is either Rogers B223, used by Cinnamus ii, or a version of it which occurs on bowls in the style of Secundus v. *c* 150–75.
    NK73FG; topsoil in hot room.

ANNEXE: AREA SOUTH OF BATH-HOUSE

59. Form 37 rim, Central Gaulish. Hadrianic or Antonine.
    NK79AD; topsoil to south of bath-house.

60. CV Form 30 or 37 base and an unidentified sherd. Both Central Gaulish and Antonine.
    NK73CN; topsoil.

61. Two sherds from a bowl with scroll decoration, Central Gaulish. The leaves (Rogers J 1 and, perhaps, H72) were used by both Attianus ii and Cinnamus ii and both used sinuous tendrils, as here, though they appear only rarely in Cinnamus's work. Not closely datable.
    NK73AB; topsoil.

62. Form 18/31R, Central Gaulish. Early to mid-Antonine.
    NK80AF; topsoil to south of bath-house.

63. Form 37, Central Gaulish, with a double medallion containing a Venus at an altar (D.184). Probably by Cinnamus ii. *c* 150–75.
    NL73AD; topsoil.

64. A bowl with scroll decoration, including a bird (D.1038) and leaf (Rogers H72). Probably by Cinnamus ii or one of his associates, to judge by the ovolo (Rogers B144). *c* 140–70
    NK73AD; topsoil.

65. Dish footring, Central Gaulish. Hadrianic or Antonine.
    NK80DG; burnt layer south of bath-house.

66. Form 18/31, from Les Martres-de-Veyre. Hadrianic.
    NK80HS; drain south of second warm room.

67. Form 18/31R, Central Gaulish. Early to mid-Antonine.
    NK80CL; pit south of warm room.

68. Form 37, Central Gaulish. The decoration includes a dolphin to right (O.2385?) in a single festoon and, perhaps, a ring-tongued ovolo (Rogers B105). Probably by Albucius ii, but Antonine, in any case.
    NK80EK; fill of drain running south from furnace of hot room.

69. Form 27, perhaps second-century Montans ware and, if so, about 120–45.
NK73Cx ; below cobbles to south of bath-house.

70. Form 33 stamped CRICIRONIS by Criciro v of Lezoux (die 4a: Hartley & Dickinson 2008b: 194). This stamp, which is also known from Camelon, was used on form 18/31. Criciro v's wares are common in Scotland and one of his decorated bowls occurs in an early Antonine pit at Alcester. *c* 135–60.
NK76FR; overlying cobbles to south of bath-house.

71. Form 30 or 37 rim, drilled for a rivet, Central Gaulish. Hadrianic or Antonine.
NK79BR; rubble south of bath-house.

72. Form 37, Central Gaulish, with panels: (1) A composite motif (?). (2) A Victory (D.474). *c* 125–45.
NK73DS; outside south-east corner of bath-house, unstratified.

73. Form 37, Central Gaulish. The ovolo is almost certainly one normally associated with the work of Cinnamus ii (Rogers B223, or a version of it), but there is apparently no border below it. However, it may have been impressed over a straight line, a common feature of Secundus v's, style. Only one example of the use of the ovolo by this potter is known to us, on a stamped bowl in the Oswald-Plicque Collection (Nottingham University Museum: Rogers 1999: pl 108, 1), but that has a bead-row below it. The decoration of the Bearsden bowl includes a double festoon which he also used. The available evidence, therefore, favours ascription to him, rather than to Cinnamus. Cf 88, below. *c* 150–75.
NK73DS; FG, NK79BN; outside south-east corner of bath-house, unstratified.

74. Form 37, Central Gaulish, with one of Albucius ii's common ovolos (Rogers B107 (illus 7.1)). The panels include: (1) a seated figure (perhaps with a staff); (2A) a Cupid (D.264); 2B) a cup (Rogers T17). Both the details in panel 2 are known on Albucius's stamped bowls, the Cupid on one from Bregenz (Stanfield & Simpson 1958: pl 121, 16) and the cup on one from the Wroxeter Gutter (Stanfield & Simpson 1958: pl 120, 1). *c* 145–75.
NK76CE; south of bath-house, topsoil.

75. Form 37, Central Gaulish, with a zone (?) of double festoons over an animal zone, including a bear (D.820) and small lion (O.1403A). By Sacer i or one of his associates (cf Stanfield & Simpson 1958: pl 82, 2, 3, 6, 7). *c* 125–50.
NK76DD; south of bath-house, topsoil.

76. A rim flake, Central Gaulish. Hadrianic or Antonine.
NK73ER; to east of cold bath, unstratified.

77. Form 30 or 37 rim, Central Gaulish. Antonine.
NK79DA; burnt material beside furnace and between bath-house and rampart.

78. Form 31, from Les Martres-de-Veyre. Early Antonine.
NK79BV; between the bath-house and annexe rampart, beside kerb of rampart.

79. Forms 30 or 37 rim and 31, Central Gaulish. Antonine.
NK73CE; topsoil overlying path to west of cold bath.

ANNEXE: AREA SOUTH-WEST OF BATH-HOUSE

80. Forms 18/31 and 33, Central Gaulish, the former perhaps from Les Martres-de-Veyre. Hadrianic-Antonine and Antonine, respectively.
NK73FS; topsoil.

81. Three sherds, two joining, of form 30, Central Gaulish. The decoration includes a slave (D.322), used by Drusus ii, and the rosette-tongued ovolo (Rogers B36?) would not be impossible for him. *c* 125–40.
NK73AW; annexe, topsoil (2); NK73AJ, annexe, topsoil.

82. Form 31, from Les Martres-de-Veyre. Hadrianic-Antonine.
NK73FS; annexe, topsoil.

83. A Central Gaulish scrap. Hadrianic or Antonine. NK73AW; topsoil. Annexe: south and west of latrine

84. Four rim sherds of form 30 or 37, some joining, Central Gaulish. Burnt, Antonine. Perhaps from the same bowl as 79.
NK79AF; topsoil south of latrine.

85. Form 30 or 37 rim, Central Gaulish. Antonine.
NK73AF; topsoil south of latrine.

86. Form 37, Central Gaulish. Hadrianic.
NK73AC; topsoil south of latrine.

87. Form 37 rim, Central Gaulish. Antonine.
NK80AE; beside cobble foundation to west of latrine.

88. Two joining sherds of form 37, Central Gaulish, with panels: (1a) A double festoon. (2) A double medallion with a horse and rider (D.156, but with a cloak). There is a small dolphin in the panel corner. (3) Man with a staff (D.88). The dolphin and the use of a straight line below the ovolo suggest Secundus v, an associate of Cinnamus ii. The ovolo (Rogers B223, or a version of it) is on a bowl stamped by Secundus in the Oswald-Plicque Collection (Nottingham University Museum: Rogers 1999: pl 108, 1). He is also known to have used the festoon. Perhaps from the same bowl as 73 above. *c* 150–75.
NK79BN; topsoil overlying gravel surface to west of latrine.

ANNEXE: SOUTH OF ROMAN ROAD

89. Two sherds of forms 18/31 or 31, Central Gaulish. Antonine.
NK77Au ; silt overlying path to east of fort rampart and building 12.

90. Forms 18/31–31, Central Gaulish. Antonine.
NK77AQ; below cobbles of path to east of rampart and building 12.

91. Form 33, Central Gaulish. Antonine.
    NK77AI; below cobbles of path east of rampart and building 12.

92. Form 37, Central Gaulish. Antonine.
    NK77AI; below cobbles of path east of rampart and building 12.

Defences

93. Form 31, Central Gaulish. Antonine.
    NK73AM; in topsoil overlying east ditches of annexe.

94. Form 37, Central Gaulish, with Cinnamus ii's ovolo 3 (Rogers B143). The leaf in a scroll is not closely identifiable. *c* 150–70.
    NK75CC; silt in outer east ditch.

External areas

95. Form 33 (?), in pale fabric, with traces of slip. Probably second-century Montans ware. *c* 115–45.
    NK78EW; to west of fort, topsoil.

96. Form 37 (?), Central Gaulish. Hadrianic or Antonine.
    NK78BQ; to west of fort, topsoil.

97. Two joining fragments of form 27, Central Gaulish. Hadrianic.
    NK78DL; to west of fort, topsoil.

98. Form 30 or 37 rim, Central Gaulish. Antonine.
    NK75BP; to east of annexe, topsoil.

99. Form 31, Central Gaulish. Antonine.
    NK75BP; to east of annexe, topsoil.

100. Form 33, Central Gaulish (?). Hadrianic or Antonine.
    NK78Bx ; to east of annexe, topsoil.

101. Form 37, Central Gaulish. The top half of a panel contains a chevron festoon (Rogers F15?), probably over an animal. The festoon was used by potters such as Laxtucissa and Carantinus, but the bowl is not firmly assignable to either. Early to mid-Antonine.
    NK78CV; to east of annexe, topsoil.

7.2 THE COARSE WARE

PAUL BIDWELL AND ALEX CROOM

7.2.1 Introduction

The fine and coarse wares assemblage as studied consisted of 3,353 sherds weighing a total of 41.082kg (table 7.1). The pottery was catalogued and quantified by weight, sherd count and by measuring rim percentages (EVEs). Many of the sherds have been badly affected by the soil conditions and are now soft and without their original surfaces.

The pottery was originally studied by Louise Hird in the 1980s, when a report, now archived, was produced and many of the vessels drawn. The report consisted of a vessel type series, a fabric list describing 40 different fabrics, and a brief discussion of the assemblage. At the same time heavy mineral analysis of the black-burnished wares was carried out by David Williams and thin sections of the oxidised wares were examined by Mark Gillings. Their reports are included below and cross-references to Gillings' samples are included in the catalogue of coarse wares with the reference numbers beginning BD (7.4.1). Williams' samples are also noted (7.4.4).

Vivien Swan started to update and revise the report in 1997 to take into account pottery research carried out in the intervening years, and recatalogued the majority of the pottery. A number of the vessels, especially those that had been drawn, were found to be no longer available for study. In 2003 the pottery database was transferred to an Access database, and further work was carried out on the pottery by Vivien Swan and Ray McBride, including the illustration of further vessels. Swan worked mainly on the North-Africa style pottery (Swan 1999) and had produced only a few notes on the rest of the assemblage before her death. This report incorporates elements of all of this previous work, as well as further research that has been carried out since.

Some of the pottery which was seen by Hird was misplaced before it was received by Swan, though it later emerged that two nearly complete vessels (nos 120 and 219) were in the Hunterian Museum .

Fortunately there are drawings and some fabric descriptions for the missing pottery, which is marked by an asterisk in the catalogue. Other fabric descriptions and identifications have been taken from Swan's notes. The identification of the Black Burnished ware 1 (BB1) as from south-east Dorset (SED BB1) or from south-western England, possibly south Somerset or west Dorset, or even east Devon (SOW BB1), has been carried out by the authors.

Excavations at sites along the Wall have produced over 600kg of pottery excluding amphorae, summarised by Swan (1999: 451–62). unfortunately, despite this large quantity, there is almost no quantification of pottery from these sites available for comparison with the Bearsden assemblage. Some has never been studied, some is awaiting publication, while much of the published material comes from old excavations when quantification was

Table 7.1
Breakdown of pottery from the whole site

Type	*Wt (kg)*	*No of sherds*	*EVE (%)*
Amphorae	150.505	2,129	unknown
Mortaria	19.369	502	1,524
Coarse wares	41.082	3,353	8,937
Samian	2.900	188	unknown

not carried out. Other more recent pottery reports do not include quantification, and sometimes do not even give the quantity of pottery recovered. Individual vessel types can be compared to those from other sites, but it is impossible to say how typical the composition of the Bearsden assemblage is of sites on the Antonine Wall.

7.2.2 Fabrics

Descriptions for the fabrics with National Reference Collection codes in table 7.17 (in italics) can be found in Tomber & Dore 1998. Other fabrics are described below, or within the pottery catalogue. Minor variations in the local wares were given separate fabric numbers; these have been included in the pottery catalogue in brackets after the fabric code (M = Mortarium Fabric).

The numbers listed under the vessel types are catalogue numbers.

Cologne (KOL CC)
Beaker: 206–7

Colchester (COL CC2)
Beaker: 205

Upchurch?
Poppy-head beaker: 209

Local oxidised ware (LOC OX)
For more detailed fabric descriptions see the report on the petrological analysis report (7.4.4) and the mortaria report (7.3).

Micaceous orange fabric, with moderate amounts of rounded quartz, soft red and multi-coloured inclusions; some sherds have a pale grey core. Can be soft and powdery, although those sherds that have survived better have a hard fabric with traces of a red slip. Some sherds have the remains of a cream slip. Gillings' analysis (7.4.1) has shown that while there is variation in the quantity of quartz present, all the sub-fabrics (distinguished by Hird), as follows, are likely to come from the same source, close to the fort.

5 Plentiful quartz inclusions (Gilling Fabrics 2 and 3).

8 Similar to Fabric 5, but with a darker, well-defined core.

10 Less quartz present than in Fabric 5, but inclusions generally larger (especially sandstone pieces). Often paler than Fabric 5. Some traces of a red slip.

14 Fine version of 10, without the large inclusions. Possible red surface slip.

16 Cream (sometimes with pink core) to very pale orange (oxidised version of Fabric 11).

26 Fine version of Fabric 10, pale orange.

M5 (Gilling Fabric 1), M8, M10, M13: these mortarium fabrics are very similar to 5 (Sarrius' workshop), 8 (Gilling Fabric 2), 10 and 13.

Local reduced ware (LOC RE)
Pale grey core (often in fact a buff core when seen in a fresh break) with mid-grey surfaces. Fabric moderately sandy, with similar inclusions to the oxidised versions, although generally quite fine.

11 Exterior sometimes darker grey from a slip.

15 Reduced version of Fabric 8.

21 Reduced version of Fabric 10.

22 Reduced version of Fabric 14.

M11 Mortarium Fabric 11

Local oxidised and reduced ware vessel types
Baking cover?: 30
Beaker: 4–6
Bowls: 31–4, 41–59, 96, 241(?), 246(?)
Cooking pot and jar: 7–29
Crucible: 90
Decorated: 93–5
Flagon: 1–2, 86, 92
Lamp: 97–8
Lids: 79–84, 254(?)
Patera: 85
Platters: 72–3
Storage jar: 3, 29
Tettina: 91
Triple vase: 89
Wide-mouthed bowl: 60

North-African type vessels
Basin: 62–4
Bowls with straight, up-turned rims: 35–40
Brazier: 87–8
Casserole: 61
Platter, flat bases, with concentric grooves on the underside: 65–7, 74
Platter, flat bases, plain: 69, 75
Platter, rims only: 70–1, 76–7
Platter, sagging base: 78
Platter, underside of base with recessed area: 68

Possible local production
Imitation African red-slipped ware dish: 249

Antonine Wall products
See also: Mortarium Fabrics 4 and 9.

As well as oxidised vessels made in Fabrics M4 and 9, there are sherds of a 'blue-grey' reduced ware. This is a fine, micaceous mid-grey fabric with plentiful soft black inclusions.

Cooking pot: 102–3

Patera: 106

Triple vase: 100

Balmuildy oxidised

A fabric thought to have been produced at the site, where it made up to 50% of the whole assemblage. It is a brownish-orange fabric sometimes with a grey core, variable sandy-textured, and often burnished or coated with a thin brownish or white slip (Swan 1999: 458). The range of vessels produced at Balmuildy was much more varied than those made at Bearsden, and includes some unusual forms (Swan 1999: 459). There are 15 sherds of this ware at Bearsden, from at least three vessels.

Cooking pot: 101, 104

Lid: 105

Severn Valley

When Webster published his study of this ware on the Antonine Wall he only knew of a single storage jar from Bearsden (Webster 1977: 171). He found that storage jars were the most common form found on the Wall, with much smaller numbers of bowls and only one tankard; Bearsden itself has produced only storage jars.

Storage jar: 191–202

Black Burnished Ware 1 (BB1)

There are at least three sources for BB1 on the Antonine Wall: south-east Dorset (SED BB1); an industry probably located in Somerset, but possibly in east Dorset or even in east Devon (SOW BB1); and Cantley/Rossington Bridge in south yorkshire (ROS BB1). Pottery from the first two sources can usually be distinguished macroscopically, but it is difficult to distinguish between vessels from south-east Dorset and Cantley/Rossington Bridge. BB1 from south-east Dorset is often darker in colour and its fabric sometimes contains fragments of shale (Buckland et al 2001), but the ware in general displays a wide range of colours and inclusions. Most of the vessel-types made in south-east Dorset and south yorkshire are indistinguishable, and the criteria proposed for the identification of jars from the latter source have been rejected by Buckland (ibid 66). However, there is one type – the bead-rimmed bowl with a markedly chamfered base – made in south yorkshire and common throughout the Roman North which does not occur in Dorset and the South-West. Details appear in the catalogue but it should not be assumed that all the examples on northern sites are Rossington Bridge products; petrological analysis has shown that there are examples which do not fit known production areas (see 7.4.1).

Bead-rimmed jar: 107, 110–13

Beaker: 108–9

Bowl, bead-rimmed: 135–6

Bowl and dish, flat-rimmed: 137–50, 233(?), 240(?)

Cooking pot: 113–31, 163, 233(?)

Dish, plain-rimmed: 132–4

Black Burnished Ware 2 (BB2)

Heavy mineral analysis of two BB2 sherds indicates that some, if not most, of the BB2 on the site came from Colchester (COL BB2; see 7.4.1), though cooking pots with bead rims (such as no 166) are probably from a different source.

For vessel types, see collectionsprojects.org.uk/archaeology/Ceramic%20Database/type%20series.html

Bowl and dish, plain-rimmed with groove: 170–2

Bowl and dish, rounded-rimmed: 181–90

Bowl and dish, triangular-rimmed: 173–80

Cooking pot: 151–62, 164–5

Cooking pot with beaded rim: 166, 237–8(?)

Dish: plain-rimmed: 167–9

East Anglian?

Grey ware, finely sandy with abundant silver mica.

Cooking pot: 21(?), 216

Storage jar: 218

Nar Valley

A rough, hard, very dark grey fabric, with moderate quartz inclusions and occasional flint fragments (Andrews 1 985: 89, RW1), produced at a number of different kiln sites in west Norfolk, near King's Lynn. The ware is mainly found in and around Norfolk, but individual vessels, transported as personal possessions or similar rather than traded commercially, are found further afield. The start date of the large-scale production of the ware is sometime in the late second or early third century, but there may have been smaller scale production earlier (Peachey 2008: 66), which would be supported by the presence of this vessel at Bearsden. There is a single cooking pot.

Cooking pot: 224

North Gaulish

Smooth, powdery, white fabric, with traces of creamy white slip on exterior. See Discussion (7.8.4).

Jar: 219

Verulamium? (VER WH)

Flagon: 256

Calcite-gritted

A single sherd with the inclusions leached out, in a dark grey fabric with an orange interior surface. Possible sherd of Knapton ware from Yorkshire. Calcite-gritted ware generally had a restricted distribution until the late third century, but small quantities appear earlier outside the Yorkshire region. There are a number of possible calcite-gritted ware vessels at Cramond (Ford 2003: illus 75, nos 2–10).

Non-local grey

There are a number of fabrics with inclusions (such as flint) that suggest or indicate they were not made locally.

Import?

Buff-brown fabric, burnished on interior and exterior. The fabric is hard, and has a more sandy texture than the locally produced fabrics. There were a few sherds from a jar and a sooted body sherd that Swan identified as possibly coming from a casserole. She thought these might be imported vessels rather than local copies.

Unidentified

This category includes unidentified oxidised and reduced wares, but also a number of vessels that had been previously illustrated but which were no longer available for study, and whose identification therefore remains uncertain.

7.2.3 Catalogue

The entries include vessel type, fabric, context and general location. An asterix indicates that the vessel was not available for study by the authors; where possible, fabric identifications or descriptions for these sherds have been taken from Hird.

Local wares

FLAGONS AND STORAGE JARS

1. Flagon, LOC Ox (26).
NK73CV and DD; bath-house, cold room, debris overlying flags.
2. Flagon 'of unusual form with an internal seating for a stopper' (Swan 1999: 467, no 41), LOC Ox (M5), with brown slip. Unevenly fired. Swan considered this a possible North-African type vessel, quoting a parallel from Uzita in Tunisia (Werff 1982: pl 47, no 9).
NK80Du ; primary bath-house, destruction debris overlying floor.
3. Narrow-mouthed jar, possibly imitating a Severn Valley ware form, LOC RE (11). Tally marks on the rim.
NK80BA and By; primary bath-house, fill of robber trench of south wall.

BEAKERS

4. Beaker, LOC Ox (14), in very poor condition. Swan considered this a possible North-African type vessel, with a parallel at Simitthus (Swan 1999: 467, no 42; Vegas 1994, form 176).
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.
5. Beaker, LOC RE (11). Imitation of a colour-coated ware beaker with an orange slip.
NK79CT; primary bath-house, unstratified.
6. Beaker, LOC Ox (5).
NK77Au ; annexe, silt overlying path to east of fort rampart and building 12.

COOKING POTS AND JARS

7. Small jar, LOC RE (15).
NK76AI; building 11, north range, topsoil.
8. Small jar, LOC Ox (5). Thin-section sample BD010 (fabric 2).
NK75CQ; building 4, rubble debris.

9.* Small jar, LOC? Exact diameter uncertain.
NK77CJ; on road to east of building 14.

10. Small jar, LOC Ox (14), with thin creamy-white slip. Very poor condition, so exact diameter uncertain.
NK73GE; south-west corner of building 1, topsoil.
11. Jar, LOC Ox (16).
NK76GH; annexe, south of changing room of bath-house, clay overlying cobbles.

12.* Jar, LOC?
NK73CA; intervallum road to west of building 3, topsoil.

13.* Cooking pot, LOC Ox ?
NK73GW; annexe, topsoil.

14. Cooking pot, LOC RE (M11). Smoothed. Burnt on tip of rim.
NK76DD and DV; annexe, south-west of bath-house, topsoil.
15. Cooking pot, LOC Ox (5).
NK73EE; bath-house, hot dry room, debris.
16. Cooking pot, LOC Ox (10). Burnt on exterior.
NK77Au ; annexe, silt overlying path to east of fort/annexe rampart south of Roman Road.
17. Cooking pot, LOC Ox (4).
NK77EE; intervallum east of building 7, unstratified.
18. Cooking pot, LOC Ox (5). Thin-section sample BD013 (fabric 2).
NK75CQ; building 4, rubble overlying granary.
19. Cooking pot, LOC Ox (5). Thin-section sample BD012 (fabric 3).
NK73BT; *via praetoria* between buildings 3 and 7, topsoil.
20. Cooking pot, LOC RE (22).
NK73EZ; annexe, south-west of bath-house, unstratified.
21. Cooking pot. Identified as LOC RE (15), although as the fabric is highly micaceous it could be East Anglian.
NK77Au ; annexe, silt overlying path to east of fort/annexe rampart south of Roman Road.
22. Cooking pot, LOC RE (15).
NK75Cu ; building 5, room 1, clay above burnt layer.
23. Cooking pot, LOC RE (M11) with black slip imitating BB2.
NK76GO; annexe, south-west of bath-house, post-hole.

24.* Cooking pot, LOC?
NK77Au ; annexe, silt overlying path to east of fort rampart and building 12.

25.* Cooking pot, LOC?
NK76Au ; building 12, topsoil.

Illustration 7.2
Coarse pottery 1–44.

26. Cooking pot, LOC Ox (5). Slipped or burnished.
NK78CT; east of annexe defences, in fill of gulley.

27. Cooking pot, LOC RE (11).
NK77AL; intervallum road to east of building 7, topsoil.

28. Cooking pot, LOC RE (15), very pimply surface.
NK76FP; annexe, south of changing room of bath-house, overlying cobbles.

29.* Plain-rimmed storage jar, LOC Topsoil.

BAKING COVER?

30.* Rectangular vessel (?), LOC Ox (10). The angle of the rim is uncertain, but it must come from a rectangular vessel as the surviving fragment is straight. The rim is expanded, with a wide depression along the top surface. It could possibly be part of a baking cover or portable oven, as rectangular examples are known from Egypt and Pompeii (Williams & Evans 1991: 51). However, there is no sign of sooting or burning, and it could possibly be just an unusual tile fragment.
NK76Au ; annexe, silt overlying path to east of fort/annexe rampart south of Roman Road.

CARINATED BOWLS

31. Flat-rimmed carinated bowl, LOC RE (11). Swan considered this a possible North-African type form, as 'no contemporary parallels [are] known in Britain' (Swan 1999: 467, no 34). However, there are other examples at Old Kilpatrick (Miller 1928, pl x x II, nos 14–15).
NK77FM, building 5, north-west corner, up-turned in a small hole.

32. Flat-rimmed carinated bowl, LOC RE (11), self-slipped.
NK76CD and EN; annexe, south of changing room of bath-house, overlying cobbles.

33. Flat-rimmed carinated bowl, LOC Ox (5). Burning on top of rim.
NK77AL; intervallum east of building 7, over drain, unstratified.

NORTH-AFRICAN TYPE BOWLS

34. Flat-rimmed bowl, LOC Ox (16).
NK73AJ; annexe, south-west of bath-house, topsoil.

35. Flat-rimmed dish, LOC Ox (5). Brownish slip and sooting on the exterior. 'Flat-rimmed bowl with burnished surfaces and a gently rounded base in Bearsden oxidised ware; not a British form, but cf a similar cooking-vessel at Ostia (Ostia II, tav xx, no 361). It is just possible that this form was ancestral to the slightly later African red slip ware bowls, Hayes Forms 42 and 45' (Swan 1999: 467, no 37). Bonifay's (2004: 263, fig 143) subsequent study of North-African pottery defines a similar type, 'Commune Type 21 (Bassins Uzita 2)', the rim of which is similar to no 35.
NK77BB and BJ, overlying charcoal spread outside fort/annexe rampart interpreted as a breastwork.

36. Flat-rimmed bowl, LOC Ox . Thin-section sample BD007 (fabric 2).
NK77BZ; building 9, unstratified.

37. Flat-rimmed bowl, LOC? Cf Cadder: Clarke 1933: fig 15, no 2.
NK74CZ; building 3, wattle and daub fill of gulley outside north-west corner.

38. Flat-rimmed bowl, LOC Ox (M10).
NK77BH, BS and BV; soil overlying daub to north of officer's quarters of building 7.

39. Flat-rimmed bowl or dish, LOC Ox (M8). Exterior abraded. Sooting on exterior and on outer edge of rim.
NK77BZ; building 9, unstratified.

40. Flat-rimmed bowl or dish, LOC Ox (5). Underfired. Thin-section sample BD006 (fabric 2).
NK77EZ; daub between buildings 5 and 7.

OTHER BOWLS AND DISHES

41. Flat-rimmed bowl or dish, LOC Ox (M10). Smoothing on exterior. Underfired and cracked.
NK73AW; annexe, south-west of bath-house, topsoil.

42. Triangular-rimmed bowl, LOC RE (11). Sooted up to rounded angle.
NK76FR and FP; annexe, south of changing room of bath-house, over cobbles.

43. Triangular-rimmed bowl, with very thin base, imitating a BB2 form. Possible traces of lattice, but extremely faint. Swan thought that the convex wall and rounded wall/base junction (not found on the BB2 form) might suggest a North-African tradition of manufacture (Swan 1999: 467, no 35), LOC RE (11).
NK73BH; annexe, south-west of bath-house, topsoil.

44. Triangular-rimmed bowl, LOC RE (11).
NK73AZ; building 3, room 4, burnt patch lying on clay.

45. Triangular-rimmed bowl, LOC RE (11). Slipped. Local BB imitation.
NK73 DQ; annexe, south-west of bath-house, unstratified.

46. Triangular-rimmed bowl, LOC RE?
NK73BG; annexe rampart, topsoil.

47. Plain-rimmed bowl, LOC RE (15). Swan considered this could be a BB imitation with a North-African type rounded base (as no 43 above; Swan 1999: 467, no 36). Burnt on exterior and on underside.
NK73CA; intervallum road to west of building 3, topsoil.

48. Plain-rimmed bowl with groove, LOC RE (15). Heavily sooted on exterior, and burnt on lower interior surface.

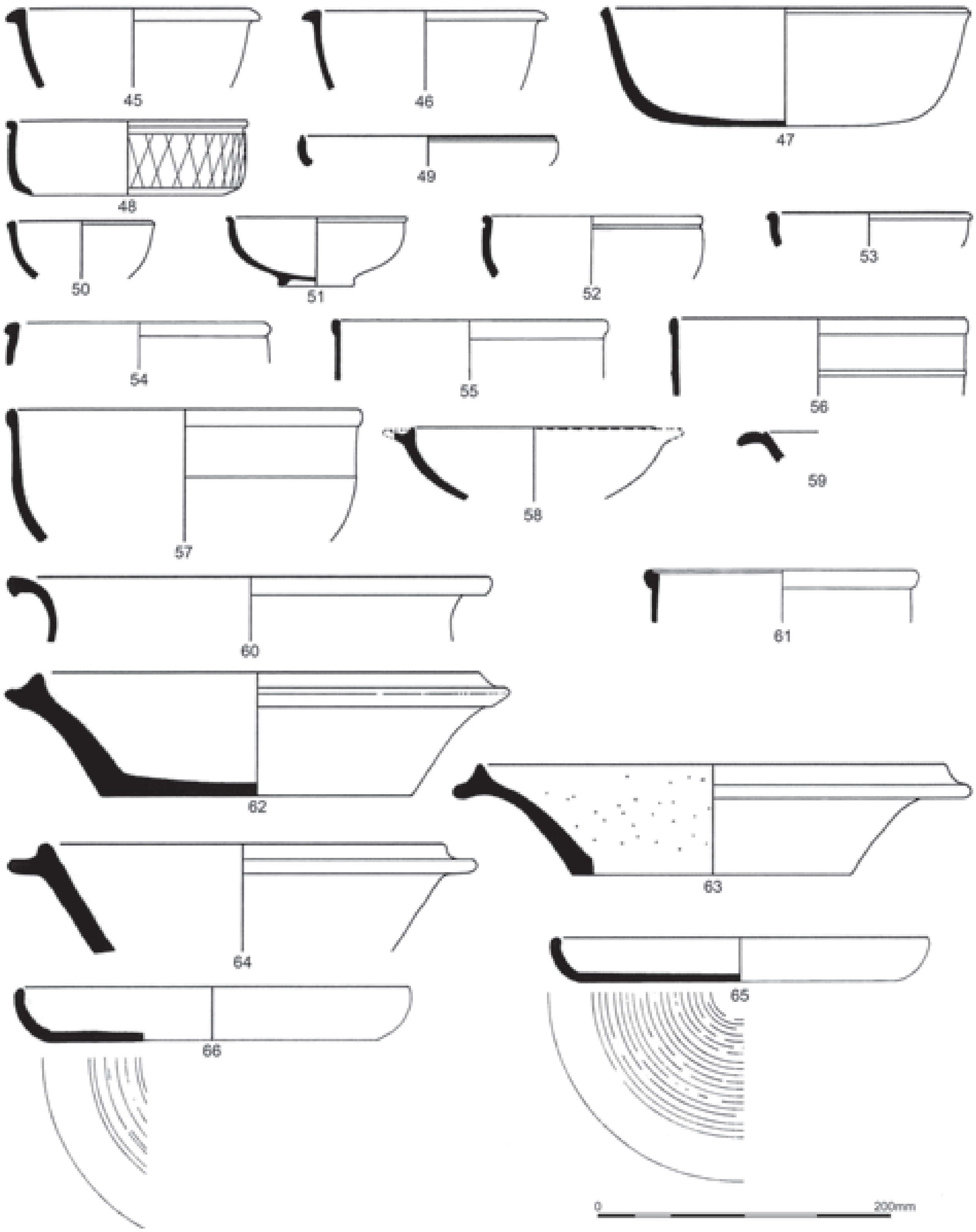


Illustration 7.3
Coarse pottery 45–66.

NK76FP; annexe, south of changing room of bath-house, over cobbles.

49.* Plain-rimmed bowl with groove and curved walls. LOC?

NK77AL; intervallum road to east of building 7, topsoil.

50. Hemispherical bowl, LOC Ox (M5). Pale reddish slip.

NK73CO; annexe, south-west of bath-house, unstratified.

51. Hemispherical bowl, LOC Ox (16). Swan has identified this as a possible 'tulip bowl', a type common in Mauretania (Swan 1999: illus 11, no 44), but it lacks the exaggerated features of other examples (Swan 1999). She also identified it as a possible North-African import, but it is likely to have been produced locally as other, non-North-African vessels have now been found in the same fabric. Cf Holt: Grimes 1930: fig 70, no 168.

NK76GG; building 16, pit.

52. Hemispherical bowl, LOC RE (11).

NK73AJ; annexe, south-west of bath-house, topsoil.

53. Hemispherical bowl with beaded rim, LOC RE (11). Facetting on rim.

NK76FP; annexe, south of changing room of bath-house, over cobbles.

54. Hemispherical bowl with beaded rim, LOC Ox (16).

NK76BB and CH; silt fill of gulley crossing *via praetoria*.

55. Dr. 37 imitation, LOC Ox (5). Thin-section sample BD004 (fabric 2).

NK77CF; building 9, unstratified.

56. Dr. 37 imitation, with small raised cordon, LOC Ox (14). Self-slipped, with smoothing on the interior. Almond-shaped rim.

NK79Bu ; annexe, between bath-house and latrine, topsoil.

57.* Dr 37 imitation, LOC? Swan suggested this form had North-African affinities (Swan 1999: illus 4, no 38).

NK77Cu ; building 6, east end.

58.* Flanged bowl, LOC? Cf Rossington Bridge: Buckland et al 2001: fig 41, nos 103, 105.

NK76Cx , fill of gulley crossing *via praetoria*, which included charcoal and daub.

59.* Flanged bowl, LOC?

NK73AD; annexe, over gravel path south of changing room.

60. Wide-mouthed bowl, with smoothed exterior, LOC RE (M11) with grey exterior, brown margins and dark grey core. Apparently a local imitation of a Severn Valley ware form, although the type is rare on the Wall (Webster 1977: fig 11. 2, no 36; cf Swan 1999: 459). Vessel found in two different areas; sherds from context CI more abraded.

NK75CI; building 3, east end; NL75CK; overlying cobbled surface between buildings 7 and 8.

CASSEROLE

61. Casserole, LOC RE (21). Burnt. This is the only definite example of a casserole in the assemblage. Together with this vessel, Swan (1999, illus 9, nos 2, 8, 33, 52 and 55) illustrates four other examples from the Antonine Wall, found at Mumrills, Bar Hill (including at least six sherds from the kiln), Duntocher and Old Kilpatrick. These are the only examples known from the Wall. The example from Duntocher was judged to be 'not necessarily local to the Antonine Wall' (Swan 1999: 461, no 52); there was nothing to indicate that the others were not locally produced and the Bar Hill example was from the pottery kiln at the bath-house.

NK76BM; annexe, south-west of bath-house.

BASINS

62. Flanged basin with scoop inside rim, LOC Ox (M5), with brown slip. Thin-section sample BD001 (fabric 1) (Swan 1999: illus 11, no 104).

NK74Cy; building 1, fill of gulley to north-west.

63. Flanged basin, with scoop inside rim. LOC Ox (5). Thin-section sample BD002 (fabric 1) (Swan 1999: illus 4, no 39).

NK75Cu ; building 5, overlying burnt layer at east end.

64. Flanged basin, LOC Ox (M8), with white specks. Thin-section sample BD003 (fabric 1) (Swan 1999: illus 11, no 105). The closest parallels for the form come from Tipasa (Anselmino et al 1989: fig 33, nos 116–18), although the general type is also 'found in Mauretania and central Tunisia' (Swan 1999: 467, no 39).

NK76BJ; overlying metalled surface south of building 12.

PLATTERS

65. Convex-walled platter with internal angle groove, LOC Ox (M10). Combed lines on the underside. Sooting on the base, which is cracked and abraded.

NK76DD; annexe, south-west of bath-house, unstratified.

66. Convex-walled platter, with internal angle groove, LOC Ox (M10) with slip. Combed lines on the underside. Sooting on exterior up to the rim, showing one or two worn patches on the angle, which could possibly be where a brazier has rubbed (Swan 1999: illus 4, no 31; illus 10, no 31).

NK73AW; annexe, south-west of bath-house, topsoil.

67.* Convex-walled platter, LOC Ox ?

NK77AO and AP; overlying gulley to north of intervallum road south of building 16.

68. Convex-walled platter, LOC RE (15). Rilled base, sooted on exterior just below the rim.

NK76FC; building 12, fill of post-hole.

69. Convex-walled platter, LOC Ox (5).

NK77Bu ; gulley to north of intervallum road south of building 16.

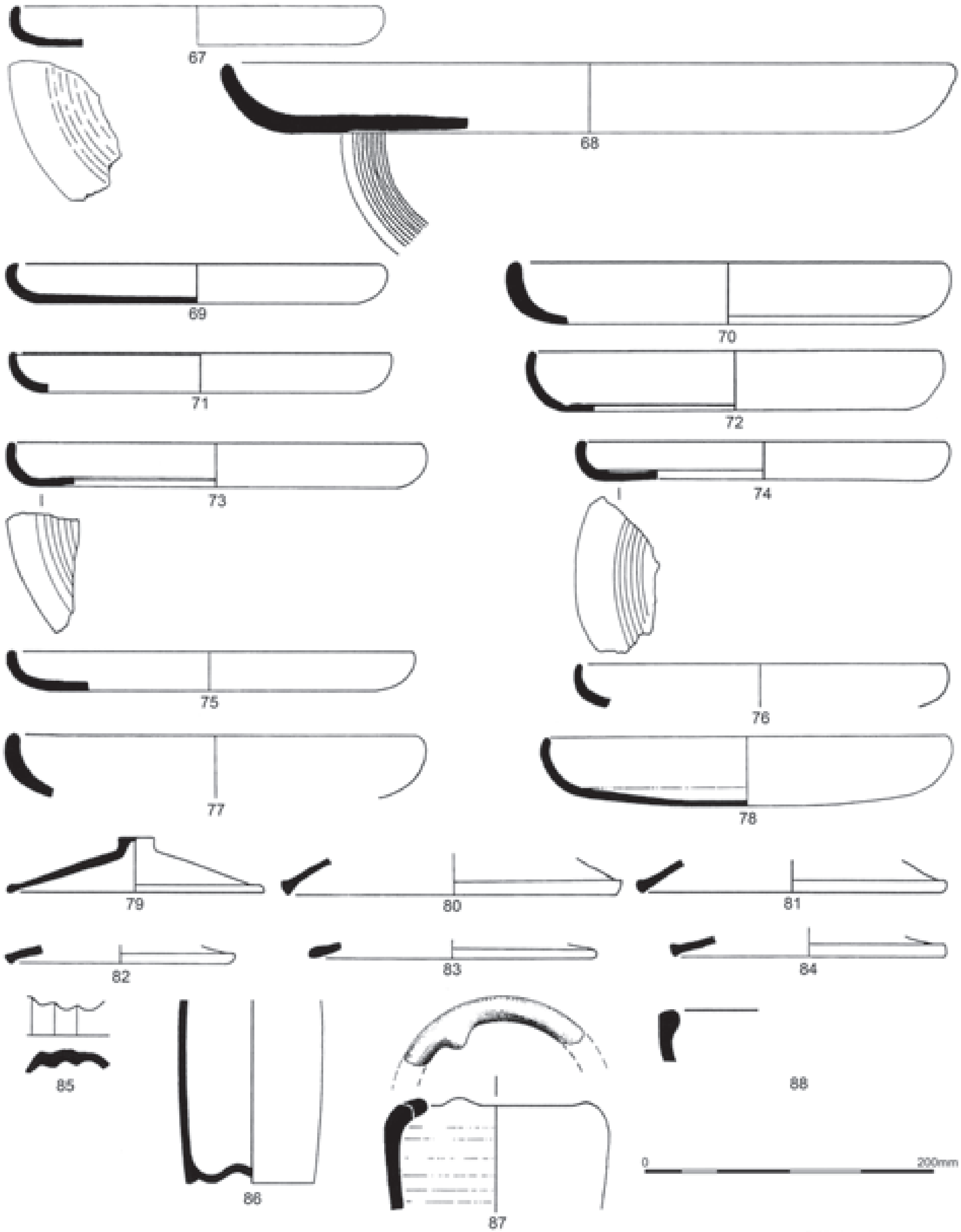


Illustration 7.4
Coarse pottery 67–88.

70.* Convex-walled platter, LOC?
NK77AP; overlying gulley to north of intervallum road south of building 16.

71. Convex-walled platter, with internal angle groove, LOC Ox (5). Facetted burnishing on exterior, and combed lines on the underside with the rills beginning on the lower wall. Self-coloured slip, thicker on the interior.
NK73ER; bath-house, overlying drains to east of cold bath, topsoil.

72. Convex-walled platter, with internal angle groove, LOC Ox (M10). Facetted burnishing, and light combed lines on underside. Sooting on side and over rim. Thin-section sample BD019 (fabric 2).
NK73BS; building 3, room 1, topsoil.

73. Convex-walled platter, with internal angle groove, LOC Ox (M5), with brown slip. Strongly combed lines on underside. Sooting on underside, wall and over the rim.
NK80DH; bath-house, hot dry room, unstratified.

74. Convex-walled platter, LOC Ox (5), with traces of slip on interior and faint rilling on the underside. Partial sooting on base.
NK77AO; overlying gulley to north of intervallum road south of building 16.

75. Convex-walled platter, LOC Ox (5), with smooth red slip. Faint rilling on base. Little or no use.
NK77AO; overlying gulley to north of intervallum road south of building 16.

76. Convex-walled platter, LOC Ox (5), with red slip. Facetted burnishing on exterior.
NK80DH; bath-house, hot dry room, unstratified.

77. Convex-walled platter, LOC RE (10). Thin-section sample BD017 (fabric 2).
NK77AP and AW; overlying intervallum road south of building 16.

78. Convex-walled platter, with internal angle groove, a sagging base and light combing on the underside, LOC Ox (5) with red slip. Unused. The only other examples of platters with a sagging base from the Antonine Wall are from Bar Hill (Swan 1999: illus 10, nos 9 and probably 10). There is a second platter from Bearsden very similar to the first Bar Hill platter (not illustrated, NK76FC; building 12, fill of post-hole) (Swan 1999: illus 4, no 32; illus 10, no 32).
NK76DD; annexe, south-west of bath-house, unstratified.

There were at least 14 examples from Bearsden, and they are common at some other Antonine Wall forts: Mumrills (1); Westerwood (1); Croy Hill (5 in Croy oxidised ware, up to 8 'in other grey and orange fabrics'); Bar Hill (many sherds from the kiln, at least 7 from elsewhere in the fort); Cadder (1); Balmuildy (2); Duntocher (3 or 4); Old Kilpatrick (21, some with under-rilling); total 49, excluding Bar Hill kiln and Bearsden.

Types:

A: internal offset at junction of wall and base with or without rilling (R) under base ('the internal groove at the junction of wall and base of the vessel is always present': Swan 1999: 417).

B: as 'A' but with a recessed base with or without rilling (R).

Swan (1999: 412) noted the British series of plain-rimmed dishes with curved walls (as Gillam 1970: Types 336–7), apparently derived from the Gallo-Belgic platter *Cam* 16. The series did not outlast the Trajanic period, and there was a 'significant hiatus' between the production of these dishes and those occurring on the Antonine Wall. Swan argued that the latter were copies of North-African dishes, in African red slip ware and local wares, which in turn represented a continuation and development of Pompeian red ware dishes or platters. In northern Britain copies of Pompeian red ware platters occur in the Hadrianic period at Hardknott (Bidwell et al 1999: fig 36, nos 67, 114, with grooves on the inner surface of the base); a rim cited by Gillam in the 1929 alley deposit at Birdoswald (Birley 1930: E: fig 16, no 82) and, from the same fort, Hird 1997: fig 156, no 42, from a group containing mainly late-Hadrianic to early Antonine pottery. There is a dish-rim from Inveresk in Inveresk ware (Dore 2004: fig 85, BO48). The type is not represented in the original type series of Inveresk ware (Swan 1988), and no certain North-African types are known from the site. Rilling under the base is sometimes a feature of *Eifelkeramik* dishes ultimately derived from the Pompeian red ware tradition (cf Bidwell & McBride 2010: fig 45, no 53).

LIDS

79. Lid. LOC RE (15). Sooted on both exterior and interior of rim.
NK76BM; annexe, south-west of bath-house, topsoil.

80. Lid, LOC RE (15). Rim blackened.
NK77AD and AE; intervallum east of building 7, topsoil.

81. Lid. LOC RE (15).
NK73CT; south of east end of building 7, topsoil

82. Lid, LOC Ox (14).
NK73AR; centre of building 3, topsoil.

83. Lid, LOC Ox (16). Light buff in colour, with traces of a thin red red slip.
NK73BB; annexe, south-west of bath-house, in gulley.

84. Lid, LOC Ox (14), with traces of red slip.
NK76GN; building 16, fill of pit.

All the lids from the site are made in locally produced ware, apart from one in Balmuildy oxidised ware and two in unidentified fabrics (illus 7.9.254–5). There are no examples of the North-African type large domed lids for use with platters (Cf Swan 1999: illus 2, no 18).

PATERA AND FLAGON

85. Probable *patera* handle, LOC Ox (M5), cracked or underfired. (Cf Towcester: Woodfield 2005: fig 1, no 3; Rossington Bridge: Buckland et al 2001: fig 51, no 335).

NK73GC; annexe, south-west of bath-house, topsoil.

86. Cylindrical flagon with omphalos base, LOC Ox (M13). Rare form. (Cf Holt: Grimes 1930: fig 68, no 125).

NK76DC and DH; fill of gulley between buildings 7 and 8.

BRAZIERS

87.* Brazier, with one surviving horn luted to the rim, LOC RE. 'The vessel is cracked and sintered and has broken off at the probable junction with the fire-basket' (Swan 1999: 467, no 43; illus 4, no 43; illus 8, no 43).

NK76EQ; building 16, patch of burning.

88.* Brazier? LOC?

Swan identified one certain brazier from the site, and three possible brazier fragments (cat nos 88; 239; 252). Two are made in the local fabrics and the other two may well have been but are no longer available for re-examination. None of the three possible brazier fragments has any diagnostic features, and they cannot now be checked for signs of internal burning, so their function must remain speculative. The profile of no 239 is similar to the possible baking cover (illus 7.2.30), but is drawn as being circular, and could possibly be a storage jar (cf illus 7.2.29).

OTHER VESSEL FORMS

89. Triple vase, LOC RE.

NK76FR and GH; annexe, south of changing room of bath-house, overlying cobbles.

90.* Described as a crucible (Swan 1999: illus 4, no 40), LOC RE.

NK78CF; building 2, daub overlying north wall at east end.

91. *Tettina* spout, LOC Ox (5). Smoothed or self-slipped on exterior.

NK73EL; annexe, south of bath-house, topsoil.

92. Handle, LOC RE (11). Of the three surviving handles in local wares, two have roughly circular cross-sections like this and only one is a strap handle with two grooves of the type more commonly used on flagons.

NK77Au ; silt overlying path to east of fort/annexe rampart south of Roman Road.

93–4, 95.* Three sherds, very abraded but probably from the same vessel, possibly a Dr 37 imitation, LOC Ox (14). Animal appliqué over rouletting, with a band of slashed incisions near the shoulder or base. No traces of a slip.

NK73AB, AD and EB; annexe, south-west of bath-house, topsoil.

Oxidised wares with barbotine decoration are known from Inveresk and three forts on the Antonine Wall in addition to Bearsden, but all the vessels are represented only by fragments and there is nothing preserved which approaches a complete scheme of decoration. Four bowls are known from Inveresk, apparently in the ware made at the site: one is a Dr 30 imitation decorated with dolphins (Dore 2004: fig 79, BO10), which also appear on another bowl of indeterminate form (Swan 1999: illus 20, no 1.235); there is also a Dr 37 imitation, the details of its decoration uncertain (Swan 1999: illus 21, no 1.231), and a fourth bowl decorated with a leaf-motif (Dore 2004: fig 79, BO12). Animals described as dogs appear on two bowls from Balmuildy (Miller 1922: pl x LIV, nos 7 and 16, the former in 'rather coarse grey-black ware', perhaps a burnt oxidised vessel); there were some 20 pieces of this ware, including sherds with 'notched ornament clearly intended to suggest the ovolo border of the samian prototype' (Miller 1922: pl x LIx , nos 14–15). From Cadder came a jar apparently with a leaf scroll (Clarke 1933: fig 16, n. 8), and from Old Kilpatrick there was a cornice-rimmed jar decorated with a lobate bud and leaf (Miller 1928: pl x x III, no 9); the latter had a 'pale paste' and a brownish-red slip, and so might have been an imported beaker, but the chaotic style of the decoration is reminiscent of the other vessels discussed here.

The Bearsden and Inveresk vessels are regarded as products made at those forts, but the thin distribution of other examples amongst the forts on the Wall might be taken to indicate that they were from one source.

96. Identified as a possible open lamp, but it is not as crude as the two certain examples, and may just be a burnt dish, LOC RE (21).

NK73AWW; annexe, south-west of bath-house, topsoil.

97. Open lamp, LOC RE (21). Crudely hand-made, with patches of soot on both interior and exterior of nozzle.

NK73AWW; annexe, south-west of bath-house, topsoil.

98. Open lamp, LOC Ox (8). Crudely hand-made, with thick base. Sooting on the whole of the surviving interior wall of body and not just the nozzle, and patch of bruning of exterior of nozzle.

NK76AG; *via praetoria*, topsoil.

ANTONINE WALL PRODUCTS

99. *Unguentarium*, orange fabric with grey core and thick cream slip. *Cam* 389. Possibly an Antonine Wall product, but more likely to come from Colchester, where they were made from the mid-second century (Bidwell & Croom 1999: 485).

NK73AA; annexe, south-west of bath-house, topsoil.

100. Possibly from a triple vase, mortarium fabric 9.

NK76BM; annexe, south-west of bath-house, topsoil.

101. Cooking pot, Balmuildy oxidised. Very thick-walled.

NK77AL; over capstones of drain through rampart east of building 7.

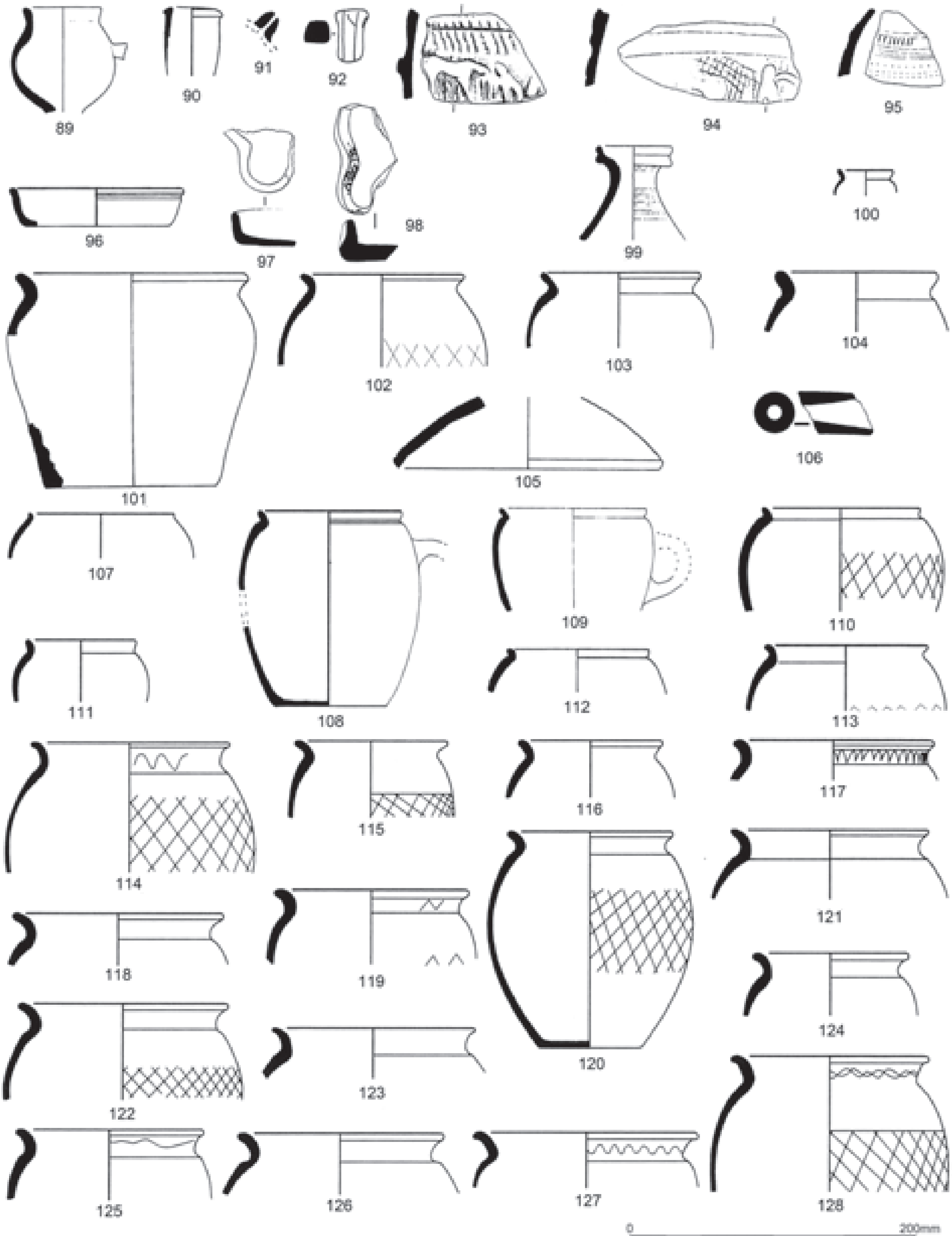


Illustration 7.5
Coarse pottery 89–128.

102. Cooking pot, Antonine Wall blue-grey fabric. The vessel is smoothed in facets on the shoulder and the interior of the rim.
NK73BM and CE; annexe, south-west of bath-house, topsoil.

103. Cooking pot, mortarium fabric 9. Smoothed.
NK74Cu ; area between buildings 3 and 4, topsoil.

104. Imitation BB2 cooking pot, Balmuildy oxidised.
NK77AL; over capstones of drain through rampart east of building 7.

105. Lid, Balmuildy oxidised.
NK77AE; intervallum east of building 7, topsoil.

106.* Self-slipped, plain cylinder, mortarium Fabric 4. Probably a *patera* handle (cf Marsh 1978, fig 614, nos 32.8–10).
NK73FR; bath-house, hot room, topsoil.

BB1

BEAKERS AND COOKING POTS

107.* Beaker, possibly BB1. Exact diameter uncertain.
NK77AJ; south ditch, topsoil.

108. Beaker with handle, BB1, possibly SOW BB 1, but in poor condition. With vertical burnishing round handle.
NK75CM and CQ; building 4, rubble overlying granary.

109.* Beaker with handle, SED BB1. Exact diameter uncertain.
NK76Cx ; drain to north-east of building 4.

110.* Beaker, BB1.
NK73GA; annexe, west of bath-house, fill of western pit.

111.* Beaker, BB1.
NK76AI; building 11, north range, topsoil.

112. Beaker, SED BB1.
NK74AS; intervallum east of building 6, topsoil.

113. Beaker, SED BB1.
NK76GP; annexe, south of changing room of bath-house, over cobbles.

114.* Cooking pot, BB1.
NK73DP; annexe, west of bath-house, fill of western pit.

115.* Cooking pot, BB1.
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

116.* Cooking pot, BB1.
NK76CJ; annexe, south-west of bath-house, topsoil.

117.* Cooking pot, BB1.
NK77BS; building 6, immediately over burnt daub.

118. Cooking pot, SED BB1.
NK73AWW and BH; annexe, south-west of bath-house, topsoil.

119.* Cooking pot, BB1.
NK76BQ; building 8, topsoil.

120. Cooking pot, BB1 (displayed in Hunterian Museum, GLAHM 138408).
NK74CZ; wattle and daub filling gulley to north-west of building 3.

121.* Cooking pot, BB1.
NK73AW; annexe, south-west of bath-house, topsoil.

122. Cooking pot, SED BB1.
NK76EN; annexe, south-west of bath-house, topsoil.

123. Cooking pot, SED BB1, in poor condition. Exact diameter uncertain.
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

124. Cooking pot, SED BB1.
NK73Cu ; intervallum east of building 7, topsoil.

125. Cooking pot, SED BB1.
NK77AE; intervallum east of building 7, topsoil.

126.* Cooking pot, BB1.
NK77AE; intervallum east of building 7, topsoil.

127.* Cooking pot, burnt BB1?
NK73BJ; building 3, unstratified.

128. Cooking pot, SED BB1. Abraded.
NK76CJ; annexe, south-west of bath-house, unstratified.

129. Cooking pot, SED BB1.
NK75DB; building 4, topsoil.

130.* Cooking pot, BB1.
NK73Cu ; intervallum east of building 7, topsoil.

131. Cooking pot, SED BB1. Burnishing lost. Williams 3.
NK73BH and AO; annexe, south-west of bath-house, topsoil.

PLAIN-RIMMED DISHES

132.* Plain-rimmed dish, BB1.
NK74Cx ; east fort rampart north of Roman Road, topsoil.

133.* Plain-rimmed dish, BB1 or local imitation. Williams 5.
NK73BJ; building 3, above natural.

134. Plain-rimmed dish, SED BB1. Scribing on base.
NK73DO; building 7, in sand fill of gulley to north of building.

The earliest contexts for this type in BB1 are sites on the Antonine Wall (Holbrook & Bidwell 1991: 99–100). The general scarcity of well-dated Hadrianic groups in the North and even more so in the South-West admits the possibility of a pre-

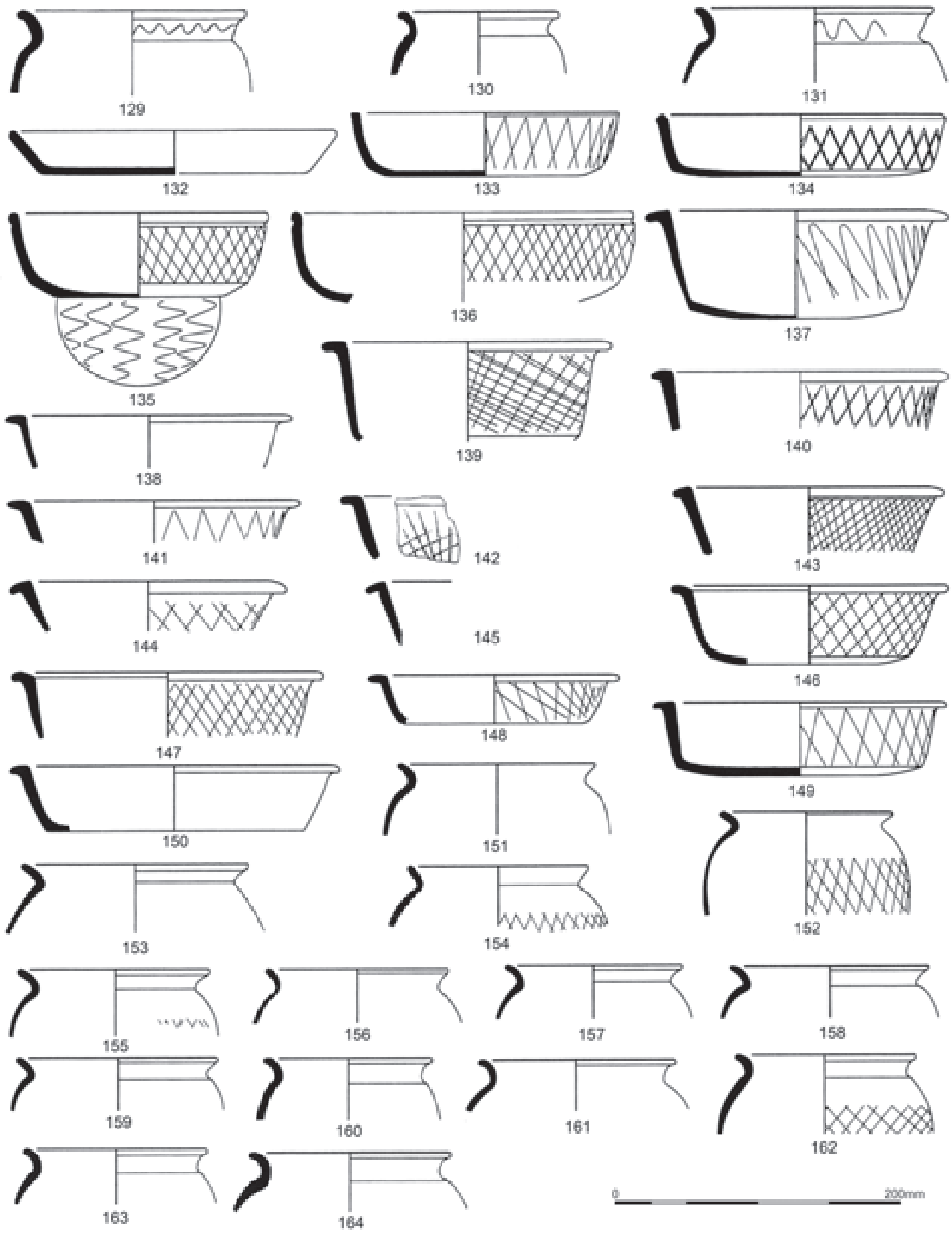


Illustration 7.6
Coarse pottery 129–64.

Antonine date for the emergence of the type; on the other hand, the small numbers known on the Antonine Wall compared with the common occurrence of the type in later contexts on Hadrian's Wall perhaps means that it emerged only a few years before the Antonine Wall was abandoned. The squared-off rim of no 133 has been recognised as a common feature of early Antonine examples (Bidwell & McBride 2010: fig 43, no 10, and note also examples from Inveresk in Thomas 1988: MF 1: E5, illus 35, 1.125, 1.126, the latter with a handle). No examples have been published from Cantley/Rossington Bridge. The top of the rim of no 134 is rounded. Later plain-rimmed dishes also have rounded tops, but the thickness of their walls often taper towards the top; in Antonine Scotland, the only possible example is from Inveresk (Dore 2004: fig 80, DI 3, apparently undecorated).

PLAIN-RIMMED BOWLS

135. Plain-rimmed bowl with external groove, BB1 in a fine fabric, but not SOW BB1. Sooting on exterior. Bowls of this type are probably Cantley/Rossington Bridge products (Bidwell 1985: fig 71, no 135; for Rossington Bridge, now see Buckland et al 2001: figs 40, nos 38, 41). Williams' heavy mineral analysis confirms the presence of Rossington Bridge products at Bearsden (samples no 4 and 5). Bowls as nos 135–6 are not known in the south-west and do not figure in the extensive BB1 type-series from Dorchester (Seager Smith & Davies 1993).

     NK73GC and AW; annexe, south-west of bath-house, topsoil.

136. Plain-rimmed bowl with external groove, heavily burnt BB1.

     NK76AP; building 8, topsoil.

FLAT-RIMMED BOWLS AND DISHES

137. Flat-rimmed bowl, SED BB1.

     NK76EN; annexe, south of changing room of bath-house, overlying cobbles.

138. Flat-rimmed bowl, BB1. Abraded and burnt.

     NK74AV; building 1, cleaning over natural.

139.* Flat-rimmed bowl, BB1.

     NK76EN; annexe, south of changing room of bath-house, overlying cobbles; NK76ED, building 12, on road surface south of building.

140.* Flat-rimmed bowl, BB1. Williams 4.

     NK73AQ; building 3, room 4, cleaning over natural.

141.* Flat-rimmed bowl or dish, BB1.

     NK75AW; building 7, west end, topsoil.

142.* Flat-rimmed bowl, BB1.

     NK77Au; silt overlying path to east of rampart east of building 12.

143. Flat-rimmed bowl, SED BB1.

     NK77AL; topsoil above drain capstones to east of bulding 7.

144. Flat-rimmed bowl or dish with drooping rim, SED BB1.

     NK76FR; annexe, south changing room of bath-house, overlying cobbles.

145.* Flat-rimmed bowl with drooping rim, BB1. Burnt; no decoration visible.

     NK73AW; annexe, south-west of bath-house, topsoil.

146. Flat-rimmed bowl, SED BB1. Loop decoration on the underside.

     NK80Dy and EJ; burnt layer outside west wall of latrine.

147.* Flat-rimmed bowl or dish, BB1. Sooting on exterior.

     NK76FR; annexe, south-west of bath-house, overlying cobbles.

148. Flat-rimmed dish, SED BB1.

     NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

149.* Flat-rimmed dish, BB1.

     NK76GN building 16, fill of pit.

150.* Flat-rimmed dish, BB1. Abraded or burnt.

     NK79CO; bath-house, pit south of first warm room.

BB2

COOKING POTS

151.* Cooking pot, BB2.

     NK76Du ; overlying cobbles to south of building 7.

152.* Cooking pot, BB2.

     NK77FH; fill of drain on north side of east end of building 7.

153.* Cooking pot, BB2.

     NK77AE; intervallum east of building 7, topsoil.

154. Cooking pot, BB2. Fine lattice and silky burnishing.

     NK78AJ; intervallum west of building 4, topsoil.

155.* Cooking pot, assumed to be BB2.

     Unstratified.

156.* Cooking pot, BB2.

     NK74Cu ; intervallum west of building 4, topsoil.

157. Cooking pot, BB2.

     NK74AL; surface of intervallum road west of buildings 1 and 2.

158.* Cooking pot, assumed to be BB2. Williams 2.

     NK73AW; annexe, south-west of bath-house, topsoil.

159.* Cooking pot, BB2.

     NK74Cu ; surface of intervallum road west of buildings 1 and 2.

160.* Cooking pot, BB2. Williams' heavy mineral analysis places this vessel (sample 6) in an undesignated group of BB1 fabrics which are products neither of south-east Dorset nor of Rossington Bridge.
NK74BR; building 1, overlying natural.

161.* Cooking pot, BB2.
NK73BH; annexe, south-west of bath-house, topsoil.

162.* Cooking pot, BB2.
NK77DZ; fill of gulley to south of south intervallum.

163. Cooking pot, BB1.
NK77AL; above drain capstones east of building 7.

164.* Cooking pot, BB2.
NK76BC; topsoil immediately north of east end of building 8.

165.* Cooking pot, BB2.
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

166. Cooking pot with beaded rim, BB2, *Cam* 328 (Bidwell & Croom 1999: 483). The type was not produced in the Thameside kilns but is not common at Colchester. See also nos 237–8.
NK77AE; topsoil over intervallum to east of building 7.

PLAIN-RIMMED BOWLS AND DISHES

167.* Plain-rimmed dish, BB2.
NK73AW; annexe, south-west of bath-house, topsoil.

168. Plain-rimmed dish with chamfer, BB2.
NK76GH; annexe, south-west of bath-house, grey clay overlying cobbles; NK76GM, burnt material lying between north wall of north granary and internal dwarf wall.

169.* Plain-rimmed dish, BB2 or imitation.
NK73AWW; annexe, south-west of bath-house, topsoil.

170. Plain-rimmed dish with two grooves and chamfer, BB2.
NK77AL, AE and BL; brown soil overlying drain capstones east of building 7.

171. Plain-rimmed bowl with groove and chamfer, BB2. Sooted underside.
NK76EN; annexe, south of changing room of bath-house, overlying cobbles.

172.* Plain-rimmed dish with groove, BB2.
NK77CB and Cx; fill of gulley to north of east end of building 7.

TRIANGULAR-RIMMED BOWLS AND DISHES

173.* Triangular-rimmed dish with chamfer, BB2.
NK79DJ; silt south of latrine.

174. Triangular-rimmed dish with slight chamfer, BB2.
NK79BR; rubble south of bath-house.

175. Triangular-rimmed dish with chamfer, BB2.
NK76EN; annexe, south-west of bath-house, topsoil.

176. Triangular-rimmed dish, BB2 (unclear if it had a chamfer).
NK76EN and FP; annexe, south-west of bath-house, topsoil.

177. Triangular-rimmed dish with chamfer.
NK76EN; annexe, south-west of bath-house, topsoil

178.* Triangular-rimmed bowl or dish, BB2.
NK80BN; area between bath-house warm rooms and drain to south, topsoil.

179.* Triangular-rimmed bowl or dish, BB2.
NK76FR; annexe, overlying cobbles to south of bath-house.

180.* Triangular-rimmed bowl, BB2.
NK76CS; building 16, unstratified.

ROUNDED-RIMMED BOWLS AND DISHES

181. Rounded-rimmed dish with drooping rim and slight chamfer, BB2.
NK77AE; brown soil overlying intervallum east of building 7.

182.* Rounded-rimmed dish, assumed to be BB2. Williams 1.
NK73AB; annexe, overlying path to south of bath-house, topsoil.

183. Rounded-rimmed bowl with chamfer, BB2.
NK78CG; fill of gulley to north of east end of building 1.

184. Rounded-rimmed bowl with chamfer, BB2.
NK76CV; fill of drain between buildings 3 and 4.

185. Rounded-rimmed bowl with chamfer, BB2. There are seven surviving drilled holes where the pot has been mended.
NK75CR; daub between buildings 3 and 4.

186. Rounded-rimmed bowl or dish, BB2.
NK76EN; annexe, south-west of bath-house, topsoil.

187. Rounded-rimmed bowl or dish, BB2.
NK73AWW, annexe, south-west of bath-house, topsoil.

188. Rounded-rimmed bowl or dish, BB2.
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

189. Rounded-rimmed bowl, BB2. The sherd is in very poor condition, with too little of the surface surviving to show any decoration.
NK74CB; building 1, topsoil.

190. Rounded-rimmed bowl or dish, BB2.
NK73BJ; building 3, men's quarters, topsoil.

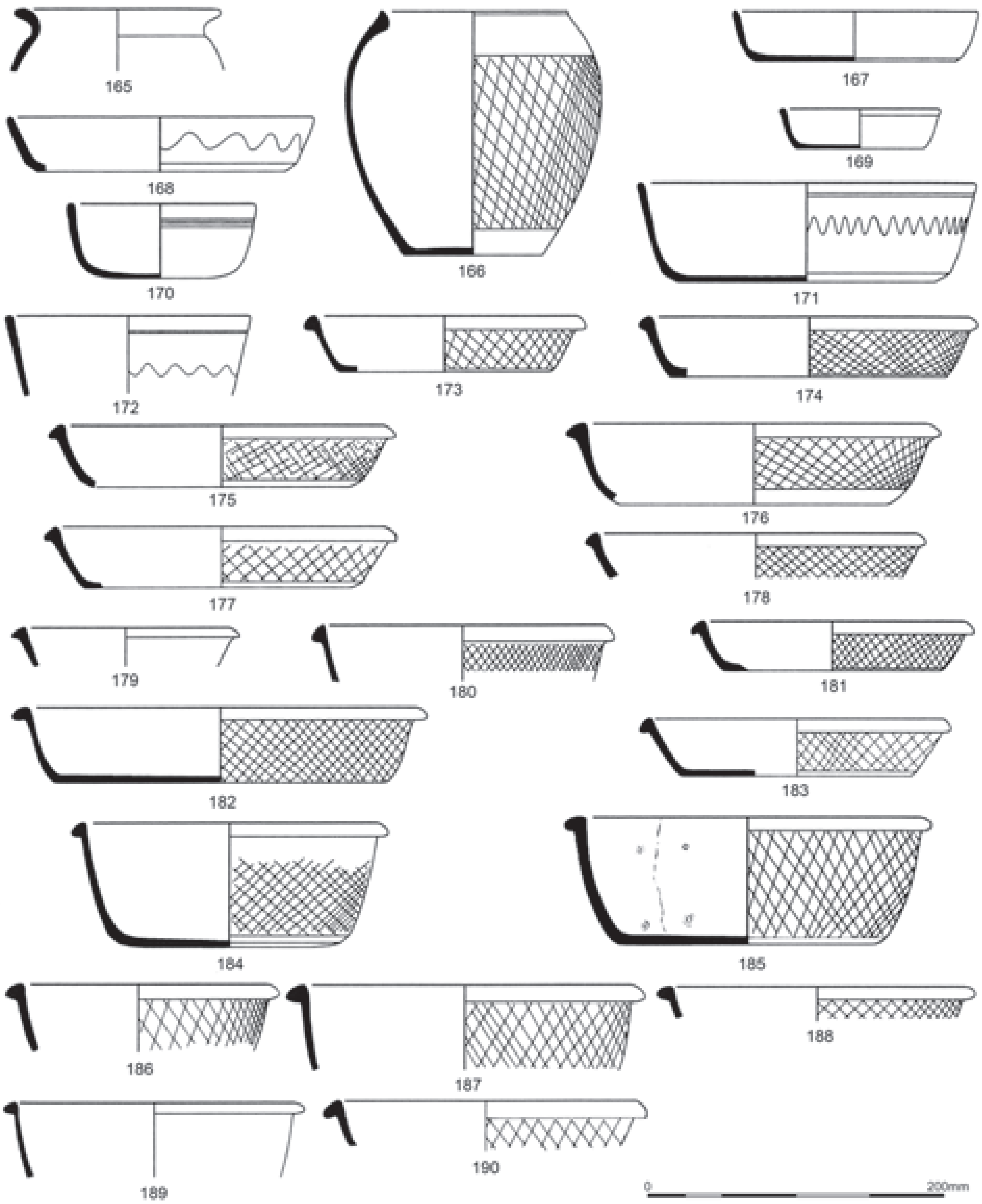


Illustration 7.7
Coarse pottery 165–90.

The rounded rims are of the type called 'beaked' by Dore (2009: 503), and can sometimes be difficult to distinguish from the triangular rims. The beaked rims are similar to the triangular rims in usually having a longer upper face than the lower face, in contrast to the more rounded, P-profile rims that appear from the 160s or 180s. Dore has suggested that a few rounded rim vessels occur on the Antonine Wall (Dore 2009: 503), perhaps coming from a different supplier than the beaked rims, but there are no examples from this site. As far as can be seen, taking into consideration the poor condition of the sherds, all the bowls and dishes have some form of decoration. This supports the suggestion that the absence of decoration is a feature of the bowls and dishes produced after about180 (Monaghan 1987: 226).

SEVERN VALLEY

191.* Narrow-mouthed jar, assumed to be SVW.
NK77BV; building 7, immediately north of officer's end.

192. Narrow-mouthed jar, SVW.
NK80CC; annexe, overlying path south of second warm room of bath-house.

193. Narrow-mouthed jar, SVW. Webster type 1. Burnt on rim.
NK73FP, beside buttress south of bath-house below rubble.

194.* Narrow-mouthed jar, SVW.
NK80AL; annexe, between bath-house and latrine, unstratified.

195.* Narrow-mouthed jar, SVW.
NK75BK; soil overlying intervallum road east of building 6.

196. Narrow-mouthed jar, SVW.
NK76AN; building 4, topsoil.

197.* Narrow-mouthed jar, assumed to be SVW.
NK76Cx , fill of gulley beyond north-east corner of building 4.

198.* Narrow-mouthed jar, assumed to be SVW.
NK78BG; intervallum west of building 3.

199. Narrow-mouthed jar, SVW.
NK78BH; intervallum west of building 3.

200.* Narrow-mouthed jar, SVW. Probably the rim mentioned by Webster (1977: 171).
NK73AR and AK; building 3, room 4, topsoil.

201.* Narrow-mouthed jar, assumed to be SVW.
NK80?GZ; annexe, south-west of bath-house, topsoil.

202.* Narrow-mouthed jar, assumed to be SVW.
NK73AN and NK76CD; annexe, south-west of bath-house, topsoil.

Other fabrics

FLAGONS AND BEAKERS

203. Single-handled flagon in sandy pinkish-orange fabric with cream slip.
NK76Dx ; annexe, south-west of bath-house, under boulders.

204. Jug in a hard sandy black fabric, with gold mica plate inclusions and buff surfaces, with patches of black. Heavily burnt.
NK73AJ; annexe, south-west of bath-house, topsoil; NK73FH; rubble in bath-house hot room.

205. Indented beaker in a hard grey-white fabric with orange-red colour coat. COL CC?
NK77BR; to north of east end of building 7.

206. Cornice-rimmed beaker, red-brown slip, KOL CC.
NK75DE; between buildings 7 and 8, topsoil.

207. Cornice-rimmed beaker, dark olive slip, KOL CC. NK73BB; annexe, south-west of bath-house, in east–west gulley.

208. Beaker, moderately fine grey fabric, with heavy burnishing in facets.
NK78EO; intervallum west of building 4.

209. Poppy-head beaker, UPC FR.
NK80DC; in pit beside buttress on south wall of bath-house.

STORAGE JARS

210. Storage jar, sandy grey fabric, with no surviving surfaces. Possibly a Colchester product. Cf Bar Hill: Webster 1977, fig 11.2, no 28; Corbridge: Bishop and Dore 1988: fig 117, no 12.
NK75AC; building 3, men's quarters, room 7 or 8, topsoil.

211. Storage jar, moderately fine grey fabric, with heavy burnishing in facets.
NK76AO; AT; BB; CH and CI; in silt fill of drain crossing *via praetoria* east of building 4 and in topsoil above.

212. Narrow-mouthed jar, grey fabric similar to a reduced version of SVW.
NK80AC; south of second warm room of bath-house, unstratified.

213. Narrow-mouthed jar, in a soft, sandy light grey fabric.
NK80DM; gulley of annexe rampart north of latrine.

COOKING POTS AND JARS

214.* Jar in an unidentified fabric.
NK75CQ; building 4, rubble.

215. Jar, in a non-local grey ware. Hard buff fabric with dark grey surfaces, plentiful rounded quartz inclusions, up to 2mm across, and possible flint inclusions. The base has been cut into a disc (D: 47mm).
NK73CA; west intervallum beside building 4, topsoil.

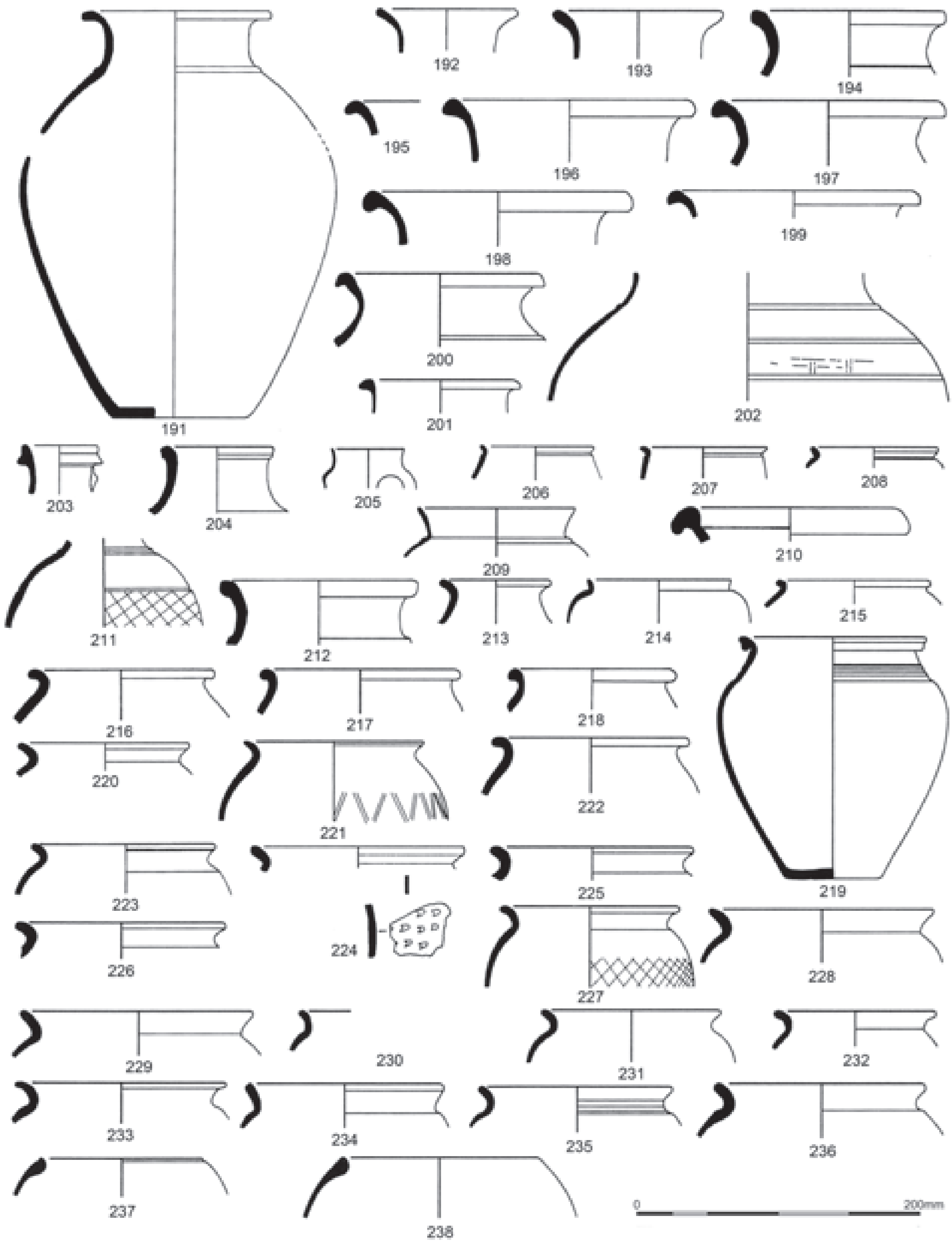


Illustration 7.8
Coarse pottery 191–238.

216. Jar, in East Anglian grey ware.
NK77AE; intervallum next to building 7, topsoil.

217.* Jar in an unidentified grey ware.
NK77BR; overlying burnt wattle and daub in drain north of east end of building 7.

218. Narrow-mouthed jar, East Anglian grey ware.
NK77Cu; brown soil in interior of building 6; NK77FL; gulley to north of officer's quarters of building 7.

219. A double-lipped jar with a rilled neck above a high shoulder, which can be identified as an import from North Gaul (illus 7.8). The vessel is largely complete and is displayed in the Hunterian Museum (GLAHM 138047). Its fabric description (Hird's fabric 23: 'smooth, powdery, white fabric. Trace of creamy white slip on outer surface') is similar to that of similar rims from Mumrills ('unusual jar in cream-coloured fabric; one fragment is sooty', Gillam 1961: fig 15, no 91) and Cramond (Ford 2003: illus 61, no 51, identified as a North-Gaulish import), where the rim could be either of early Antonine or Severan date. These three vessels find parallels in the Hadrian's Wall zone at South Shields, but in Severan and later deposits (unpublished), and at Housesteads (Dore 2009: fig 16.16, nos JA 108–108B). The type also occurred in the New Fresh Wharf deposit at London, which was of third-century date but incorporated earlier material. Richardson (1986: 109, 1.55–57) included the London vessels under the general heading 'Pottery from North West Gaul (Pas-de-Calais/Picardy Region)'. French publications, mostly subsequent to Richardson's report, support this identification of their source, though with more emphasis on Picardy and areas to its south-west. A vessel-type from the general area of Amiens is very similar to the Bearsden jar, though with a flatter shoulder and a groove around its point of maximum girth (Bayard 1980: pl 27, no 45). The fabric description also corresponds to those of the British vessels: it has been classified as an example of 'le groupe de pâtes blanches à quartz', which had a wide distribution to the south of the Somme basin from the first half of the second century, if not the Flavian period; in the areas north and west of Beauvais it represented more than 30% of the coarse wares in the second quarter of the third century (Bayard 2001: 46, fig 11, Type 45 and earlier variant, fig 12 (distribution map); for petrological analysis of the fabric, see Dubois & Mille 1995).
NK73CR; building 3, room 1, layer above natural.

220. Cooking pot, in a non-local sandy grey ware with sparkling sand grains.
NK73CR; building 3, room 1, layer above natural.

221.* Cooking pot, in an unidentified grey ware.
NK73AJ; annexe, south-west of bath-house, topsoil.

222.* Cooking pot, in an unidentified fabric.
NK77AE; building 8, topsoil.

223. Cooking pot, in a hard, gritty dark grey fabric, with plentiful white specks and occasional black inclusions and voids.
NK76FP; annexe, south of changing room of bath-house, overlying cobbles.

224. Cooking pot, Nar Valley ware. Body sherd has stabbed decoration made by a crescent-shaped implement.
NK77AE; building 8, topsoil.

225.* Cooking pot, in an unidentified fabric.
NK76Dy; building 11, fill of post-hole.

226.* Cooking pot, in an unidentified grey ware.
NK76DD; annexe, south-west of bath-house, topsoil.

227.* Cooking pot, in an unidentified grey ware.
NK77DZ; gulley between south rampart and intervallum.

228.* Cooking pot, undistinguished grey ware with whitish slip.
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

229.* Cooking pot, in an unidentified grey ware.
NK76FR; annexe, south changing room of bath-house, overlying cobbles.

230.* Cooking pot, in an unidentified fabric.
NK75DC; building 6, unstratified.

231.* Cooking pot, in an unidentified grey ware.
NK76FR; annexe, south of changing room of bath-house, overlying cobbles.

232.* Cooking pot, in an unidentified grey ware.
NK73BF; building 7, men's quarters, soil overlying natural.

233.* Cooking pot, BB1 or imitation.
NK76DC; gulley north of building 8.

234.* BB1 imitation cooking pot, in an unidentified fabric.
NK73BS; building 3, room 1, topsoil.

235.* Cooking pot, in an unidentified grey ware.
NK77BS; building 6, immediately over burnt daub.

236.* Cooking pot, in an unidentified fabric.
NK76FP; annexe, south of changing room of bath-house, overlying cobbles.

237.* Cooking pot with beaded rim, in an unidentified fabric (BB2?). Cf no 166 above.
NK75CK; overlying metalling between buildings 7 and 8.

238. Cooking pot with beaded rim, in a soft sandy fabric, with light grey core, darker surfaces and traces of a decayed slip. Probably abraded BB2. Cf no 166 above.
NK78EQ; daub to north-west of building 5.

239.* Jar or brazier, in an unidentified fabric, possibly similar to a tile fabric. For other possible braziers see nos 87–8, 252.
NK73GC; annexe, south-west of bath-house, topsoil.

BOWLS AND DISHES

240.* Flat-rimmed bowl, possibly BB1.
NK75BM; east of east annexe ditches.

241.* Flat-rimmed bowl or dish, possibly in a local oxidised fabric.
NK73AJ; annexe, south-west of bath-house, topsoil.

242.* Triangular-rimmed bowl or dish in an unidentified grey fabric.
NK73CT; over metalling between buildings 7 and 8.

243.* Rounded-rimmed bowl or dish in an unidentified grey fabric.
NK73GA; annexe, west of bath-house, fill of west pit.

244.* Dish in grey fabric with a black slip.
NK76FP; annexe, south of changing room of bath-house, overlying cobbles.

245. Dr 37 imitation, in a hard light grey fabric with mid-grey surfaces, slightly micaceous.
NK77AL; above capstone of drain through east rampart of fort.

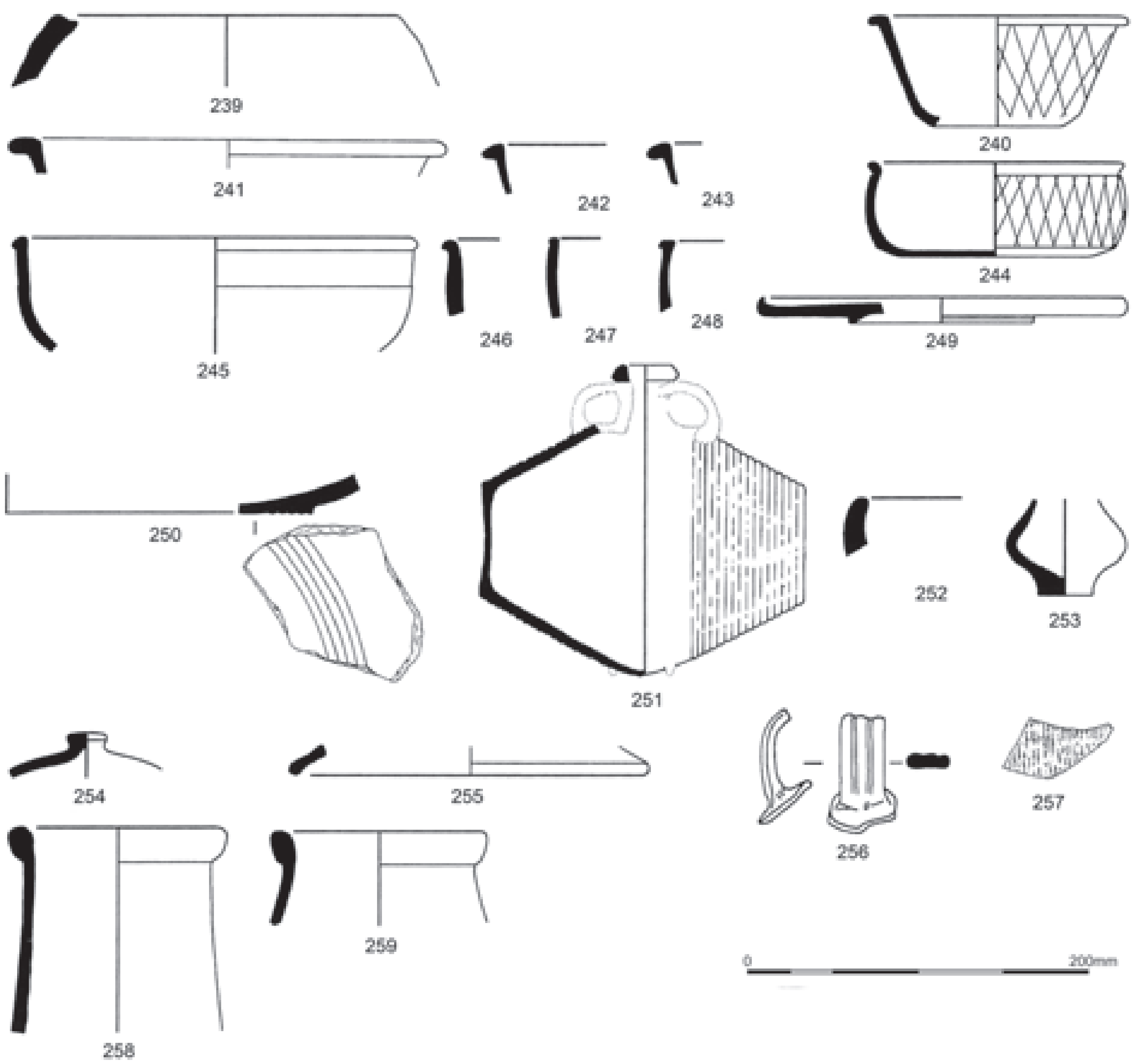


Illustration 7.9
Coarse pottery 239–59.

246.* Bowl, self-coloured, soft, sandy and slightly micaceous fabric. Probably a local oxidised fabric.
NK73AB; annexe, south-west of bath-house, topsoil

247.* Bowl, in an unidentified fabric.
NK76AP; building 8, topsoil.

248.* Bowl in a sandy pink fabric with plentiful soft red inclusions and less common opaque white inclusions.
NK78CT; fill of gulley in area to east of annexe.

249. Shallow tableware dish, in a fine brick-red fabric with very fine sand inclusions. Carefully burnished red-slipped surfaces, burnt on the rim and interior. 'Both Mercedes Vegas and Jaap van der Werff (pers comm) have suggested that this may be a local copy of a non-standard African Red Slip ware form' (Swan 1999: 468, no 45).
NK76DD; FP and EN; annexe, south of changing room of bath-house, overlying cobbles.

OTHER VESSEL FORMS

250. Closed form, in a micaceous, hard off-white fabric with white margins and a smooth, dark grey slip.
NK77AL; above capstone of drain through fort rampart east of building 7.

251. Costrel in fairly fine, off-white fabric with sparse red and grey inclusions and fine silver mica. Non-joining sherds from the rim and neck also survive. Probably Eastern Mediterranean in origin (Swan 1999: 468 and illus 4, no 46). Rilled.
NK73AW, CK and FZ; annexe, south-west of bath-house, topsoil; NK79AF; annexe, south of latrine, topsoil.

252.* Possible brazier, in an unknown fabric. See also nos 87–8, 239.
NK73AA, annexe, south-west of bath-house, topsoil.

253.* Possible *unguentarium*, in an unknown fabric.
NK77DA; area of gulley between south rampart and intervallum, topsoil.

254.* Lid, possibly in a local oxidised ware.
NK77ED; on intervallum east of building 7.

255. Lid, in a reddish-brown fabric with fine multi-coloured inclusions and plentiful mica on the surface.
NK76AI; building 10, overlying natural.

256. Flagon handle, VER WH?
NK74AE; Building 6, topsoil.

257.* Decorated body sherd, in an unknown fabric.
NK78Cu ; area east of annexe.

258.* Hard pink fabric with pinkish-cream surface.
NK73ET; bath-house, hot room.

259.* Sandy, soft creamy-buff fabric.
NK73AA; annexe, south of changing room of bath-house, topsoil.

Nos 258 and 259 were originally classified as jars but are possibly amphorae, though neither their rim-forms nor their fabrics correspond to common types.

7.3 MORTARIA

KATHARINE F HARTLEY

7.3.1 Summary

The mortaria from these excavations constitute one of the largest assemblages in Scotland, and the biggest in the western sector of the Antonine Wall. No mortarium made outside Britain is present in the sample and, perhaps more surprisingly, none made in the north of England. These factors alone make it of considerable significance, but its outstanding importance lies in the evidence for the presence of a pottery workshop of substance. The mortaria in Fabric 5, attributable to the potter Sarrius, provide a unique assemblage and proof of the presence of a workshop, one which had potters from up to four different potting traditions for making mortaria, not to mention the production of many other kinds of coarseware (see Bidwell & Croom above), a workshop, whose inception dated from very early in the fort's history. The purpose of this workshop was clearly to service the local military, but there is a strong possibility that it was also intended to serve a wide spectrum of the western sector of the Antonine Wall. Its presence gives the site a significance which merits further exploration. It also raises, not for the first time, the question of the precise nature of the involvement of Sarrius, who may well have been the most important single potter in Britain making mortaria in the mid-second century, as is discussed below (for his general production and his involvement in another pottery workshop at Rossington Bridge, near Doncaster, see Buckland et al 2001: 42–8 and 86–7).

7.3.2 Methodology

A paper database was compiled in the 1980s by y vonne Boutwood who also did valuable initial work on fabric descriptions and on the quantifying of sherds in Fabric 5 (ie Sarrius). The pottery was quantified by weight, sherd count and rim percentage. All other work on the report, including a recent complete re-examination of all of the sherds and the fabrics, has been done by the author. The database has been transferred to computer and as much detail as possible included. Entries in the database are under random archive numbers, but the Catalogue entries below have been arranged under fabrics with the database archive numbers added at the end of each entry, before the excavation code and context details, eg:

49 (illus 7.20.34) Diam 270mm. Two joining sherds from a hard mortarium, fired throughout to dark grey except for its surface which is oxidised to orange-brown; the slip on the flange is scuffed. Archive no 1/115.
NK73AS; east end of bath-house, unstratified. NK80BD; primary bath-house building, hearth.

Table 7.2
Quantification of all the mortaria from Bearsden

Fabrics and sources	*Wt in gms*	*Sherds*	*% rim*	*Vessels*
Fabric 1: Verulamium region	690	14	30	1
Fabric 2: Mancetter-Hartshill, Warks	3,000	29	206	13
Fabric 3: Colchester	765	18	69	10
Fabric 4: Mascel(l)io, etc: Bearsden?	370	5	49	2
Fabric 5: Sarrius: Bearsden	10,456	344	820	57
Fabric 6: raetian: Bearsden	1,200	18	69	8
Fabric 7: raetian: Bearsden	495	17	41	5
Fabric 8: raetian: Bearsden	489	6	3	1
Fabric 9: raetian: Bearsden	240	8	21	2
Fabric 10: raetian: Bearsden	340	6	43	4
Fabric 11: Cicu(s), etc: Bearsden?	930	27	95	8
Fabric 12: unidentified stamps, etc: Bearsden?	150	6	9	3
Fabric 13: western sector, Bearsden?	505	12	0	3
Fabric 14: Scotland, western sector	245	4	0	1
Totals	19,875	514	1,455	118

Joining sherds are shown as archive nos 1/115, but 105/25 and 18 for example, means that archive nos 105 and 25 join while archive no 18 belongs to the same vessel but does not join. It has not been possible to eliminate certain anomalies which resulted from transferring the old paper database to a computer. Joining sherds with differing excavation codes were sometimes given the same number on paper and treated as a single entry because they joined or were from the same vessel. In order to make sorting on an excavation code or context basis possible, the joining sherds retain the same archive number, but are entered on separate lines and the forward slash which indicated the join in the paper archive has been removed, so that the archive number 127 for example, appears four times consecutively in the archive number column.

Numbers like (1K) are my personal record numbers for individual stamps; these have been retained in the archive and the catalogue because of their convenience in keeping a check on the large number of fragmentary and some unidentified stamps. A full list of the abbreviations found in the database and sometimes used in the catalogue can be found at the end of this report.

Where possible, the National Roman Fabric Reference Collection by Tomber & Dore (1998) has been referred to for fabrics, with additional information being added for the unusual Verulamium region fabric and some Mancetter-Hartshill mortaria which have an early type of trituration grit which it is important to distinguish from that used later. Descriptions have been provided for all of the Scottish fabrics, with help from Paul Buckland for Fabric 5, the fabric of the Sarrius mortaria.

Samples from the mortaria at Bearsden were subjected to petrographical examination by G H Collins (7.4.2), but due to his sudden death it has not been possible to make maximum use of his work. G D Gaunt has made a very useful study of the trituration grit used in a selection of the mortaria (7.4.3). Both support the belief that Fabrics 4–14 were produced in the western sector of the Antonine Wall and that all could, in theory, have been produced at Bearsden. Mark Gillings made a chemical and petrological analysis of local oxidised ware (7.4.4), but did not include mortaria in his analyses. He did, however, remark on the very close affinities between other coarse ware and the daub samples, which 'implies the exploitation of a close clay source'. His conclusion, taking all of his analysis into consideration, was that oxidised ware was manufactured in the immediate vicinity of the fort.

7.3.3 Quantification

The assemblage quantified consists of 514 mortarium sherds weighing a total of 19.875kg. Eighteen extra sherds weighing 135gms are excluded from the quantification: four of these (archive nos 143, 161–2, 289) appear to be shapeless pieces of clay while 14 small body sherds are of indeterminate fabric. The sherds quantified are from a total of *c* 118 mortaria. The details for all quantified sherds are summarised in table 7.2 and in the summary

Summary of Table 7.2

Sources and fabrics	*Weight gms*	*Sherds*	*% rim*	*Vessels*
Mancetter-Hartshill	3000	29	206	13
Verulamium region	690	14	30	1
Colchester	765	18	69	10
Sarrius	10,456	344	820	57
Mascel(l)io	370	5	49	2
raetian	2,764	55	177	20
Cicu *et al*	930	27	95	8
Scotland: other	900	22	9	7
Totals	19,875	514	1,455	118

Table 7.3
Mortaria from sources inside Scotland

	Weight	*Sherds*	*% rim*	*Vessels min-max*
Sarrius	10,456	344	820	37–57
raetian	2,764	55	177	20
Mascel(l)io	370	5	49	2
Cicu, etc	1,080	33	104	11
Others	750	16	0	4
Totals	15,420	453	1,150	74–94

Table 7.4
Mortaria from sources outside Scotland

	Weight in grams	*Number of sherds*	*% of rim*	*Min-max vessels*
Mancetter-Hartshill	3,000	29	206	13
Verulamium	690	14	30	1
Colchester	765	18	69	10
Totals	4,455	61	305	24

of table 7.2. Illus 7.10–7.12 show the percentages of mortaria from different sources according to weight, sherd count, and surviving rim-percentage. With most of the fabrics the number of vessels can be assessed exactly because so few sherds are involved, but with Fabric 5 the large number of sherds (344) make this impossible; the number of vessels range from an absolute minimum of 37 up to *c* 57. Illus 7.14 and 7.15 show the relative number of vessels from different sources using these maximum and minimum estimates for Fabric 5 (Sarrius). With Fabrics 13 and 14, base sherds and incomplete rim fragments had to be used to estimate vessels in the absence of adequate rim sherds.

7.3.4 Mortarium fabrics

Fabrics produced outside Scotland *Fabrics 1–3*

Fabric 1

Verulamium region, ie at workshops alongside Watling Street between Verulamium and Radlett (Tomber & Dore 1998: 154–5; Hartley, K F & Tomber 2006: 95–6).

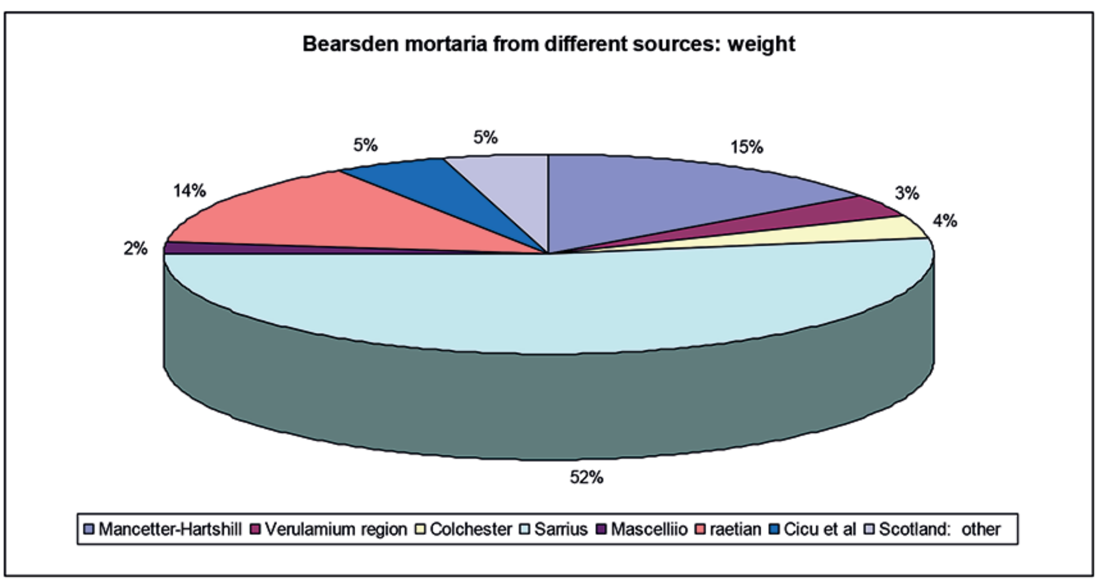


Illustration 7.10
Bearsden mortaria from all sources by weight.

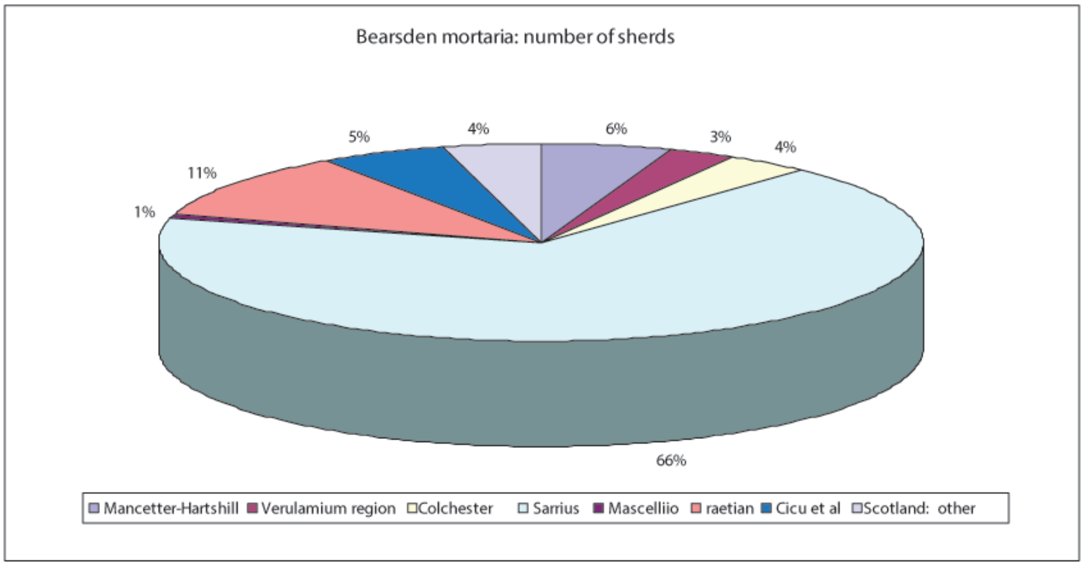


Illustration 7.11
Bearsden mortaria from all sources by number of sherds.

The single mortarium from this source is in hard, granular brownish-orange fabric with thick cream slip. Inclusions are frequent, mostly tiny, fairly well-sorted, sub-rounded and angular quartz with occasional flint and rare black slag and orange-brown material. The trituration grit has not survived, but was probably mainly flint with occasional quartz and rare red-brown material. The mortarium fabrics produced in the potteries south of Verulamium were mostly greyish-cream and were either self-coloured or had a self-coloured slip, but a few potters produced orange- to red-brown fabrics. Two minor red-brown fabrics with cream slip were also produced at Radlett (unpublished) and at Brockley Hill (Castle 1973: 82, MS12). The Bearsden example is in the much coarser red-brown fabric with cream slip which is very rarely found.

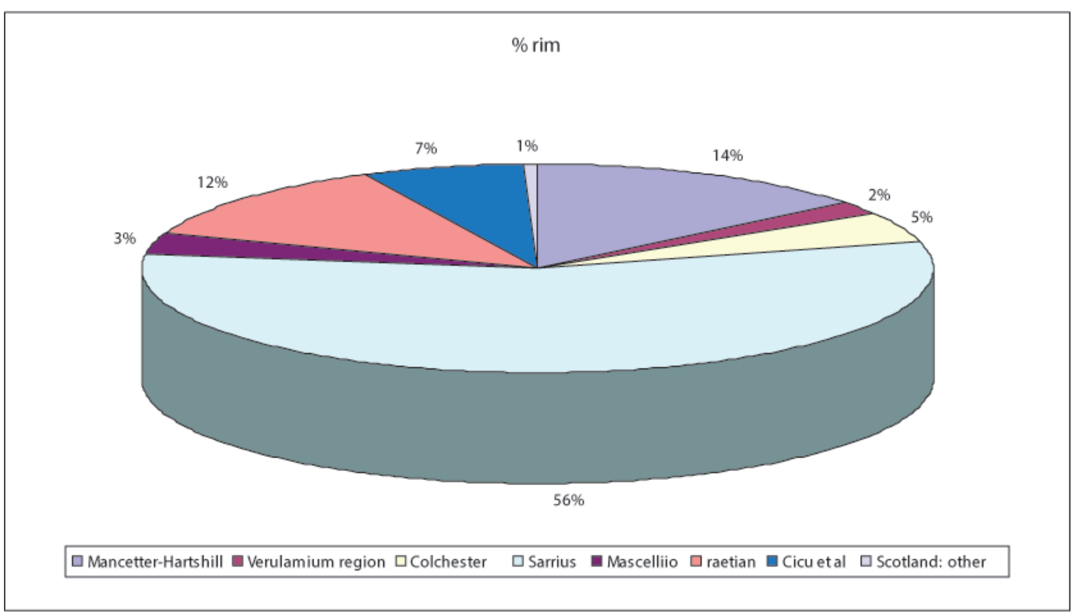


Illustration 7.12
Bearsden mortaria from all sources by rim percentages.

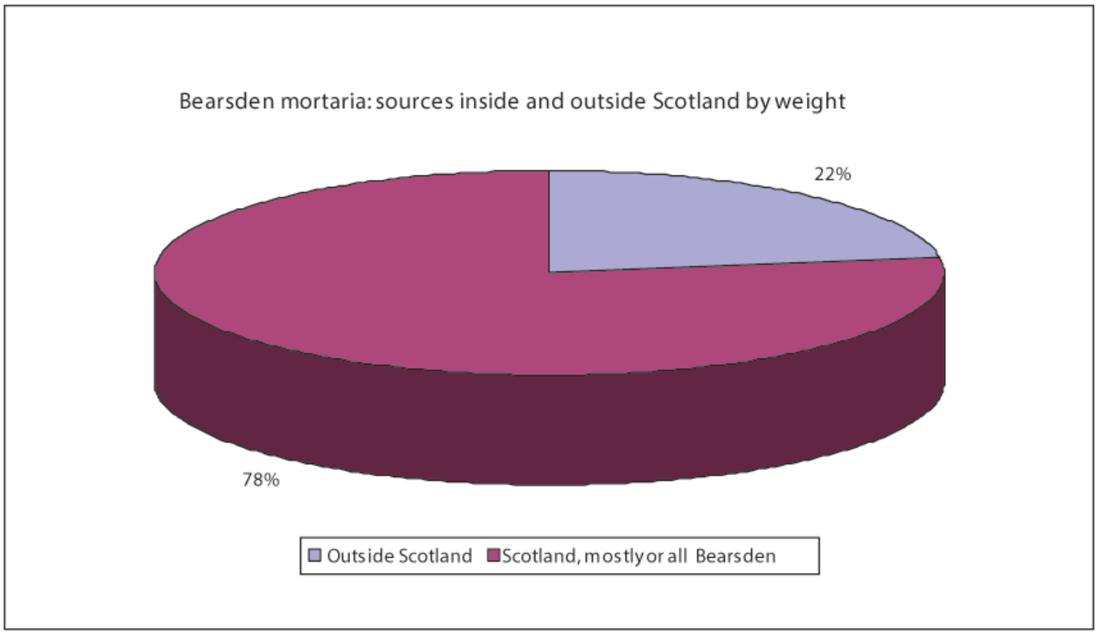


Illustration 7.13
Bearsden mortaria from sources inside and outside Scotland by weight.

Fabric 2

Mancetter-Hartshill potteries in Warwickshire (Tomber & Dore 1998: 189)

A usually fine-textured, cream fabric, varying from softish to very hard, sometimes with pink core. Inclusions are usually moderate, fairly small, transparent, and translucent white and pinkish quartz with sparse orange-brown fragments. The range in fabric is, in fact, quite wide, from that with scarcely any inclusions to fabrics with a fair quantity and fabrics with hard, ill-sorted black inclusions. The trituration grit after some point in the period 130–40 consisted of hard red-brown shale (Roberta Tomber, pers comm), and/or hard blackish, fragments; quartz fragments are very rare indeed after 130–40. Earlier mortaria (archive nos 275–8 is probably one of these) usually have a well-mixed trituration grit in which quartz and sandstone are normal components.

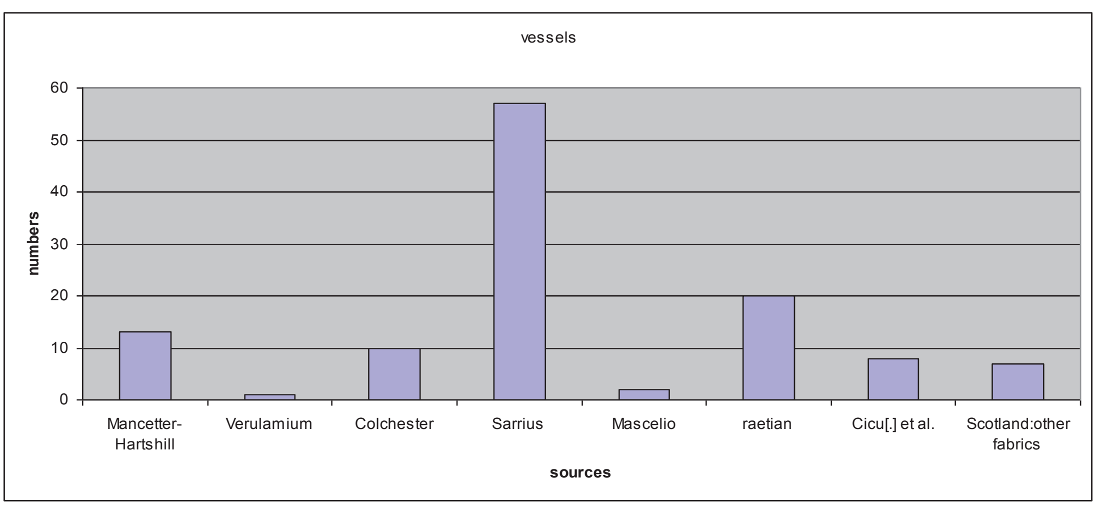


Illustration 7.14
Bearsden mortaria from all sources using the maximum figure of 57 vessels for Fabric 5 (Sarrius).

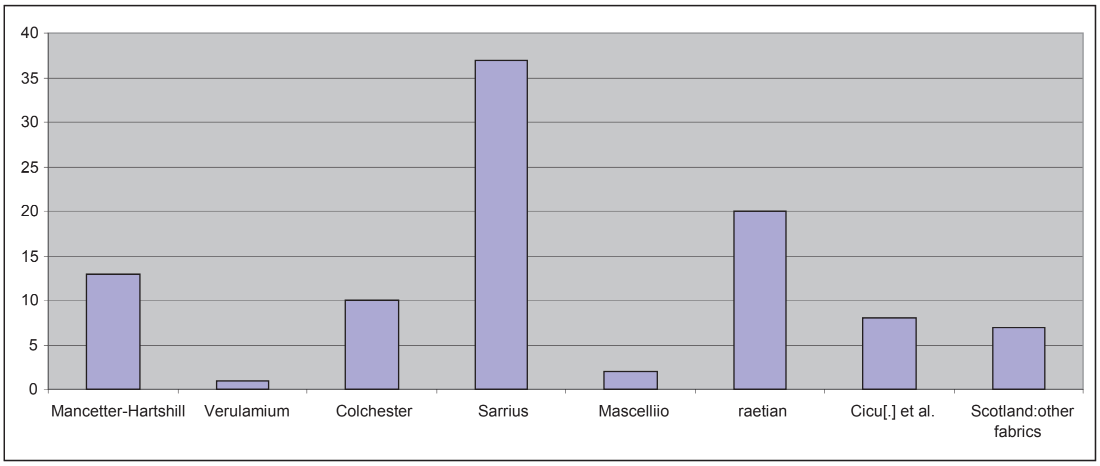


Illustration 7.15
Bearsden mortaria from different sources using the minimum figures of 37 vessels for Fabric 5 (Sarrius).

Fabric 3

Colchester (Tomber & Dore 1998: 133–4; Hull 1963)

The fabric colour intended was cream, but it could vary through yellowish-cream to brownish-cream and could have a pink core. The fabric is always badly affected by chemical weathering in acid and/or wet conditions and many of the Colchester mortaria in Scotland are in the process of disintegration; those found at Bearsden are no exception. The colour of some fragments can also be affected. The inclusions consist of angular and ill-sorted quartz, flint and black slag fragments. Trituration grit consists of opaque quartz, flint and occasional black slag fragments. Colchester had the major workshop for these mortaria, but a smaller workshop in Kent probably in the vicinity of Canterbury made similar mortaria. Some Kent products can be distinguished, mostly because of the stamp used; distinction by fabric alone is very difficult.

Fabrics produced inside Scotland Fabrics 4–14

All the remaining sherds are in the oxidised range, and have been divided by macroscopic examination into eleven fabrics. Various analyses were undertaken by G H Collins (7.4.2), G D Gaunt and M Gillings (7.4.3 and 7.4.4). All agreed that all the rocks present could be found in the western sector of the Antonine Wall and within a comparatively small radius of Bearsden so that manufacture in the immediate vicinity of the fort was possible.

Fabric 4

Probably Bearsden

Softish, powdery and friable; the fabric is very orangy brown (Munsell 5y R 6/8) with a fair amount of sand in the matrix. Archive no 320, Mascel(l)io, has tiny traces of cream slip, but many sherds are in too poor a condition for any slip to have survived. Inclusions are moderate, random, sub-rounded, but ill-sorted quartz, with occasional black fragments. No trituration grit survives.

Fabric 5

Bearsden – the fabric produced by Sarrius in the Bearsden workshop (including putative waste pottery from a kiln).

A detailed description of the fabric has been provided by Buckland: 'An orange-brown fabric, often with thick dark grey core. The temper includes much fine angular quartz, derived from a fine grained sandstone/siltstone, occasional coherent fragments of which appear in the fabric and which forms the bulk of the trituration grit. Subrounded clear quartz grains and occasional angular fragments of vien quartz are also evident in the trituration grit, with angular fragments of a fine-grained black metamorphic rock and some red brown sandstone; occasional fragments appear to be a metaquartzite. These characters are sufficient to distinguish this group from the Rossington Bridge products of Sarrius (Buckland et al 2001: 39, "Fabric 1") and a local source in the Drift of the Clyde Valley is probable'.

More than half of the sherds in Fabric 5 have a powdery surface but sufficient are in hard and good condition, with cream slip intact, to show the standard being sought. At its best, the fabric is a hard orange-brown throughout with a grey core only in thicker areas where the flange joins the side and where the side joins the base. There are, however, many with a well-defined, very thick grey core in the body and others where the fabric is grey throughout or have only patches of orange-brown at the surface. All were clearly intended to have a cream slip.

Fabric 6

Bearsden

An unusual fabric, reddish- to orange-brown with well-defined, black or near black core and little pockets of red and yellow clay; a moderate amount of quartz inclusions. The trituration grit consists of quartz (3–4mm). Some have cream slips like nos 97, 98, and one bodysherd, but nos 100, 102 and103 have traces of red-brown slip on the upper surface of the flange; no 99 has only self-coloured slip on the flange, but is otherwise identical. This red-brown slip is being used as a raetian-type slip. No 104 is the base of a waster.

Fabric 7

Bearsden

Hard, buff to pale orange fabric, sometimes with deeper orange core; inclusions are quartz (sub-angular ill-sorted grains), red-brown fragments and sparse black fragments. Trituration grit consists of quartz and red-brown material. Nos 105 and 108 have traces of buff-brown slip apparently used as a raetian slip.

Fabric 8

Bearsden

It can be assumed that this fabric was intended to be orange-brown, but it was fired to grey with paler centre; the slip is reduced to grey. The sparse, ill-sorted inclusions are quartz with red-brown and black rock fragments. The trituration grit consists mainly of quartz with some pale sandstone and black rock. The greyness of this fabric is probably the result of accidental reduction and to its being a waster rather than to deliberate reduction.

Fabric 9

Bearsden

Dense, fairly fine textured orange-brown fabric; fairly frequent, tiny to small inclusions, mostly quartz, with rare black and red-brown material. The trituration grit is a well-mixed assemblage of quartz, reddish-brown sandstone, black and other rocks, moderately well-sorted in size and extending throughout the interior. Patches of good red-brown raetian slip survives on the flange of no 111.

Fabric 10

Bearsden

Orange-brown fabric with rather open texture; any slip used has survived on only one sherd where it is of the red-brown raetian type. There are fairly frequent, ill-sorted and random inclusions, mostly quartz (some angular quartz up to 4mm), with rare red-brown and black material. Trituration grit included quartz with some red-brown material.

Fabric 11

Western sector of Antonine Wall, probably Bearsden.

The softish, fine-textured fabric is orange-brown; it has few, ill-sorted, but mostly tiny quartz, red-brown and black inclusions. Trituration grit consisted of quartz, sandstone and opaque black material. Slight traces of cream slip sometimes survive. The fabric is now powdery and abrades easily giving surfaces an abraded appearance; some sherds are badly degraded.

Fabric 12

Western sector of the Antonine Wall, probably Bearsden

Brownish-orange fabric, sometimes with bright orange core; fine-textured, but with distinctly more sand in the clay than Fabric 11; surface powdery. Inclusions are sparse, random, ill-sorted, consisting mainly of quartz with rare pale sandstone, and red-brown and opaque black material. Trituration grit consists of quartz, sandstone and rare opaque black material. Small traces of cream slip survive on some sherds.

Fabric 13

Western sector of the Antonine Wall, perhaps Bearsden

Slightly abrasive, bright orange-brown fabric with a fair amount of angular and sub-rounded, extremely ill-sorted quartz, and, less common, ill-sorted, opaque black and red-brown inclusions. Trituration grit consists mostly opaque white quartz (5mm) with rare red-brown material. No certain traces of slip have survived.

Fabric 14

Western sector of the Antonine Wall

Very hard, yellowish-brown fabric fired to a more orange-brown colour at the surface, with a red-brown slip. Inclusions consist of abundant tiny quartz and black rock, with some large, ill-sorted, white quartz grains and rare red inclusions. Trituration grit consists of quartz, quartz sandstone, grey and red-brown sandstone, and black material. The texture and colour of this fabric is quite different from any of the other fabrics.

7.3.5 Catalogue of stamped mortaria

Mortaria made outside Scotland

1–3. Gratinus Fabric 2 (illus 7.18.4–5; illus 7.16.1–3 scans) Catalogue nos 6, 7, 9

Three different mortaria, which have incompletely impressed stamps reading [.]RATIN[.], [.]RATINI and [.]RATINI respectively, with N sloping to the right. All are from the commonest die of Gratinus who worked in the Mancetter-Hartshill potteries in Warwickshire. Over 70 of his mortaria have now been noted from occupation sites in the north and midlands of England and 10–11 from sites in Scotland: Balmuildy; Bearsden (3); Birrens (2); Cappuck; Kirkintilloch and Newstead (2–3). Such evidence as is provided by his distribution, rim profiles and the kilns he used at Hartshill point to his main activity being marginally earlier than that of Sarrius though there was some overlap in date: 130–60 should cover it. Nos 8 and 10 are so close to the mortaria with stamps of Gratinus (nos 6, 7 and 9) that it is reasonable to suppose that they could also be mortaria made by this potter. It is unusual to find even three mortaria of the same potter and to have the real possibility of five mortaria by one potter is truly surprising. For other details of this potter's activity see Cooke et al 2014: 190.

4. Imemituobon[...] Fabric 2 (illus 7.18.2; illus 7.16.4 scans) Catalogue no 2 (29K) 4.

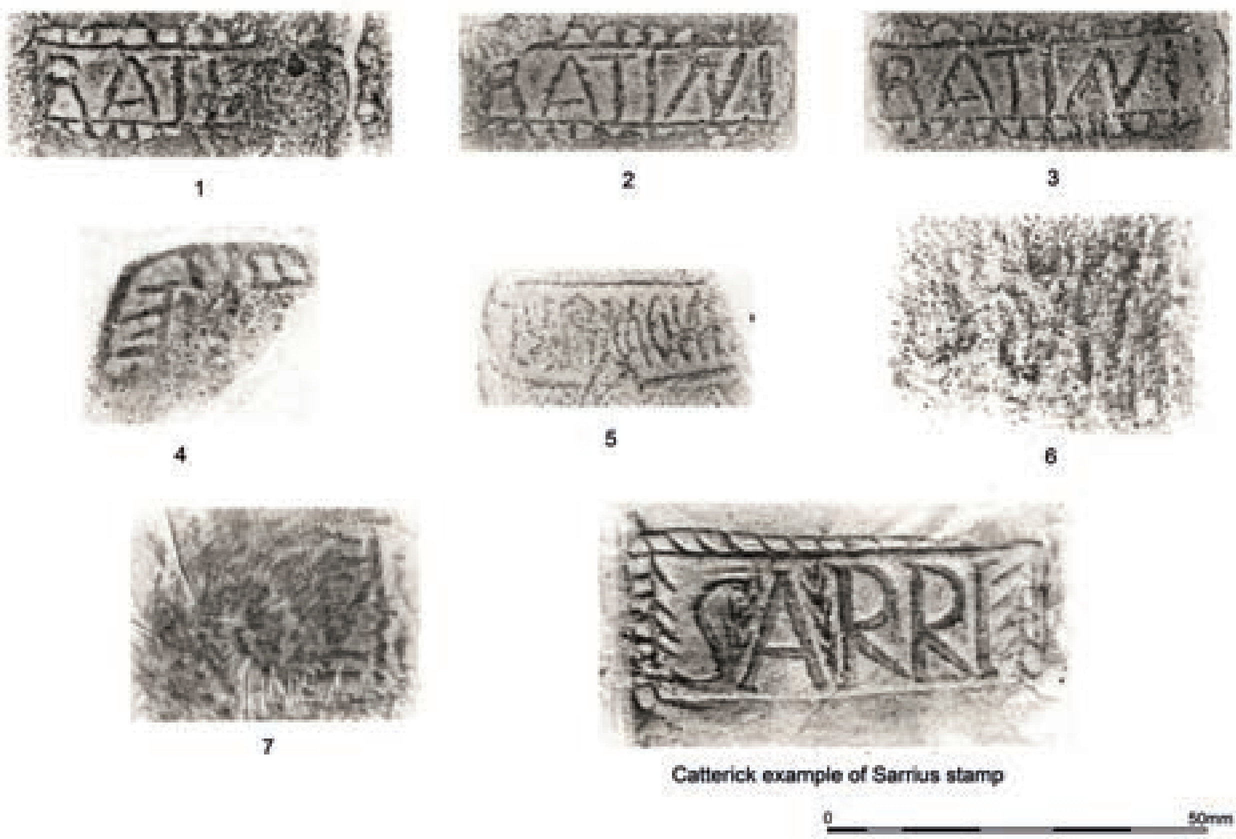


Illustration 7.16
Stamps of potters other than Sarrius recorded at Bearsden, together with the rubbing of a complete stamp of Sarrius from Catterick.

The fragmentary, left-facing stamp shows parts of the upper and left-hand borders of a two-line stamp which, in complete examples, reads IMIIMI/TVOBON, both lines retrograde, though the upper one is the same whether read as retrograde or from left to right. The two verticals represent E while the second 'O' is very small. The two borders surviving in the Bearsden stamp can be identified as his, only because they are distinctive in this stamp. He worked in the Mancetter-Hartshill potteries and his mortaria are now recorded in England from: Aldborough, yorks; Burton by Lincoln; Corbridge (2–4); Leicester (3–5); Little Chester, Derbyshire; Market Overton, Leicestershire; Saxondale, Nottinghamshire; Tiddington, Warwickshire; Toad's Hole Piece, north of Lichfield; and Wall, Staffordshire; and in Scotland from Ardoch; Bearsden; Camelon; Mumrills (2); and Newstead (1–2). His date is assessed from his presence at Antonine forts in Scotland, his rim-profiles, spouts and from the fact that some of his mortaria have the mixed trituration grit commonly used in these potteries before *c* 140. He worked within the period 130–60. This mortarium has the remains of a pale orange-brown slip which may have covered all surfaces, a slip similar to those often used in east midland workshops. No other example of such a slip is recorded on Mancetter-Hartshill mortaria, and no explanation can be offered.

5. Minomelus Fabric 2 (illus 7.18.6; illus 7.16.5 scan). Catalogue no 13
The right-facing stamp reads [M]INOM[E]LVS retrograde, the E is slightly unclear. This is one of only three stamps known for this die, the other two being from Hartshill, Warwickshire, where one of his kilns was excavated in 1960 (unpublished). Up to 69 of his mortaria have now been noted from occupation sites in England and six from sites in Scotland at: Bearsden; Inveresk; Mumrills; Newstead (2), and Rough Castle. Several factors point to activity within the period 130–60, possibly ending somewhat earlier than 160. These include possible associates at the Hartshill kiln; his rim-profiles; the larger number of his mortaria in Antonine Scotland compared to those on Hadrian's Wall and those at Pennine sites believed to have been abandoned when the Antonine Wall was built (Hartley, B R 1972; Hartley, B R 1961: 113; Hartley, B R 1966: 42). (24K)

6. Herringbone stamp Fabric 3 Too fragmentary for illustration. Catalogue no 19

Part of a herringbone type stamp. Most herringbone type stamps from the Colchester pottery have two raised central spines, but this one has only one; this makes it possible to suggest that it is probably from the same die as Hull 1963: fig 60, no 38. The distribution of Colchester herringbone type stamps could be consistent with their production being linked specifically with the occupation of Scotland and it is worth considering whether the production could have been initiated deliberately for this 'market' (Maxfield forthcoming, Chapter 17, 114–17). The proportion of Colchester mortaria in the central and eastern parts of the Antonine Wall is far higher than at forts in the western sector (Hartley, K F 1980: 267–8). This and the distribution further south which was largely concentrated at Corbridge and in north-east yorkshire points to transport by coastal traffic. Whatever the precise date at which their production commenced and ended, their *floruit* was within the period 140–70 with production tailing off afterwards and their presence in the north being rare to absent thereafter. For other comments on these stamps, see Hartley, K F 1999: 205 and 209. (28K)

Stamped mortaria manufactured in Scotland, perhaps all at Bearsden

7–29. Sarrius Fabric 5 (illus 7.19.12–26; 7.19.28–37; 7.19.38–45) All stamps which were not too fragmentary or abraded are drawn on illus 7.17.1–27 and, for comparison illus 7.16 shows a scan of a complete stamp from the same die-type on a midland mortarium found at Catterick (Wilson 2002: 339, fig 167, MS60), which has an almost complete impression of this stamp. Catalogue nos for the stamped mortaria: 27–42 (flanged); 82–7 (wall-sided).

QUANTITY

The stamps of Sarrius at Bearsden are mostly fragmentary (some join), but they provide absolute evidence for the presence of 16 flanged mortaria and six wall-sided mortaria, giving a total of 22 stamped vessels. All are in Fabric 5 which is easy to recognise and all the mortarium fragments in Fabric 5 can be attributed to this potter. Careful examination of the remaining rim sherds in Fabric 5 suggests that this assemblage includes at least ten more flanged mortaria and five more wall-sided mortaria, giving a minimum total of 37 mortaria. There are 54 other rim sherds in Fabric 5; some of these may belong to the above, but some will belong to other vessels. These include seven spout fragments from flanged mortaria and one from a wall-sided mortarium. The unusual conformity of the mortaria, makes it difficult to be precise about the total number of vessels. The figures, therefore, give a total of 22 vessels with their stamps surviving, but judging from all the fragments present, an absolute minimum total of 37; the true total could be higher, possibly as high as 57 (the number used in table 7.2); illus 7.14 and 7.15 illustrate proportions from different sources using maximum and minimum numbers, 57 and 37, for Sarrius.

Illustration 7.17
Reduced representations of the stamps of Sarrius found at Bearsden.

UNIFORMITY OF RIM-PROFILES

A large selection of the form-profiles are illustrated on illus 7.19–7.21. These illustrate at a glance the remarkable homogeneity of the rim-profiles, both flanged and wall-sided. The sherds which are not illustrated echo exactly the forms illustrated. The flanged mortaria have a relatively wide, shallow flange often slightly incurved at the distal end. The bead is slightly below the top of the flange, level with it and on rare occasions marginally above the flange. One noticeable feature of most of the rim-sherds, is the marked change of angle often visible underneath the flange at the distal end. The cracking along this line in many sherds shows that this was a point of weakness; it is consistent with many being wasters, but it is out of sight and would not have made vessels unsaleable. The keying for adding the extra clay used in forming the spouts on these flanged mortaria was made by deep slashing across a wide area of the flange; this is sometimes visible through the slip as on illus 7.19.12–13; it is the type of keying used on his midland mortaria. All the Bearsden spouts on flanged mortaria are of a single type, used by Sarrius and other contemporary potters in the Mancetter-Hartshill potteries *c* 135–50. The productive life of different potters overlapped in date and some might be more conservative than others, but each had tendencies to favour certain spout-types which can be identified and these have some chronological value. The type favoured by Sarrius (and, for example, Bruscius) for his flanged mortaria post-dates most of those used by potters like Gratinus, pre-dates many favoured by Iunius, and probably pre-dates all used by Maurius, Sennius and Carita[…]. Further work needs to be done on the Mancetter-Hartshill mortaria for more definitive comparison to be made. The precise, slightly clumsy wall-sided mortaria are again very uniform and the bottom of the rim-wall seems to be finished off by curling excess clay underneath; there was a tendency at Bearsden for this clay to come adrift. Illus 7.21.45, is exceptional among the wall-sided mortaria; no other parallel for this rim-profile has been found at Bearsden or at Mancetter-Hartshill.

DIAMETERS

The diameters of the flanged mortaria vary between 230mm and 310mm, the majority being 260–280mm. Mortaria made in Sarrius's Warwickshire workshop tend to be marginally larger and any equivalent, casually assembled number of his midland products, show much less uniformity both in diameter and in rim-profile. The diameters of the wall-sided mortaria vary between 190mm and 220mm; the majority being 190–200mm. The small wall-sided mortarium has a diameter of 160mm (illus 7.21.45, Catalogue no 92).

SIGNIFICANCE OF HIS WALL-SIDED FORMS AND THEIR SPOUTS AT BEARSDEN

A key factor in dating Sarrius's mortaria at Bearsden lies in the wall-sided forms and the small projecting spouts associated with them. This precise profile and spout are very rare because it is a transitional form which had a very limited life. Although later unstamped hammerhead forms did eventually develop from this humble beginning, this form itself was short-lived. Very few examples are known and all of those from Mancetter-Hartshill are stamped by Sarrius, Iunius, Iunius Loccius or Maurius. Six stamped mortaria survive at Bearsden while only six are known in the Mancetter-Hartshill fabric for all four potters known to use the form: Sarrius (2); Iunius (2); Iunius Loccius (1) and Maurius (1). They are almost rare enough to be oddities! Thus the stamped mortaria of this type recorded from Bearsden equal the number known for all four producers in the Warwickshire potteries. Sarrius may well have been the first to experiment in making it, but all available evidence suggests that Iunius, Maurius and probably Iunius Loccius overlapped with Sarrius in date and continued working later than him. A date near to 145 is as early as could easily fit the evidence for all three potters to be simultaneously active.

ABSENCE OF WEAR

The white slip is moderately well-preserved and clearly or partially covers the trituration grit on a large number of the sherds. The first result of use of slipped mortaria was the loss of the slip on the internal surface; in used mortaria it commonly survives only one to two centimetres below the bead ending in a clear line around the interior. The slip on the underside of the base was similarly subject to early wear and this also has survived on many sherds despite difficult soil conditions. There is no certain sign of wear on the trituration grit in many of the Bearsden mortaria. This absence of obvious wear suggests that, where it was possible to check, many of the mortaria had never been used.

THE STAMPS

The stamps on all of the flanged mortaria were impressed at right-angles to the flange and on all occasions where it was possible to verify it, they were impressed to read from the bead outwards. All of the stamps on the wall-sided mortaria were impressed along the collar and all were impressed upside down.

All of the stamps are from one die. Complete stamps read SARRI and show well-formed letters with serifs and decorative, chevron motifs between S and A, and, between A and R. The letter panel has neat chevron motifs at the beginning and end of the panel which are rarely fully impressed (see scan on illus 7.16); on incomplete impressions they can resemble the upper and lower borders which have neat diagonal bars. They are from the same die-type as stamps reading SARRI on mortaria made in the potteries at Rossington Bridge near Doncaster (Buckland et al 2001, 39–47, there described as Die 4[1]); they are also identical with the stamps from one of five dies giving SARRI which were used in the Mancetter-Hartshill potteries in Warwickshire (two other dies give his name in full). It is virtually impossible for the stamps from all three sites to be from one actual die. Sister-dies must have been made from a single matrix which may have been created by a specialist craftsman (Hartley, K F 1996: 147–8).

DETAILED DISTRIBUTION OF SARRIUS MORTARIA IN SCOTLAND

A Mancetter-Hartshill workshop: Ardoch; Balmuildy; Bar Hill (2); Birrens (1–2); Camelon (2); Carzield; Croy Hill; Inveresk; Mumrills; Newstead; Rough Castle; Strageath (2); and Wilderness Plantation;

B unlocated workshop in northern England (linked to a different die): Birrens (Robertson 1975, fig 84, no 7, wrongly attributed to Rossington Bridge);

C Clyde Valley workshop at Bearsden: 22 with stamps surviving, many are likely to be kiln-waste, but some would have been in use on the site; Balmuildy (3; plus 3 unstamped sherds); Camelon (old find, Fx 598)

D Rossington Bridge, Doncaster: none

NB: Published references to the mortaria at Bearsden which attributes them to Rossington Bridge should be regarded as incorrect (eg Hartley, K F 1980: 268). They are the result of unjustified assumptions made soon after the excavations at Bearsden took place and before they were examined closely. Stamps on mortaria from Birrens and Carlisle were also mistakenly attributed to Rossington Bridge (Robertson 1975: 237–8 and fig 84, no 7; Taylor 1991: fig 303, nos 12 and 367)

COMMENTS ON THE DISTRIBUTION OF MORTARIA OF SARRIUS

For a summary of Sarrius mortaria see table 7.5. With very few exceptions, the 125 stamped mortaria of Sarrius, which are attributable to his workshops in Warwickshire, have been found at sites in the midlands, northern England and in Scotland (for further details and a distribution map, see Buckland et al 2001, 46–7 and fig 36). His output from the Warwickshire potteries, compared with that of other potters, leaves no doubt that he had a dominant position at some point in the mid-second century, within the period 135–45/150. This in itself gives him exceptional importance, but what marks him out from other potters in these potteries and from all but a handful of potters throughout Britain, is his involvement in at least three subsidiary productions elsewhere: at Rossington Bridge, near Doncaster (Buckland et al 2001), at Bearsden and at an unlocated site in northern England. In table 7.5 the totals of his mortaria manufactured at the subsidiary sources appear on the surface to indicate that production in these was, for whatever reason, relatively limited or short-lived.

DATE

The overall date of Sarrius's activity is assessed from the abundance of his work at forts on the Antonine Wall, its relative absence from Pennine forts believed to be unoccupied from *c* 120–60, his rim-forms and his possible association with Iunius at one of the Mancetter kilns. A stamp from Verulamium is from a context dated about 155–60 (Frere 1972: no 35) and one is recorded from a Hadrianic deposit at Birdoswald (Birley 1930: 187, no 2, described as 'illegible'). Comparison of his mortaria and their spouts, with those of Gratinus and Imemituobon[..] suggest that his midland production began slightly later than theirs. The evidence as a whole suggests activity within the period 135/140–65. His wall-sided mortaria, like those at Bearsden cannot date much earlier than 145.

Although we do not know the order in which they were set up, all of his northern workshops were active during the Antonine period and their activity almost certainly overlapped in time. Bearsden was a secondary fort on the Antonine Wall and a small sherd undoubtedly from a Sarrius mortarium (catalogue no 49, 7.20.34) was found in the burning around the hearth in the primary bath-house, a context which cannot be forced later than 145 and which may be earlier (see pp 346–8; 376–8). This certainly suggests that pottery production was established at Bearsden

Table 7.5
Summary of mortaria stamped by Sarrius which can be attributed to all of the workshops in which he was involved (excluding all on production sites). Fabric numbers are taken from the Bearsden Fabric list

Fabric	*Source*	*Die used*	*England*	*Scotland*	*Totals*
Fabric 2 white	Mancetter-Hartshill	die 4[1] as Bearsden	33	05	38
Fabric 2 white	Mancetter-Hartshill	6 other dies	75	12	87
Fabric 5 oxidised	Bearsden	die 4[1]	00	04	04
oxidised	Rossington Bridge, Doncaster	die 4[1]	05[2]	00	05
oxidised	unknown source in north-east England	new die specific to a new fabric	02–03	01 (Birrens)	03–04
oxidised	source being assessed[3]	die 4[1]	04	00	04
Totals			119–120	22	141–142

Notes:

1. die '4' is an arbitrary recording number; it is NOT a final die number.
2. no mortaria with only the stamp of Setibogius or Secundua have been included. Six such mortaria have been recorded at sites other than the Rossington Bridge production site and at least four from the production site itself (Buckland et al 2001: 45).
3. these are from Aldborough; Castleford and Healam Bridge (2): analyses of fabric and trituration grit are needed to assess whether they constitute a new group.

NB: Any published references to the mortaria at Bearsden which attributes them to Rossington Bridge is incorrect (eg Hartley in MacIvor, Thomas & Breeze 1980: 268). They are the result of unjustified assumptions made soon after the excavations at Bearsden took place and before they were examined closely. Stamps on mortaria from Birrens and Carlisle were also mistakenly attributed to Rossington Bridge (Robertson 1975: 237–8 and fig 84, no 7; Taylor 1991: fig 303, no 12 and 367).

very early in the fort's history. We do not know if his production at Bearsden spanned the whole period of its occupation, but the distribution of his work throughout the fort and the large amount of probable kiln-waste in the eastern intervallum area could fit this proposition.

SUMMARY OF THE EVIDENCE FOR ATTRIBUTING FABRIC 5 TO A WORKSHOP AT BEARSDEN

Paul Buckland describes the inclusions and trituration grit in Fabric 5 as likely to be from a local source in the Drift of the Clyde Valley. All methods of quantification show that mortaria in Fabric 5, a fabric unknown elsewhere, are in an overwhelming majority on the site (table 7.2, illus 7.10–7.13); there is a marked uniformity of form; many appear to be unused and, they are not only stamped by one potter, but all are stamped with the same die. Furthermore, the condition of the fabric with its wide variation in texture and varying degrees of reduction in an otherwise homogeneous group, suggests inadequate firing-control and the possibility that much of the pottery could be redeposited kiln waste. The concentration of 122 sherds on the east intervallum and some others in the vicinity could best be explained as redeposition at a time when the fort was being abandoned. It could also explain a finding by Bidwell & Croom below (p 177) that the break-down of pottery by vessel types in table 7.18 shows that mortaria are about twice as common as would be expected from a military assemblage; this imbalance is primarily caused by the excessive number of sherds in Fabric 5. As one would expect, some mortaria were found in contexts which suggest that they were in normal use: for example, barrack 3 (15 sherds); building 5 (3 sherds); building 11, headquarters building (1 sherd); bath-house (5 sherds including one in the hearth of the primary bath-house) (illus 21.32).

OTHER POTTERS LIKELY TO HAVE WORKED AT THE BEARSDEN WORKSHOP

30. Mascel(l)io Fabric 4 (illus 7.22.46 and illus 7.16.6)
Catalogue no 25

A badly eroded right-facing stamp of Mascel(l)io survives. Complete impressions of this stamp read MASC retrograde, with blind or dotted A; see Taylor 1991; fig 303, no 6 and Robertson 1975; fig 84, no 15 for examples from the same die. In better preserved examples a border is visible after the C showing that MΛSC was being used as an abbreviated form of his full name which is likely to be Mascel(l)io. Four die-types are directly attributable to him and a fifth, which may be his, gives the name 'Mascelio' in full. Mortaria stamped with the same die as the Bearsden example are now recorded, in Scotland from Bar Hill (1–2); Bearsden; Birrens; Inveravon; Mumrills; and Old Kilpatrick; and, in England from: Carlisle (1–2); Corbridge; and South Shields. Mortaria stamped with other dies of Mascel(l)io are known from Bainesse (2); Brompton-on-Swale; Catterick (4); Chesters (Mascelio); Corbridge; Healam Bridge; Housesteads; and Piercebridge. For further details and a distribution map of his mortaria including all but the mortarium from Healam Bridge, see Wilson 2002: 446, MS5; 449, fig 206. The distribution of stamps from particular dies shows interesting groupings: the nine stamps in the Bainesse/Piercebridge area are from two dies; only one stamp from one of these has been recorded from outside that area, at Housesteads (Wilson 2002: 446). All of the stamps from Scotland are from one die and the stamps in England from that same die are recorded only from Carlisle, Corbridge and South Shields with none further south. No stamps from any of his other dies have been recorded from Scotland. The evidence suggests that he began stamping mortaria in the Bainesse/Catterick area, where there was a considerable pottery-making industry from early in the second century; at some point within the period 125–40, he moved north to an unlocated site. The concentration of stamps from specific dies suggests that Mascel(l)io moved from the Catterick area rather than being involved in more than one workshop simultaneously like Sarrius. The single die used for his stamps in Scotland indicates that this die was in use only after he had left the Catterick area, since no stamps from it have been recorded south of Corbridge, South Shields and Carlisle. The fact that all of his stamps in Scotland are from this one die had already given rise to the idea that he may have become involved in a workshop in Scotland during the Antonine occupation. The die used on mortaria found in Scotland must have been in use in the latter part of his lifetime and is likely to have been his latest one.

The location of his activity after leaving the Catterick area is uncertain, but other potters who were active in England and for whom there is evidence suggesting production in Scotland are Austinus and Docilis 3, who had been active in multi-potter workshops at Wilderspool, Cheshire (Hartley, K F & Webster 1973), Walton-le-Dale, Lancashire (unpublished) and Carlisle (Hartley, K F 2012b). The workshop which provided any springboard into Scotland for them was undoubtedly at Carlisle (Hartley, K F 2012b: 106–14). Carlisle is just a possibility for Mascel(l)io's activity, but the mortaria made there were habitually very hard-fired, quite unlike the texture of his mortaria in Scotland. The evidence available suggests that Austinus and Docilis 3 could have been involved in at least one workshop in Scotland at Newstead (Hartley, K F 1976; Hartley, K F in Maxfield forthcoming; Hartley, K F 2012b: 113). Mascel(l)io's distribution in Scotland is not only more limited than theirs, but it is quite different in character, being confined to sites on the Antonine Wall except for one mortarium at Birrens. Although the evidence is sparse, the Bearsden workshop was very well-placed for his activity in Scotland (see below for further discussion).

31. Unidentified stamp (not illustrated) Fabric 6 (illus 7.22.49)
Catalogue no 98

An eroded stamp on a mortarium in Fabric 6 with traces of cream slip. The stamp cannot be identified, but the discovery of clearer examples should make that possible in the future. The fabric almost certainly points to manufacture at Bearsden. (31K)

CICV[..] and unidentified stamps on generally similar mortaria. Fabrics 11 and 12, nos 32–6. (illus 7.22.58–60)

Stamp 32 can be attributed to Cicu[..]; stamp 33 has the same, unusual type of border and is likely to be his; stamps 34–5 (Fabric 12) are unlikely to be his, but they are on similar rim profiles. In all, there are at least six mortaria in Fabric 11 and two in Fabric 12 with small rounded rims similar to illus 7.22.58–60. This is a large enough number to be significant and it is likely that some of the rims belong to mortaria of Cicu[..]. Given that his stamp distribution points to a source in the western sector of the Antonine Wall, the presence of a pottery workshop of some significance at Bearsden makes his presence there the more likely; the number of vessels of similar type and fabric supports this. The mortaria of the same type with other stamps would suggest that other local potters who may be unknown, were working in the same tradition. Cicu[..] is the typical 'local' potter with no association away from the Antonine Wall and with no stamps east of Croy Hill or outside Scotland. Balmuildy was a primary fort on the Wall and it is, of course, possible that he was active there at some time, perhaps before the workshop at Bearsden was set up; careful examination of the rim-profiles, individual vessels and fabrics at Balmuildy would help to clarify these issues.

32. Cicu[..] Fabric 11 (profile not illustrated; 7.16.7) Catalogue no 117
The partly disintegrated stamp is from the single die of a potter whose stamps can be read from lef t to right as CICV[..] for some name like Cicuro; because the initial letter is more like a G than a C, it can also be read as a retrograde stamp, giving GICΛ though this seems an unlikely name. Only […]V and part of the preceding C, together with part of his unusual borders, survive in the present example. His mortaria are now recorded from Balmuildy (3 stamps, probably from 2 mortaria; Miller 1922: pl xl, B, no 7); Bar Hill (Robertson et al 1975, f ig 49, no 9); Bearsden (2); Croy Hill; Duntocher (Robertson 1957, f ig 15, no 7); Old Kilpatrick (1–2; Miller 1928: pl xviii, no 3). His distribution clearly indicates production in the western sector of the Antonine Wall (Hartley, K F 1976: 84–5). Present evidence does not prove that he was making pottery in the Bearsden workshop, but the very presence of the workshop, the number of mortaria from these excavations which are of the type which he made (illus 7.22.58–60) and their condition, makes it likely. This stamped sherd is too sof t and abraded for its prof ile to be drawn, but it is similar to illus 7.22.59. The clearest and most complete published examples of this stamp are from Bar Hill and Balmuildy (see above). (20K)

33. Probably Cicu[..] Fabric 11 (illus 7.22.58; stamp not illustrated) Catalogue 119
A right-facing stamp which is too abraded to identify with certainty, but which has the unusual double border used by Cicu[..]. This border and the rim-profile makes this stamp likely to be one of Cicu[..], and this mortarium has a small rounded rim closely similar to that of Cat no 117 above. (30K)

34. Unidentified stamp (illus 7.22.61; stamp not illustrated) Fabric 11 Catalogue no 124
The broken, left-facing stamp, is too abraded for identification; the border is not clear enough to show a link with Cicu[..] stamps. The rim-profile and spout type are close enough to his known products for there to be a possibility that the stamp is his. (12K)

35. Unidentified stamp (not illustrated) Fabric 12 Catalogue no 125
A broken and abraded stamp on a fragmentary, small, but thick, rounded flange, which could be similar to illus 7.22.58–60. The stamp seems unlikely to be of Cicu[..]. (38K)

36. Unidentified stamp (not illustrated) Fabric 12 variant no 126
The details on the incomplete stamp are too smoothed to identify, but it appears to have upper and lower borders filled with very fine diagonal bars, which may help to identify it in the future. This flange fragment in Fabric 12 has a brown slip on the upper surface and no slip on the lower surface suggesting that the slip has been used as a raetian type slip. It is very rare in Britain to find this usage combined with a stamp, but it is essentially an ordinary mortarium which has just had the slip added and this could happen if it was made in a workshop where raetian mortaria were being made. (32K)

UNSTAMPED, RAETIAN MORTARIA ATTRIBUTED TO MANUFACTURE AT BEARSDEN

Raetian type mortaria in Fabrics 6–10 (illus 7.22.50–57). See Hartley, K F 2012a for further details of the classic types A, B, C, and E, the derived type D and the sub-raetian F forms. Table 7.6 shows the distribution of mortaria of different raetian types at sites throughout Scotland.

It should be noted that the distinctive features which make these mortaria recognisable are limited to the rim, the concave area below the rim and the spout so that illus 7.14 and 7.15 which relate to vessels might be more reliable than illus 7.10–7.13. In fact, they correspond well and it is likely that most or all of the body and base sherds in Fabrics 6–10 are from raetian mortaria, which consistently appear in all charts as the next commonest to those in Fabric 5 (Sarrius).

Raetian mortaria were initially so-called because they were believed to have been imported from the Danubian Provinces where mortaria with their distinguishing features are common (Hartley, K F 2012a). It has long been apparent that all of those in Britain were made here, initially, at least, by potters who had come from those provinces. Their distribution is limited to the military zone or to areas like Wroxeter which have distinct links to it and all are in orange-brown fabrics. Most of those made in England and Wales were produced at sites on the Bunter sandstone in the legionary depot at Holt, Denbighshire, and in workshops at Chester, Wroxeter, Wilderspool in Cheshire, Walton-le-Dale in Lancashire, and Carlisle. There is growing evidence to suggest that they were also made at many other sites, but perhaps on a much smaller scale. It used to be thought that raetian mortaria in Scotland had been imported from south of the border, but it has become increasingly clear that any such mortaria would be the exception not the rule. Carlisle would have been the obvious import source for Birrens, but the numbers of raetian mortaria present at Birrens together with differences in fabric and subtle differences in form from those at Carlisle, leaves no reasonable doubt that there was production at Birrens even though no kilns have yet been located (Hartley, K F 2012a; Robertson 1975: 204–10). If my suggestion that the potters Docilis iii and Austinus became involved in a workshop at Newstead is true (Hartley, K F 1976; Hartley, K F 2012b: 113), then potters making raetian mortaria may have been with them as they were at previous workshops at Wilderspool, Walton-le-Dale and probably Carlisle. The present distribution on table 7.6 shows Birrens, Newstead, Bearsden and possibly even Old Kilpatrick standing out as likely production sites in Scotland.

Table 7.6 shows that sites in eastern Scotland have few raetian mortaria, and, that they are much better represented on sites in the western sector like Bearsden and Old Kilpatrick. No

Table 7.6
Raetian mortaria in Scotland (for details of the classic and derived types (see Hartley, K F 2012a)

	Type A	*Type B*	*Type C*	*Type D*	*Type E*	*Type F*	*Type unrecorded or fragmentary*	*Totals*
Bearsden	**0**	**0**	**1**	**0**	**13**	**0**	**1**	**15**
Ardoch	0	0	4	0	0	2	1	7
Balmuildy	0	0	0	0	1	1	1	3
Bar Hill	0	0	8	0	0	0	0	8
Birrens*	0	0	30	0	4	19	4	57
Bothwellhaugh	0	0	1	0	0	0	1	2
Cadder	0	0	1	0	0	0	1	2
Camelon	0	0	1	0	0	1	0	2
Cappuck	0	0	1	0	0	0	0	1
Cardean	0	0	0	0	0	0	0	0
Carzield	0	0	1	0	0	0	0	1
Castledykes	0	0	0	0	0	1	0	1
Cramond	0	0	0	0	0	0	0	0
Duntocher	0	0	0	0	1	0	0	1
Inveresk*	0	0	0	0	0	0	0	0
Mumrills	0	0	0	0	0	0	0	0
Newstead*	0	0	3	0	7	0	6	16
Old Kilpatrick	0	0	1	0	5	2	1	9
Raeburnfoot	0	0	1	0	0	1	0	2
Rough Castle	0	0	0	0	0	0	0	0
Strageath	0	0	0	0	0	0	1	1
Totals	0	0	55	0	31	27	17	130

This table includes all the records I have of raetian mortaria in Scotland. The numbers refer as far as possible to individual vessels and are reasonably accurate, although further study, not to mention, further excavation would improve them. They have been compiled from notes made several years ago when examining raetian mortaria to write 'Raetian mortaria in Britain' (ibid), and, from mortaria seen since then. An asterisk denotes probable numbers at sites which presented some difficulty: I have seen a good proportion of the mortaria from Inveresk, but not all; all from Newstead except for those at Melrose. Unfortunately the Birrens mortaria were not recorded in order of Types when writing the report; these numbers have been reached by later observation in the Hunterian Museum. Some sites, like Inveravon are not listed because no raetian mortaria have yet been found there.

Type A mortaria have yet been found in Scotland and they are uncommon in England and Wales though at least two are now recorded at Carlisle (Hartley, K F 2012b: 111), one at York and one at Brough-on-Humber; their production may have ceased by 140. Type D is an aberrant form linked only to Carlisle. Of the 'classic' forms, A, B, C and E, the commonest by far throughout England is Type C. Type E was the norm only at the legionary depot at Holt (Grimes 1930: fig 61, nos 2–8 (no 21 is Type A); Hartley, K F 2012b: 84 and fig 5), but it was common at nearby Chester which is likely to have had potters from Holt (Hartley, K F 2012a: 90–1 and fig 6). Everywhere else Type E was an uncommon form, appearing in very small numbers. This makes their presence in number at Bearsden (13) particularly outstanding, especially as only one of the common Type C is present. The body and base fragment in Fabric 6, no 104, has radial cracks coming up from the base which clearly fits with production at Bearsden, but, being only the base, it cannot be as directly associated with raetian mortaria as one would wish. Some of the mortaria in Fabric 6 show the same wide variations in firing as those in Fabric 5. No 110 in Fabric 8 is reduced throughout to pale grey with reduced slip; this reduction is virtually certain to be the result of faulty firing since deliberate production of reduced mortaria belongs to the third and fourth centuries and took place mainly in East Anglia. One of the rims in Fabric 10 (no 115) has what appears to be a waster crack and no 113 has crazed surfaces likely to be the result of misfiring. Although the numbers of raetian mortaria are paltry compared with the numbers in Fabric 5, they nevertheless stand out as a distinct group, which is certainly large enough to indicate production at Bearsden. Some of the fabrics described as Fabrics 6–10 could represent merely variations in the treatment of the clay and in the firing, though there could have been more than one clay source available. It is also evident that the occasional mortarium does not fit the pattern: eg no 98 in Fabric 6, has an ordinary profile and a cream slip while no 126 in Fabric 12 (with a stamp) has an ordinary profile and a raetian type slip although Fabric 12 is not considered to be a raetian fabric. Oddities like these did occur where raetian mortaria were being made: both variants can be mirrored at Wilderspool (Hartley, K F & Webster 1973: 98–101 and the mortarium of Nanieco, Hartley and Webster 1973: 93, G).

The large number of raetian Type E mortaria at Bearsden show a clear link with the legionary depot at Holt in north Wales (Grimes 1930: fig 61) where production of this form was the norm. The extreme slenderness of the flange and wall of illus 7.22.50–1 and 54, is a characteristic unrecorded in any mortaria in Britain, but the closest parallel is still from Holt (Grimes 1930: fig 61 no 3). It seems likely that any potter or potters producing these mortaria at Bearsden would have come from Holt. Holt produced tiles and pottery for the Twentieth Legion, stationed at Chester, and a building inscription found at Bearsden in 1976 records that the fort there was built by the legion XX Valeria Victrix (5.2.1.1). This provides an interesting link, but it has also to be remembered that there are seven 'raetian' mortaria of Type E at Newstead. Type E could have been produced at both sites. The numbers in table 7.6 obviously reflect the amount of excavation undertaken at the various sites. The relatively large numbers at Old Kilpatrick (8 including 5 of Type E) could indicate further production there of raetian mortaria.

7.3.6 *Final comments*

A multi-potter workshop at Bearsden?

There is evidence for a number of small productions at sites on the Antonine Wall, for example at Balmuildy (Hartley, K F 1976: 85 and fig 2, 19–23); at Bar Hill (Hartley, K F: 1976, 85, fig 2, 24–27; Swan 1999: 465 and fig 2, nos 11–12); at Croy Hill (in preparation); at Mumrills (Hartley, K F 1976: fig 2, nos 28–30 and 31–4). Evidence for another at Bearsden would have been interesting, but hardly exciting, except that raetian mortaria would have been involved. It is the quantity of Fabric 5 mortaria which provides the overwhelming proof, both for manufacture at Bearsden and for Sarrius's involvement in the workshop. One can now also posit the near certainty of it being a multi-potter workshop on the model of Rossington Bridge, including raetian production and probably manufacture by Mascel(l)io and Cicu(…); the manufacture would, of course, include production of wares other than mortaria, some by the aforementioned potters, but probably also by others. There is evidence to suggest that the workshop was set up very early in the fort's history, not later than 145 and possibly slightly earlier. The available evidence and the quantification (illus 7.10–7.16) are consistent with Sarrius being the dominating influence.

Why at Bearsden?

Sites at the eastern end of the Antonine Wall had large supplies of pottery apparently brought north by coastal traffic from Colchester, and a smaller workshop in Kent, believed to be at Canterbury (Hartley, K F 1980: 263, table 2). The heavy distribution of these mortaria in the eastern sector provides strong evidence to prove this. Transporting such pottery in quantity to forts like Balmuildy, Bearsden and further west on the Wall would have required a long transport link for easily broken, bulky material; the area was aceramic before the occupation, so no local civilian supplies were possible. Providing there was a good source of clay available, the establishment of a suitable workshop made excellent sense. Local kilns are known to have existed at some time at Balmuildy, Croy Hill, Bar Hill and perhaps elsewhere; some may pre-date production at Bearsden; they may have served purely local needs – it would be useful to know if their products appear away from the production sites.

The multi-potter workshop at Rossington Bridge, near Doncaster

At some point in the Antonine period Sarrius became involved in a pottery workshop at Rossington Bridge where his stamp sometimes appears alongside a stamp of either Setibogius or Secundua (Buckland et al 2001). It has always been supposed that they were local potters who were acting as 'agents' for Sarrius, but it would make more sense if they were the two potters sent by him from his headquarters workshop in Warwickshire and if they were allowed to put their names on the vessels as well as his. Sarrius was also involved in production at Cantley, where his name has, so far, always appeared alone. Buckland et al (2001) published a comprehensive array of other coarse and fine wares which were made at Rossington Bridge by potters from Dorset and possibly even Aquitania. There was likely to be production there at much the same time as at Bearsden if the presence there of the unusual, short-lived wall-side mortarium, stamped by Secundua, can be relied upon.

Sarrius's production at other sites in the north

There is undoubted evidence from fabric and a die used only in association with that fabric which points to another production centre in north-east England. Unfortunately, its location is still unknown.

The importance of Sarrius in the Mancetter-Hartshill potteries

Out of all the potters making mortaria in the mid-second century in the Mancetter-Hartshill potteries Sarrius has the largest number recorded to date from occupation sites (125). Judging from recorded mortaria, he was at some point within the period 135–50 probably the most important potter there and almost certainly one of the most important potters making mortaria in Britain. Although it is difficult to prove, both Buckland and myself came independently to the conclusion that he did not quit his prosperous production in the midlands when the workshop at Rossington Bridge was set up.

Multi-potter workshops?

Evidence is growing for the existence of multi-potter workshops involving potters from up to four or more different potting traditions in areas serving forts in the military zone. In the first century there is the workshop at Elginhaugh (Hartley, K F 2007). Swan and I both believed that there is evidence for at least four different potting traditions at Holt. Study of the pottery production at Wilderspool (Hartley, K F and Webster 1973), Walton-le-Dale, Lancashire (in preparation) and Carlisle (Hartley, K F 2012b; Maxfield forthcoming) shows not only a number of potters (many stamping their mortaria), with differing potting traditions at work in the same workshop but the presence of some or all of the very same potters involved in the other workshops. Moreover, these potteries overlap in date, at least, to some extent. Evidence from Scotland suggests that some of these potters were also involved in a workshop in Scotland, probably at Newstead (Hartley, K F 2012b: 113; Maxfield, forthcoming). Although present evidence is more nebulous than one would wish, there is a distinct possibility that these workshops had a link to Wroxeter.

The importance of Sarrius at Bearsden, Rossington Bridge and at least one other workshop in the north of England

Sarrius's production in Warwickshire marks him out as exceptional, clearly a man of substance. Why or how did such a man become involved in at least three and possibly more 'subsidiary' workshops in the north of England and in Antonine Scotland? Rossington Bridge and Bearsden are both Antonine in date and the other(s) are likely to be. The workshops at Rossington Bridge and Bearsden have other potters from divers potting traditions working there. Sarrius is the one common factor linking all of these productions, the unlocated workshop and his major workshops in Warwickshire; no other clear instance of this kind of link is known.

Organisation of workshops

The most detailed information about the organisation of ceramic workshops comes from the brickyards which supplied Rome. Dolia, mortaria and other ceramic products were also made though they formed a subsidiary part of the output. The stamps, especially on tiles can give considerable information about the potter who was sometimes, probably often, a slave; also about the workshop and even, on occasion, the date of manufacture. These enterprises were often on estates owned by members of the senatorial class, but there is enough detail to show that unless the landowner was directly involved, the land on which the workshops and kilns stood had to be bought or more probably rented. An infinite amount of study has been devoted to teasing out the meaning of all of these stamps. Much remains obscure, but a wealth of information has been obtained, though not always with universal agreement (Helen 1975; Setälä 1977; Aubert 1994). Aubert (1994: 200–321) stated that arrangements could be fairly fluid rather than having to follow a specific formula; he also mentioned the scarcity of information concerning 'agents' of *negotiatores*, suggesting that this might be ascribed to some members of the senatorial order not wanting to advertise their involvement in marketing (Aubert 1994: 73). It might be thought that details of these enterprises are not relevant to pottery workshops in Britain, but members of the wealthy classes on the Continent owned estates, enterprises and slaves throughout the Empire including Britain (for an example see Finley 1980: 123). Even in the military zone the same factors are involved. The land for the workshop had to be bought or more probably rented, in the case of Bearsden presumably from the army; the use of clay beds and access to a wood source had to be rented unless it was included with the land for the workshop. The relevant potters had to be brought in or bought in to man the enterprise. The workshop had to be run in a responsible manner and sales had to be arranged. During a very useful discussion about ceramic workshops in Britain, Ian Rowlandson pointed out interesting comparable information concerning small producers at Ticknall, Derbyshire in the Middle Ages (Spavold & Brown 2005).

Why or how was Sarrius involved?

We can only speculate. The amount of information we have about Sarrius and his pottery productions is unprecedented for a potter in Britain, but that only highlights just how little we still know of how pottery-making workshops were organised and who owned them. In the Rossington Bridge report, Buckland (Buckland et al 2001: 87) made a cogent argument, 'The presence on a single kiln-site of potters whose origins can be traced to a diversity of tribal units, Durotriges and Corieltauvi, and perhaps Aquitanians, requires an explanation which goes beyond the simplistic concept of migrating or wandering potters.' This becomes more blatantly true as more multi-potter workshops are identified (eg Elginhaugh, Hartley, K F 2007). In order to get the required potters, the person setting it up needed know-how and to have wide contacts in pottery-making industries not only throughout most of Britain but on the Continent in Germany, the north of France, Aquitania, north Africa etc. In the Roman world slaves and skilled artisans could be acquired to order and readily moved about from one estate or enterprise to another since wealthy landowners often owned estates across the Empire. This is speculation concerning what may have happened at Bearsden and Rossington Bridge etc but it is, by far, the easiest way to explain the presence of potters from different and distant workshops. The people with appropriate knowledge and contacts were the *negotiatores* who could well have been funded by 'patrons' in the expectation of mutual profit. Sarrius was undoubtedly an important enough potter to be a well-known contact; it would have been absolutely normal to ask him to send a few potters with some suitable financial arrangement. This could have happened for all the 'subsidiary' workshops in question. The alternative possibility is that Sarrius himself opened the subsidiary workshops, but he would almost certainly have had to act in conjunction with a *negotiator* who would have known where the workshop should be located, would know what kinds of pottery were required and would have the necessary contacts and influence or power to get the relevant potters supplied. We do not know when Sarrius died or ceased manufacture or how far that would have any effect on the activity of subsidiary workshops (Hartley, K F 2012b: 113).

The significance of the Bearsden workshop for pottery studies in Britain

In the 1950s, eight kilns were excavated at Rossington Bridge with at least 15 others known, and up to 50 kilns were excavated at Cantley with the reasonable supposition that at least as many more existed. Black-burnished ware and mortaria stamped by Sarrius were being made in both areas and there is no geographic reason why they should not be parts of the same pottery-making complex (Paul Buckland, pers comm). The impact on the pottery world was such that there was an immediate assumption that this 'major' production, beginning in the mid-second century, was established to furnish the needs of the northward advance of the army to the Clyde–Forth frontier. Sarrius's link with these productions, surprising though it appeared, was just part of this.

Some black-burnished ware present at forts on the Antonine Wall may be linked to production in these potteries (see p 110 above), but apart from that, these prophesies have, not only, not been fulfilled, but have provided some salutary lessons about not jumping to conclusions. These potteries appear to be linked to Doncaster and south yorkshire more than to the occupation of Scotland. What they do demonstrate brilliantly is how extensive potteries of any importance could be. During the last 30 years there has been ever increasing knowledge of pottery production in Antonine Scotland (Hartley, K F 1976; Breeze 1986). The realisation that Sarrius was linked to a pottery production at Bearsden was a catalyst for further discovery. Detailed re-examination of his red-brown mortaria north of the Doncaster potteries soon revealed a third production probably in north-east England, which was linked with one specific die, a production still not located, though its existence is absolutely certain. It is hoped to examine a possible fourth production this year.

Sarrius's definite links with at least three subsidiary productions, presents what appears to be a unique situation and so it may be, but it may also appear unique because of the fragmentary nature of our knowledge about the organisation of pottery production and marketing in Roman-Britain. We are exceptionally lucky that his stamped mortaria are directly linked with two potteries, Mancetter-Hartshill and Rossington Bridge-Cantley, where excavations have taken place and that we have virtual proof of production at Bearsden – no kilns can be associated directly with the Flavian potter Albinus who has three times more mortaria recorded than Sarrius. It could also be a matter of good luck that the mortaria at each workshop actually carried his stamp. These workshops could not otherwise have been linked with complete certainty, the potters working there for Sarrius might have used their own stamps, or, the products of a workshop could have been left unstamped. However obscure details remain, this intriguing association surely represents a significant step forward in the understanding of how workshops could be organised in Roman Britain.

7.3.7 Catalogue of mortaria found at Bearsden arranged in fabrics

Abbreviations used in the Database and sometimes elsewhere in the Catalogue:

shds	=	number of sherds. So far as possible only breaks in antiquity have been counted. Where sherds have been joined and where fabric has disintegrated due to chemical weathering I have estimated the number.
'part'	=	the part of vessel surviving.
CR	=	complete rim-profile.
IRS	=	incomplete rim-profile, ie part of flange and bead or body.
FF	=	flange fragment.
SPT	=	spout fragment.
BS	=	body sherd.
BBS	=	body and base sherd.
/	=	joins.
and	=	belongs to the same vessel but does not join.

Column titles in database:

V	=	an individual vessel, ie '1' indicates either certainly or possibly an individual vessel
'joins'	=	archive numbers of other sherds which join.
'same'	=	archive numbers of sherds which are certainly or very probably from same pot, but do not join.
'wear in use'	=	estimated amount of wear at the point of discard.
z	=	the part surviving is inappropriate, ie the sherd is broken too high for the amount of

use to be estimated, or, the surface is too damaged or obscured for use to be assessed etc.

'condition' = burnt; crazed, eg Fabric 3 which deteriorates and disintegrates in acid/wet soils; but a crazed surface can also be the result of overfiring.

'date' = optimum date for manufacture; at Bearsden manufacture has to be dated within the date of the occupation of the site within the period *c* 140–65; with vessels known to have been made elsewhere, eg in the Mancetter-Hartshill potteries, the estimated extent of the production period is given.

'potter' = name of potter or to whom it is attributed if possible; all sherds in Fabric 5 can be attributed to Sarrius because the fabric is almost always easy to recognise and no other potter working Bearsden used closely similar fabric.

'Comments' = in addition to normal entries, this column includes details of the fabric of sherds in Fabric 5 (Sarrius) because of variations which have resulted from lack of control during the firing process.

K no = Numbers like (1K) etc which are my personal record numbers for individual stamps have been retained in the archive and Catalogue because of their convenience in keeping check on the large number of fragmentary and unidentified stamps.

Mortaria manufactured outside Scotland

FABRIC 1 *Verulamium region*

1. (illus 7.18.1) Diam 260mm. Thirteen joining sherds from a heavily worn mortarium. Generally similar rim-profiles were produced in the potteries between Verulamium and Radlett (Fabric 1 for further comments). The precise rim-profile with its unusually deep flange is also rare, though

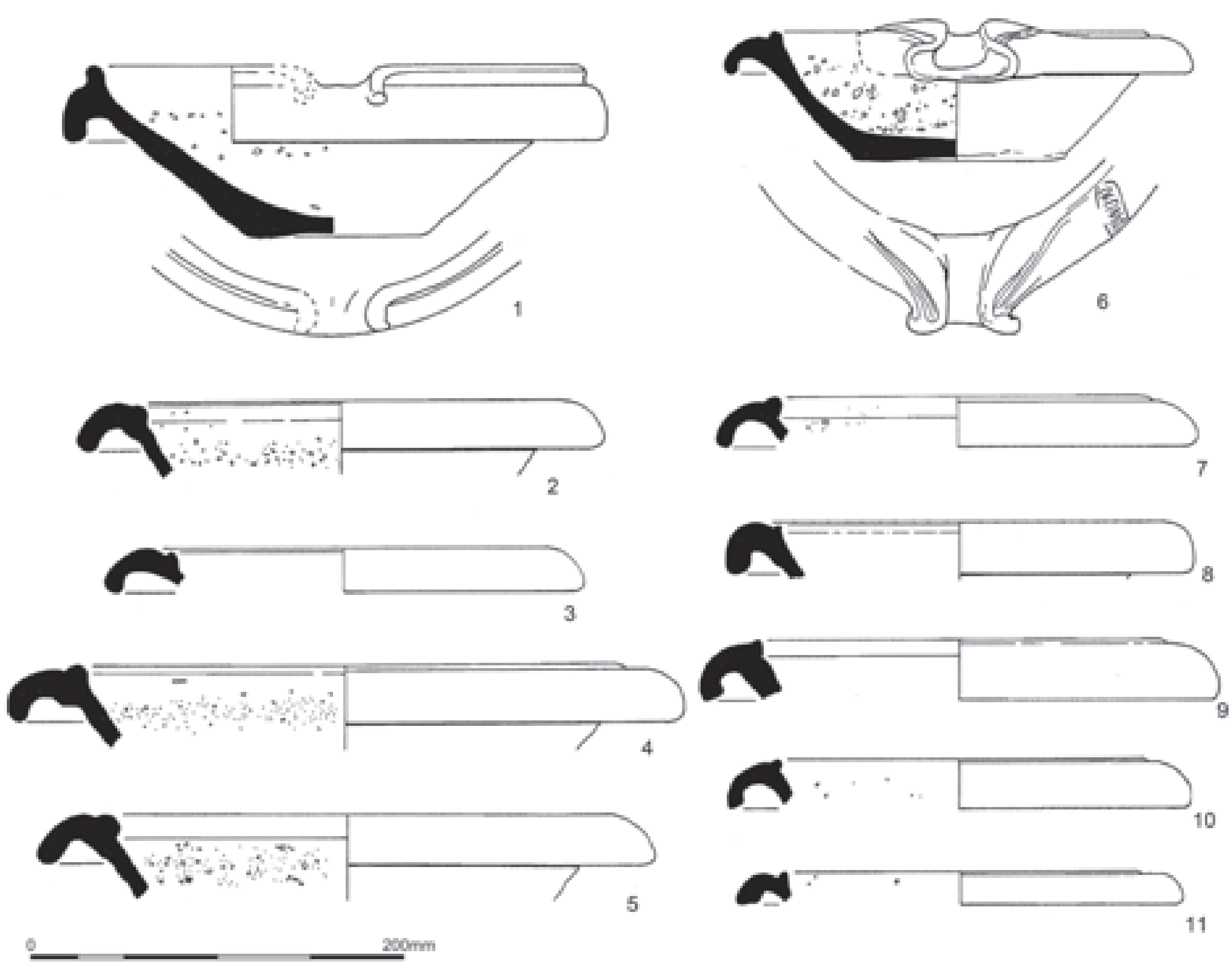


Illustration 7.18
Mortaria 1–11: mortaria made outside Scotland; 1 Verulamium region; 2–7 Mancetter-Hartsmill potteries; 8–11 Colchester.

related forms with shorter flanges, eg Frere 1972: fig 130, no 1037, are not uncommon at Verulamium, where they are recorded from deposits as early as 140–50, 150–55/160, and 160–75, but the type continued in production in some variants throughout the Antonine period. This mortarium is in a fabric which was very rarely produced in these potteries. Two other mortaria are known in this variant fabric, from Kelco cave, near Settle (unpublished) and another from Ashtead in Surrey (Bird, D in preparation); both have similar rim profiles to the Bearsden one. Archive no 109. An eroded rim fragment is from the same vessel. Archive no 160.

NK73Cu ; buildings 6 and 7; NK73Cu ; officer's quarters of building 7, overlying Roman layer.

FABRIC 2 MANCETTER/HARTSHILL POTTERIES, WARWICKSHIRE

2. (illus 7.18.2) Diam 290mm. A mortarium with left-facing stamp of Imemituobon[..], see stamp no 4 above. *c* 130–60. Archive no 319 (29K).

   NK74AG; buildings 1 and 2, topsoil.

3. Fragmentary rim sherd from a mortarium generally similar to no 2 above. *c* 130–60. Archive no 189.

   NK74BD; buildings 1 and 2, topsoil.

4. (illus 7.18.3) Fabric 2 (earlier version), soft and powdery. Diam 300mm. The few trituration grits surviving includes quartz sandstone suggesting that the mortarium was made before the general switch from mixed grit including quartz to the

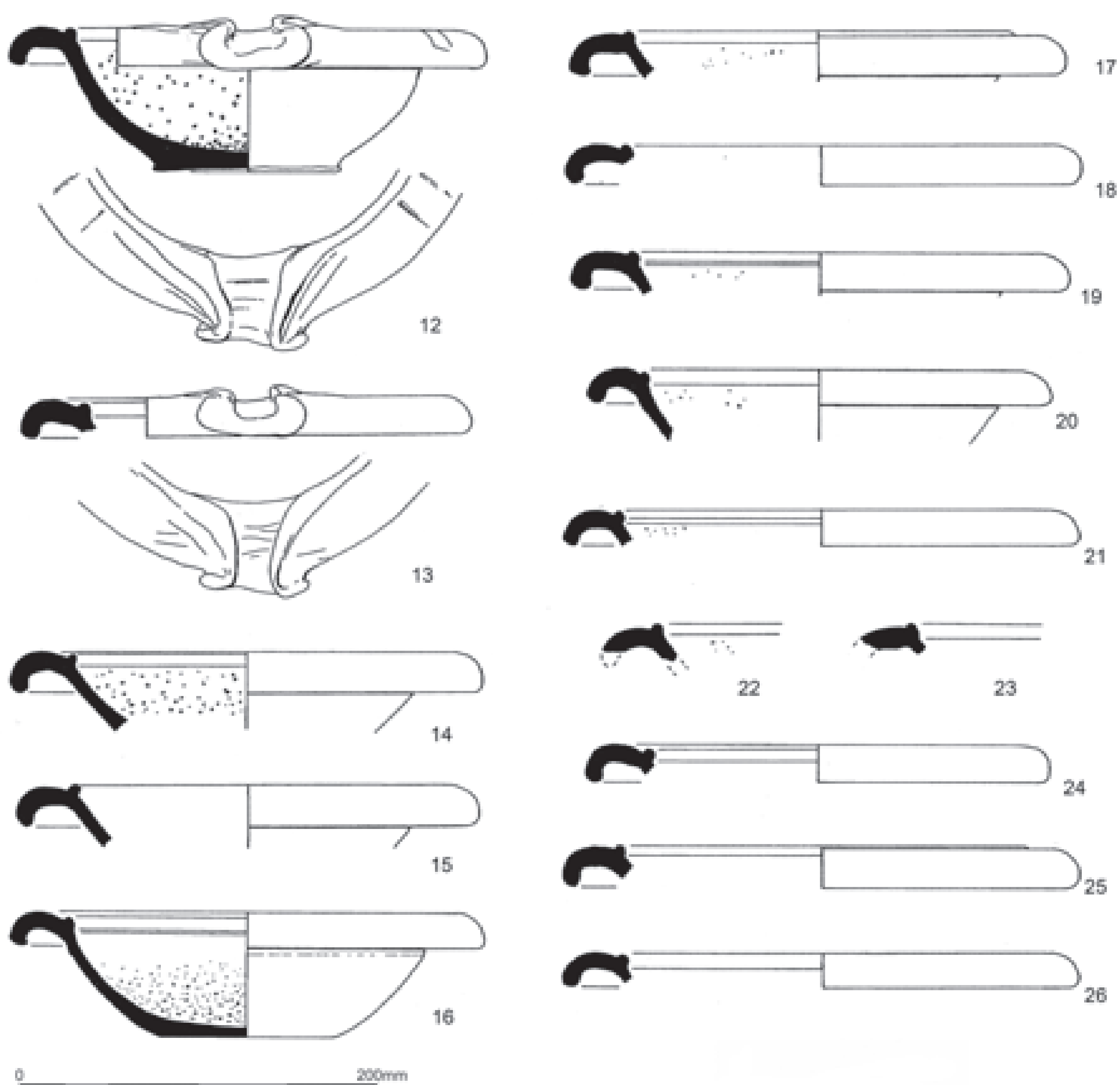


Illustration 7.19
Mortaria 12–26: mortaria made at Bearsden by Sarrius in Fabric 5.

well-known red-brown and/or black grit; this change seems to have occurred within the decade 130–40 and the timing could have varied between potters. The wide, shallow rim-profile with bead below the flange was also an early form in these potteries. A date of 130–50 is appropriate; typologically it should be amongst the earliest imports to Bearsden. The underside of the base has unusual, deep circular grooves. Archive nos 275–8; 16.

NK76BB; topsoil overlying *via praetoria* east of building 4; NK76FR; annexe, south-west of bath-house, overlying cobbles.

5. Diam 260mms. Flange fragment from a mortarium generally similar to no 4 above. *c* 130–50. Archive no 117.

   NK81AB; below floor of latrine.

6. (illus 7.18.4) Diam 420mm. Two joining rim sherds with a right-facing stamp of GRATINu S, stamp no 1 above. Archive no 298 (27K).

   NK76DT; pit to south of building 7.

7. (not illustrated) Diam *c* 380mm. A rim sherd with stamp, no 2 above, of GRATINu S, from a second similar mortarium, identical, except for having a slightly narrower flange. There is a brown accretion on the upper surface and some fractures. Archive no 303 (26K).

   NK75BI; topsoil overlying west end of building 7.

8. Diam 360mm. Two joining sherds from a mortarium identical with no 6, but smaller in diameter. It appears to have been very hard-fired and the surface and fabric are somewhat reduced. Archive no 134.

   NK75AO; BI; topsoil overlying west end of building 7.

9. (illus 7.18.5) Diam 340mm. A mortarium showing some wear with a stamp of GRATINu S, stamp no 3 above. Archive no 312 (25K).

   NK73FF; bath-house, topsoil.

10. Diam 350mm. Rim sherd identical in form with no 9, but from another mortarium. Archive no 9.

    NK73AJ; annexe, south-west of bath-house, topsoil. Nos 6, 7 and 9 all have stamps from the commonest die of Gratinus. Nos 8 and 10 are so close to these mortaria in form that it is reasonable to assume that they too were probably made by Gratinus.

11. A flange fragment from a mortarium different from any listed above. 140–70. Archive 199.

    NK77AK; building 3, officer's quarters, unstratified.

12. Two joining flange fragments similar in form to no 11 above, but probably from a different vessel. 140–70. Archive no 200.

    NK77AK; building 3, officer's quarters, unstratified.

13. (illus 7.18.6) Diam 250mm. Six joining sherds making up three-quarters of the rim and half of the base of a heavily worn mortarium, burnt after fracture. There are small oblique parallel cuts across the bead for about 45mm of the circumference. The right-facing stamp reads [M]INOM[E]Lu S retrograde, stamp 7.16.5. *c* 130–60 Archive no 127 (24K).

    NK77BR; overlying path north of building 6; NK77CB; gulley north of building 7; NK77CV; brown soil overlying intervallum; NK77FJ; clay floor of officer's quarters of building 7.

14. (illus 7.18.7) Diam 260mm. *c* 130–60. Archive no 19.

    NK76FR; annexe, south-west of bath-house, overlying cobbles.

    Not listed: details of four base/bodysherds, all worn. Archive nos 101, 108, 118, 178, 246.

    NK78EP; overlying intervallum road west of building 4; NK73FQ; annexe, under cobbles south of changing room; NK81AB; below latrine floor; NK74AE; west end of buildings 5 and 6, topsoil; NK74AC; intervallum east of building 6, topsoil.

FABRIC 3 COLCHESTER

15. (illus 7.18.8) Diam 240mm. This chunky little hooked rim with the flange rising well above the bead is likely to be an early form within the period 130/140–70. Archive no 182.

    NK75CM; rubble overlying building 4.

16. (illus 7.18.9) Diam 280mm. A typical Colchester profile. Within the period 130/140–70. Archive no 251.

    NK75DK; building 7, brown soil below topsoil at east end.

17. (illus 7.18.10) Diam 250mm. Fabric crazed and discoloured. Almost identical in form to no 16, but a smaller rim. 130/140–70. Archive no 232.

    NK78DG; building 2, south-west corner.

18. (illus 7.18.11) Diam 240mm. In unusually good condition for this source. 130/140–70. Archive no 112.

    NK80AF; bath-house, unstratified.

19. Three joining, but crumbling, rimsherds with incomplete rim-section, too fragmentary for illustration. The broken herringbone type stamp which is impressed across the rim is too fragmentary to be illustrated. Probably from the same die as Hull 1963: fig 60, no 38. 130/140–70. Archive nos 248/293/294. (28K).

    NK77AC; soil overlying intervallum east of building 7.

20. Rimsherd with incomplete rim-section. 130/140–70. Archive no 126.

    NK74Ay; officer's quarters of building 7, topsoil.

21–23. Flange fragments from three different mortaria. Within the period 130/140–70. Archive nos 3; 141; 211

NK73AW; annexe, topsoil (2); NK73AZ; men's quarters of building 3, burnt patch overlying clay.

24. (not illustrated) Estimated diameter 240mm. A form which was never stamped; probably made in Kent rather than Colchester; see Maxfield forthcoming, M48–51 and M49 specifically, for a close parallel; another, similar, but an

unpublished parallel is known from Inveresk. Optimum date 150–80/90. Archive number 337.

Not listed: details of one base/bodysherd, and five bodysherds, all abraded, disintegrating or crazed can be found in the archive. 130/140–70. Archive nos 205; 191, 196, 212, 239, 241.

NK78BV; intervallum west of building 4, topsoil; NK74CW; overlying gulley to west of building 2; NK76AR; rubble to west of building 4.

Mortaria made in Scotland

These make up 78% (by weight) of the whole mortarium sample from these excavations; all can be attributed, with virtual certainty, to sources in the western-sector of the Antonine Wall (see illus 7.14).

FABRIC 4 PROBABLY BEARSDEN

25. (illus 7.22.46; 7.16.6 scan). Diam 280mm. One badly eroded sherd with very faint retrograde stamp of Mascel(l)io. Collins RP31 Grp 3. Archive no 320 (21K).

    NK76BM; annexe, south-west of bath-house, clay below topsoil.

26. (illus 7.22.47) Fabric 4. Diam 280mm. Two very friable sherds, not joining, from one mortarium. Archive nos 20–1.

    NK76BM; annexe, south-west of bath-house, clay below topsoil.

    Not listed: an abraded IRS sherd. Archive no 157.

    W10, Buildings 6 and 7.

FABRIC 5 BEARSDEN

52% (by weight) or 66% (by sherd count) of the whole mortarium sample from Bearsden are in the distinctive Fabric 5 and all of the sherds in this fabric can be attributed with certainty to the potter Sarrius and to production in a pottery workshop at Bearsden (illus 7.19–7.21).

Much of the pottery in fabric 5 appears to consist largely of redeposited waste so that successes and failures in the firing technique make for obvious colour and texture differences in the resulting fabric, ranging from being orange-brown throughout to being reduced except for a surface skin, and finally to being reduced throughout (see Fabric 5 and fragmentary stamps 7.17.1–27). Because of this, these differences are noted as far as possible in individual entries.

Sixteen individual flanged mortaria with one or both stamps of Sarrius surviving, nos 27–42.

27. (illus 7.19.12, for stamps see illus 7.17.12a and b) Diam 260mm. Thirteen joining sherds. Both sides of the spout survive with one partially impressed stamp and a second fragmentary one in the complementary position to the other side of the spout. The slashing to provide keying for extra clay added to form the spout is visible in the surface. Archive no 120 (34K).

    NK75BK; BT; By; CH; CZ soil overlying path between east ends of building 6 and 7; NK75CF; burnt material overlying intervallum east of buildings 6 and 7.

28. (illus 7.19.13) Diam 250mm. Two joining sherds in good condition. Both sides of the spout survive and the edge of the right-facing stamp (not illus). Again keying in the extra clay added to make the spout is visible in the finished surface. Archive no 295. (10K).

    NK76BF; overlying gulley north of building 4.

29. (illus 7.19.14) Diam 275mm. Four joining sherds with left-facing stamp, not illustrated. Orange-brown fabric, grey core; good condition. Archive nos 250/313/234 (7K)

    NK73Bx and By; soil overlying building 3; NK76AR; rubble and topsoil beside building 4.

30. (illus 7.19.15; for stamp illus 7.17.15) Diam 260mm. Eleven joining sherds with left-facing stamp. Apparently a waster reduced to grey throughout with patchy slip on both the inside and the exterior. Profile close to no 31. Archive no 321 (1K).

    NK74BQ; CA; GB; mixed clay deposits overlying intervallum east of building 8.

31. (illus 7.19.16; for stamp illus 7.17.16) Diam 260mm. Thirteen sherds from the same mortarium accidentally reduced to grey throughout; the slip is patchy but survives inside as well as outside and underneath the base showing that it was never used. A fragmentary right-facing stamp of Sarrius survives. Archive nos 314, 47 (3K).

    NK74BG; BK; BQ; CA; mixed clay deposits overlying intervallum east of building 8.

32. (illus 7.19.17; for stamp see illus 7.17.17) Diam 280mm. In good condition, orange-brown throughout with slip intact, but broken too high to show whether used or not. The broken stamp of Sarrius can be assumed to be right-facing because of its position; this has lost some slip and the letters are abraded. Archive no 297 (19K) .

    NK77FH; fill of gulley north of building 6.

33. (illus 7.19.18; for stamp see illus 7.17.18) Diam 290mm. In powdery condition; the upper half of the flange is greenish-grey, lower half orange-brown; the slip is patchy. There is some cracking under the flange and this is a typical waster fragment. A broken stamp of Sarrius, probably the left-facing one, survives. Archive no 302 (16K).

    NK75AL; building 3, unstratified.

34. (illus 7.19.19) Diam 280mm. Thick dark grey core with a clearly defined orange-brown skin and patchy white slip; in powdery condition. The edge of a right-facing stamp of Sarrius survives (not illustrated). Archive no 300 (9K).

    NK73DH; intervallum west of building 3, unstratified.

35. (illus 7.19.20) Diam 260mm. Fired to normal orange-brown at outside surface only, otherwise reduced with upper surface a muddy brown; traces of slip. Powdery with the upper surface eroded, so that the left-facing stamp (not illustrated) is barely visible. The slashing for keying on extra clay to make

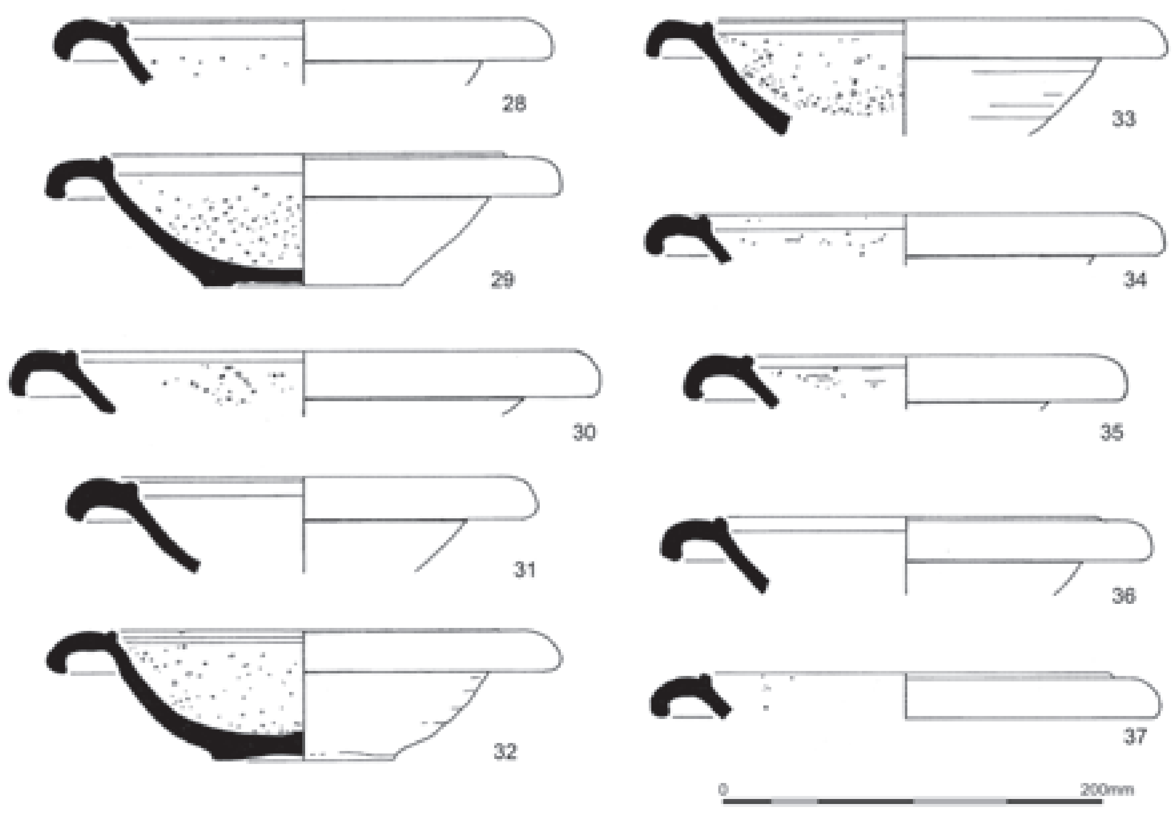


Illustration 7.20
Mortaria 28–37: mortaria made at Bearsden by Sarrius in Fabric 5.

the spout is just visible. Profile similar to no 28. Archive no 272 (22K).

NK76AG; *via praetoria*, topsoil.

36. (illus 7.19.21; for stamp see illus 7.17.21) Diam 290mm. Fired to muddy brown throughout; powdery condition; slip patchy. The left-facing stamp of Sarrius is badly abraded. Archive no 291 (18K).

    NK74BC; soft clay overlying intervallum east of building 8.

37. (illus 7.19.22; for stamp see illus 7.17. 22) IRS fragment in hard fabric, reduced to dark grey and oxidised at surface only; slip surviving well. A broken, right-facing stamp of Sarrius survives. Archive no 304 (17K).

    NK76EK; depression south of building 7, silty clay.

38. (illus 7.19.23; for stamp see illus 7.17.23) IRS fragment in identical condition, but from a different mortarium. A broken left-facing stamp of Sarrius survives. Archive no 299 (8K).

    NK73CR; Roman level within officer's quarters of building 3.

39. (illus 7.19.24) Diam 260mm. A severely abraded rimsherd fired similarly to no 37 above. A badly battered stamp of Sarrius survives (not illustrated). Archive no 308 (6K)

    NK74CD; building 5, topsoil.

40. (illus 7.19.25; for stamp see illus 7.17.25) Diam 290mm. A much abraded sherd in powdery condition, with slightly thinner grey core than the above, with fragmentary stamp of Sarrius. Some waster cracking under the flange. Archive no 307 (15K).

    NK75AG; topsoil west of changing room of bath-house.

41. (illus 7.19.26) Diam 260mm. Heavily abraded rimsherd fired like no 36; traces only of slip. Only part of one border of the stamp survives (not illustrated); attributed to Sarrius. Archive no 110 (37K).

    NK73FM; topsoil in inner west ditch.

42. Profile not illustrated (for stamp see illus 7.17.27). Hard grey throughout; presumed waster. Archive no 329 (2K) NK74BG; mixed clay deposits overlying intervallum east of building 8. Unstamped flanged sherds nos 42–51 are probably individual vessels, all attributable to Sarrius, but with no stamp surviving. Nos 51–81 are more fragmentary and may be from individual vessels, but some will be from nos 27–51.

43. (illus 7.20.28) Diam 270mm. Four joining sherds, fired orange-brown throughout and in good condition. Archive no 125/139.

NK73Cu ; east end of building 7 overlying Roman layer; NK77BH; soil overlying burnt daub at east end of building 6.

44. (illus 7.20.29) Diam 265mm. Twenty-six joining sherds from a mortarium whose colour varies from orange-brown to grey; the base survives with slip intact on the inside, a sure sign that it has never been used. This is clearly waste material. Archive nos 41/45/48.

    NK74BG; BQ; CA; CL; mixed clay deposits overlying intervallum east of building 8.

45. (illus 7.20.30) Diam 310mm. Slightly powdery, orange-brown throughout; slip in moderately good state. Archive no 149.

    NK73Cu ; east end of building 6, overlying Roman layer.

46. (illus 7.20.31) Diam 250mm. Hard, oxidised fabric with dark grey core and extensive grey in flange; wasterlike cracking under flange; slip intact on inside. Archive no 176.

    NK76Du ; soil overlying path south of building 7.

47. (illus 7.20.32) Diam 270mm. Eight joining sherds from an unused mortarium which is over hard, but otherwise in good condition and with slip intact, inside and out. The base is unusually concave and poorly finished off. Archive no 133.

    NK75BT; soil overlying path between east ends of buildings 6 and 7; NK77BR; BV; soil overlying path between buildings 5 and 6; NK77FH; gulley north of building 6; NK77CN; building 6, topsoil; NK76By ; overlying cobbles, building 10.

48. (illus 7.20.33) Diam 275mm. Eight joining sherds from a mortarium in fairly normal condition and with slip intact inside and out, pointing to lack of use. Archive nos 121/35/36.

    NK77AE; intervallum east of building 7, topsoil.

49. (illus 7.20.34) Diam 270mm. Two joining sherds from a hard mortarium, fired throughout to dark grey except for its surface which is oxidised to orange-brown; the slip on the flange is scuffed. Archive nos 1/115.

    NK73AS; east end of bath-house, unstratified. NK80BD; primary bath-house, burnt debris around hearth.

50. (illus 7.20.35) Diam 230mm. Two joining sherds from an abraded mortarium (orange-brown throughout); slip scuffed. There is waster cracking under the flange. Archive nos 142/237.

    NK76DB; building 7. NK74 BW; topsoil overlying gulley between buildings 3 and 4.

51. (illus 7.20.36) Diam 260mm. Four joining sherds fired to hard, dark grey with orange-brown skin only at surface; slip poor, but intact. Archive no 151.

    NK73Cu ; overlying Roman layer at east end of buildings 6 and 7.

52. (illus 7.20.37) Diam 270mm. Fired as no 50, but in better condition. Archive no 281.

    NK75CN; building 7, brown soil overlying occupation layer.

Flanged fragments, not illustrated

53. Two joining spout and body sherds. Grey throughout; slip survives inside, patchy elsewhere. Archive nos 46/50.

    NK74CA; BC; mixed clay deposits below topsoil and above intervallum road and drain to the east of building 8.

54. Five sherds making up an entire spout. Fired grey throughout; slip scuffed. Archive no 42.

    NK74GB; NK74CA; mixed clay deposits below topsoil and above intervallum road and drain to the east of building 7.

55. Diam 270mm. Three joining sherds near to the left-facing side of the spout; grey throughout, slip nearly intact; cracking under rim. Archive no 43.

    NK74CA; NK74 BQ; mixed clay deposits below topsoil and above intervallum road and drain to the east of building 8.

56. Five joining flange and bodysherds. Grey throughout; slip intact. Archive no 44.

    NK74BG; BQ; CA: mixed clay deposits below topsoil and above intervallum road and drain to the east of building 7.

57. Diam 260mm. Sherd from left-facing side of the spout. Hard, grey throughout except for surface skin of orange-brown; slip intact; cracking under flange. Slashing visible through the slip, for adding extra clay to make the left-facing side of the spout. Archive no 97.

    NK73DN; west rampart.

58. Diam 260mm. Orange-brown throughout; slip badly scuffed; powdery. Archive no 99.

    NK73CL; west intervallum area.

59. Diam 260mm. Hard, grey throughout except for orange-brown surface skin; slip intact; cracking under flange. Slashing visible through the slip, for adding extra clay to make the left-facing side of the spout. Archive no 124.

    NK73Cu ; building 7, room 1.

60. Diam 270mm. Orange-brown throughout; slip badly scuffed on flange; powdery Archive no 135.

    NK75BT; brown soil below topsoil and above path between the east end of buildings 6 and 7 beside intervallum space.

61. Small rimsherd, very battered and abraded. Hard, dark grey except for surface skin; traces of slip. Archive no 146. Small sherd archive no 327 is probably part of it.

    NK75CA; brown soil below topsoil in intervallum area to the east of building 7.

62. Diam 260mm. Orange-brown throughout; slip patchy; powdery. Archive no 167.

    NK73Bu ; building 7, rooms 4/6.

63. FF Fabric and condition as no 61. Archive no 168.

    NK73Bu ; building 7, rooms 4/6.

64. Diam 270mm. Hard, dark grey except for surface skin; traces of slip. Archive no 177.

    NK77Au ; annexe, path to east of fort/annexe rampart.

65. IRS. Dark grey except for muddy brown surfaces; traces of slip; abraded. Archive no 181.
NK76AO; building 4, north-east corner, topsoil.

66. Diam 310mm. Hard, dark grey core; trace of slip. Badly abraded. Archive no 186.
NK73BS; building 3, room 1/2, topsoil.

67. Diam 270mm. Hard, dark grey except for surface skin; slip patchy. Archive no 190.
NK74Bx ; west intervallum road, topsoil.

68. Sherd from the right-facing side of a spout. Fabric similar to no 67. Abraded. Archive no 214.
NK73BT; *via praetoria*, topsoil.

69. One sherd forming the right-facing half of a spout. Orange-brown throughout; traces of slip. Some cracking under the spout. Badly abraded and upper surface exfoliating. Archive no 224.
NK73BS; building 3, rooms 4/5, topsoil.

70. Diam 270mm. One sherd near the left-facing half of the spout. Dark grey core; traces of slip. Badly abraded and upper surface exfoliating. Archive no 225.
NK73CH; building 3, rooms 4/5, topsoil.

71. Diam 280mm. Thick grey core; only traces of slip. Surface powdery and badly abraded. Archive no 227.
NK73AK; building 3 rooms 4/5, topsoil.

72. Diam 240mm. Surface powdery and abraded; thick grey core; slip patchy. Archive no 229.
NK73FF; path outside fort/annexe rampart to west of bath-house.

73. Diam 250mm. The end of the spout has flaked off from the flange at the junction where extra clay was added, showing the deeply scored keying underneath; there is continuous cracking underneath the flange. Orange-brown throughout; fabric powdery and much of the slip has been abraded away. Archive no 231.
NK79AK; west intervallum, topsoil.

74. Diam 260mm. Entire spout survives with cracking under the spout. Dark grey core; some abrasion of the slip, otherwise in fairly good condition. Archive no 233.
NK76BA; building 4, destruction level.

75. IRS. Fabric with heavy grey core in upper part; powdery and some of slip abraded. Archive no 235.
NK74CO; building 4, rubble.

76. Diam 270mm. FF In good condition. Archive no 255.
NK75CF; burnt material overlying road between buildings 6 and 7.

77. Diam 260mm. Thick grey core; powdery and all but the tiniest specks of slip have been abraded away. Archive no 273.
NK76CK; south of building 7, topsoil.

78. Diam 300mm. Hard fabric; very thick grey core; some of slip abraded away. Archive no 274.
NK76BB; *via praetoria*, topsoil.

79. Diam 270mm. Fabric beige-brown throughout; powdery, much of slip abraded away. Similar to no 32 above. Archive no 280.
NK75BC; building 3, east end, topsoil.

80. Diam 260mm. FF with heavy abrasion and accretion similar to no 38 above; only specks of slip survive. Archive no 282.
NK75BC; building 3, east end, topsoil.

81. IRS Fabric orange-brown throughout; surface very powdery and all but a few specks of slip have been abraded away. Archive no 247.
NK76DJ; topsoil to south of building 7.
Unlisted IRS and FF fragments from flanged mortaria in Fabric 5.
Three tiny, unrelated FF sherds, all in fabric with thick dark grey core, all abraded and with little slip surviving. Archive no 159, 283 and 326.
NK73Cu ; building 7, room 1, overlying Roman level; NK75BH, building 3, east end, topsoil.
Five small IRS sherds, four in fabric with thick dark grey core, the fifth grey throughout. Archive nos 217, 228, 230, 286 and 52.
NK73CB; *via praetoria*, surface; NK73CD; bath-house cold room, above paving; NK73EQ; rubble overlying building 4; NK75 BC; building 3, east end, topsoil; NK74BQ; mixed clay deposits overlying intervallum east of building 8.

WALL-SIDED MORTARIA IN FABRIC 5; NOS 82–87 WITH ONE OR BOTH STAMPS SURVI VING.

82. (illus 7.21.38; for stamp see illus 7.17.1) Diam 190mm. Twelve joining sherds of a slightly distorted mortarium with a neat projecting spout; both stamps survive, though one is very faint. There are no obvious signs of wear. Archive no 119 (33K).
NK75BI; building 7, western end, unstratified; NK75By; soil overlying path between east ends of buildings 6 and 7; NK75BE; bath-house, western pit west of changing room; NK75DK; brown soil below topsoil at east end of building 7.
With only one stamp surviving

83. (not illustrated) IRS Two minute fragments which have been fired to grey throughout, with part of a stamp on the rim fragment, possibly from the above mortarium, but too tiny for certain attribution. The stamp is unlikely to belong to any of the other stamped sherds present. Archive nos 66 (14K) and 67 (23K).
NK74CL; intervallum east of building 8.

84. (illus 7.21.39; for stamp see illus 7.17.3) Diam 220mm. A rim sherd from a mortarium with powdery surfaces. Archive no 292 (35K).
NK77AE; intervallum east of building 7, topsoil.

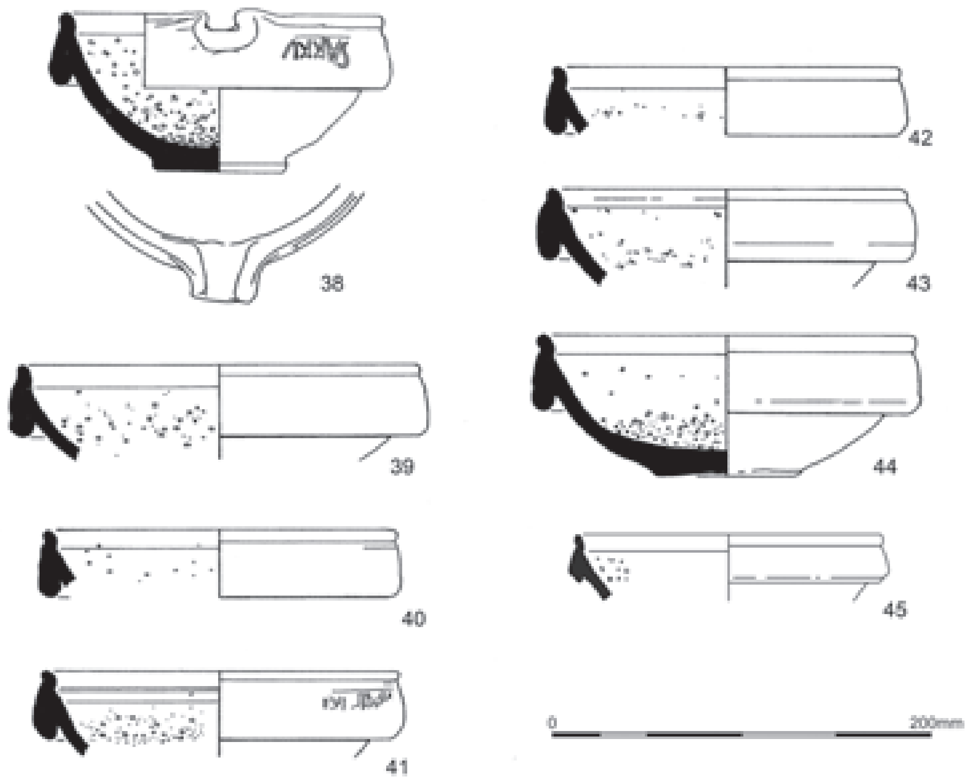


Illustration 7.21
Mortaria 38–45: wall-sided mortaria made at Bearsden by Sarrius in Fabric 5.

85. (illus 7.21.40; for stamp see illus 7.17.4) Diam 190mm. Four joining sherds with one fragmentary stamp. Similar condition to no 84. Archive nos 315/39 (13K/36K).

    NK75BA; east end of buildings 6 and 7, topsoil; NK75BK; soil overlying path between east ends of buildings 6 and 7; NK77AE; intervallum east of building 7, topsoil.

86. (illus 7.21.41; for stamp see illus 7.17.5) Diam 190mm. Four sherds, three of them joining, from a mortarium with powdery surfaces. The slip is intact on the interior and the surviving upper half shows no sign of use. Archive nos 316/301 and 150. (5K)

    NK73Cu ; building 7, room 1 overlying Roman layer.

87. (illus 7.21.42; for stamp see illus 7.17.6) Diam 190mm Three sherds from a mortarium with powdery surfaces. Archive no 317 probably joins archive no 318 (11K/4K).

    NK75By; soil overlying path between east ends of buildings 6 and 7; NK74Ay; east end of building 7, topsoil.

Other sherds from wall-sided mortaria, many, individual vessels, all attributable to Sarrius, but with no stamps surviving; nos 88–96.

88. (illus 7.21.43) Diam 200mm. Seven sherds, five joining, from a mortarium in orange-brown fabric with thick very pale grey core; slip intact on the inside. Archive nos 26/242 and 40.

    NK77AE; intervallum east of building 7, topsoil; NK77AC; soil overlying intervallum east of building 7.

89. (illus 7.21.44) Diam 200mm. Ten joining sherds from a mortarium in orange-brown fabric throughout; surfaces are powdery, but the slip on the underside of the base is intact which indicates lack of use. Archive nos 30, 122, 175, 244, 260.

    NK77AL; topsoil overlying drain through rampart east of building 7; NK77FH; fill of gulley north of building 7; NK75CF; burnt material overlying path between buildings 6 and 7; NK75Cu ; clay overlying burnt material east of building 5; NK75BK: soil overlying path between east ends of building 6 and 7; NK75BA; topsoil overlying east ends of buildings 6 and 7.

90. Diam 200mm. IRS with the complete spout surviving which is of exactly the same type as in no 82 above. Two other sherds are probably from the same mortarium; the bottom of the wall has become detached from both sherds. The fabric is reduced to grey but slightly oxidised at surface where the colour ranges from orange-brown to muddy brown and grey; small patches of slip survive. The surface is powdery and abraded. Archive nos 53 and 59.

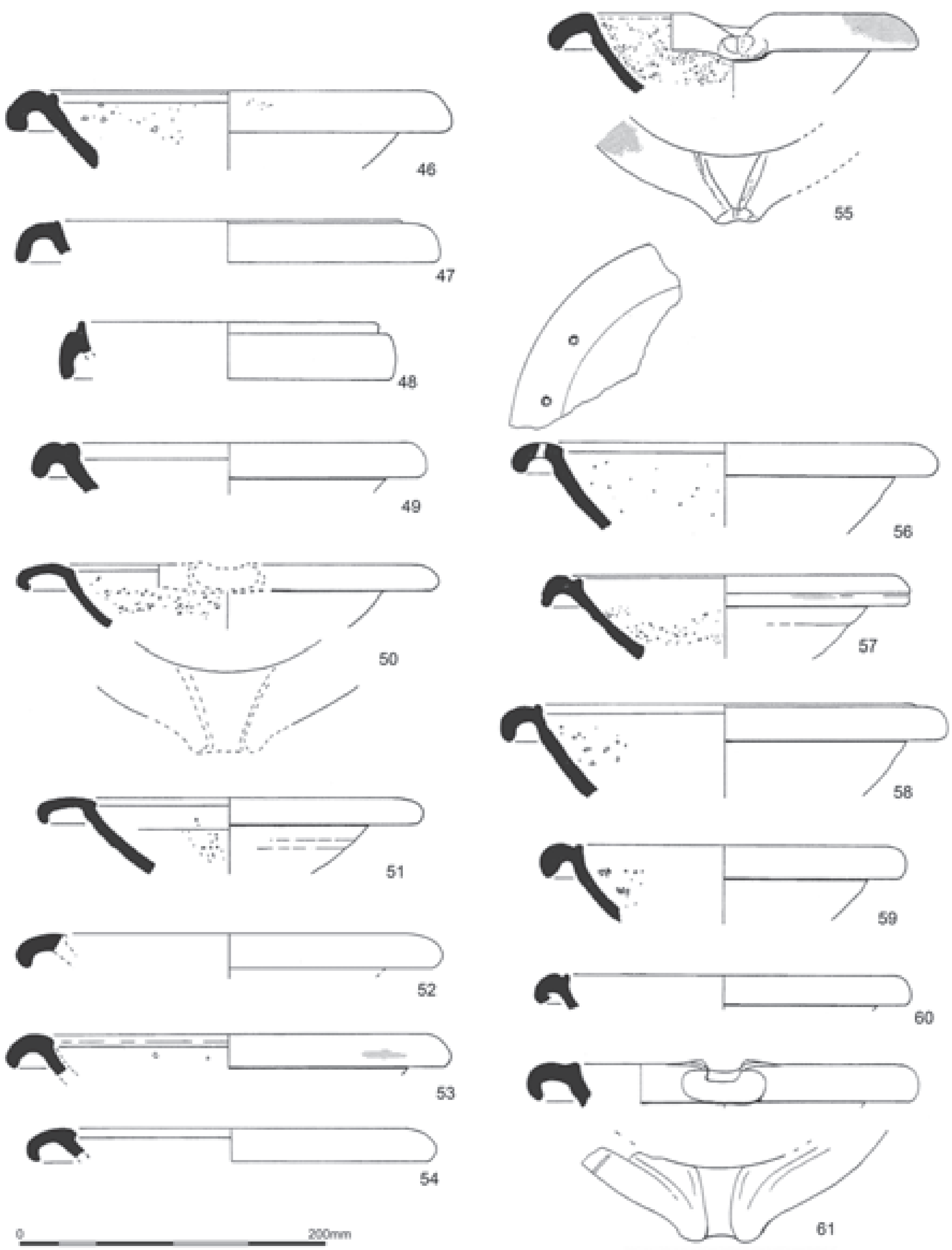


Illustration 7.22
Mortaria 46–61: mortaria made in Scotland, possibly all at Bearsden in Fabrics 4, 6–12.

NK74DE; overlying intervallum east of building 8; NK74BC; soft clay below topsoil and overlying intervallum east of building 8.

91. Diam 200mm. Two joining rimsherds from either no 88 above or from a similar mortarium. Archive no 253.

NK75CF; burnt layer overlying path between buildings 6 and 7.

92. (illus 7.21.45) Diam 160mm. A small sherd, orange-brown throughout with only specks of white slip surviving, from a mortarium with unusually short rim and a smaller diameter than any other mortarium in the sample; it is very like a small bowl, but it has a gritted surface and is therefore just a very small mortarium; no other example known. Archive no 2.

NK74BG; mixed clay deposits overlying intervallum east of building 8.

93. Four joining sherds from a mortarium generally similar to no 88, but a different vessel. The powdery fabric is partially reduced and little patches of slip survive. Archive nos 81, 58, 71.

NK74BC; BG; CA; mixed clay deposits overlying intervallum east of building 8.

94. Diam 200mm. Heavily abraded rimsherd; reduced with surface varying from muddy to orange-brown; traces of cream slip. A second sherd from the same or a similar mortarium is in similar condition. Near to no 86 in profile. Archive nos 222 and 221.

NK75BC; east end of building 3, topsoil.

95. IRS Three joining sherds in fabric with thick grey core, orange-brown skin and traces of slip. Archive no 60.

NK74Cx ; fort east rampart, rubble.

96. Two joining sherds; orange-brown throughout; powdery condition; traces of slip. Archive nos 82.

NK74BG; mixed clay deposits below topsoil and above intervallum road and drain to the east of building 8.

Not listed: rim fragments from wall-sided mortaria (details in database):

Nineteen very small rim fragments from the above or other wall-sided mortaria:

Eight fired to orange-brown throughout, six reduced with thin orange-brown skin and five mostly reduced. Archive nos 68, 80, 84, 90–2, 104; 33–4, 38, 88–9, 254; 64–5, 51/74, 331.

NK74CA; BG; BQ; BK; CL; mixed clay deposits below topsoil and above intervallum road and drain to east of building 8; NK78AK; west intervallum, surface; NK77AE; intervallum east of building 7, topsoil; NK77AL; annexe, topsoil; NK75BA; topsoil overlying east ends of buildings 6 and 7; NK74Cx ; fort east rampart, rubble.

For unattached bodysherds in Fabric 5, see database only for details.

Fabric 6 Bearsden

97. (illus 7.22.48) Orange-brown skin with thick dark grey core and traces of cream slip. Diam 220mm. This may be a bowl rather than a mortarium, but it is broken too high up to show whether the odd grits present are trituration grit or inclusions in the fabric. It should be dated by its presence on the site. Archive no 236.
NK74BW; topsoil between buildings 3 and 4.

98. (illus 7.22.49) In identical fabric to no 97 with traces of cream slip. Diam 280mm. A mortarium with a thick hooked rim and a slight indication of a distal groove. There is an eroded stamp which cannot be identified, although the discovery of a clearer example might make that possible in the future. Archive nos 311/252. A base sherd, archive no 213 could belong to this vessel. (31K).
NK75CA; brown soil overlying path between buildings 7 and 8; NK77Cu ; brown soil overlying Roman level within east end of building 6; NK75DB; building 4, topsoil.

99. (illus 7.22.50) Fabric 6 with thinner grey core and no visible slip. Diam 270mm. This is a highly unusual mortarium of raetian-type. It is very delicate in its general appearance, especially in the slender wall and slender, wide, shallow and flat flange. In its general form and lack of bead it is clearly a raetian-type mortarium of type E though the above characteristics make it a very unusual one; this example appears to have had a self-coloured slip instead of the almost samian-like, red-brown one which was commonly applied to the upper surface of the flange; it was used for the illustration in Hartley, K F (2012a: fig 11, no 6). Archive no 204. Bodysherd possibly from the same vessel. Archive no 264.
NK73DO; fill of gulley to north of east end of building 7; NK75CF; burnt material overlaying intervallum east of building 6.

100. (illus 7.22.51) Traces of matt, red-brown slip limited to the upper surface of the flange. Incomplete rim-section, identical in form to no 99. The outer surface has begun to craze. Probably unused. Archive no 10 has been used with Archive 7 below to complete illustration no 51. NK73AW; annexe, south-west of bath-house, topsoil.

101. (Used to complete illus 7.22.51) A flange fragment from a mortarium identical in form and fabric to nos 99–100 above, but all of its surfaces are crazed which would fit with being a waster. Archive no 7, used with Archive 10 above to complete drawing of illustration 51.
NK73AJ; annexe, south-west of bath-house, topsoil.

102. (not illustrated) Flange fragment with traces of red-brown slip on its surface; probably from a different mortarium of the same type as nos 99–101 above; a small part of the right side of the spout survives. Archive no 15.
NK76AC; annexe, bath-house, topsoil.

103. (not illustrated) Flange fragment with traces of red-brown slip on its surface, from a different, thick mortarium of the

same type as nos 99–102 or no 110, but in a hard variant of Fabric 6. Archive no 6.

NK73AO; annexe, south-west of bath-house, topsoil.

104. Fabric 6. A complete base from a different mortarium; thick, and very heavy, with at least six radial waster cracks while the inside surface is completely crazed. Archive no 132.

NK76FA; at Roman level, south of building 7.

Not listed: unattached body and body and base sherds see archive. Archive nos 14; 144, 184 (with traces of cream slip) and 207.

NK73AQ; building 3, men's quarters, cleaning over natural; NK75CA; brown soil overlying path between buildings 7 and 8; NK73BS; building 3, topsoil.

Fabric 7 Bearsden

105. (illus 7.22.52) Traces of buff-brown slip on upper surface of flange. Diam *c* 280mm. Flange fragment from a mortarium of similar type to no 99, but narrower and thicker. Archive no 245.
NK74AS; brown soil overlying Roman layer at east end of building 6.

106. No slip apparent. This is a typical raetian-type spout with sharply cut sides; there is enough of the flange surviving to show that the mortarium was of the same type as nos 99–103 and 105 above. This spout was used to restore the drawing in Hartley, K F (2012a: fig 11, no 6). Archive no 243.
NK78DL; area beyond the western ditches.

107. No slip apparent; with surface cracking. Abraded fragment of a second spout of identical type. Archive no 226.
NK73AK; building 3, room 4, topsoil.

108. Traces of red-brown raetian slip. Diam 310mm. Two flange fragments, probably joining, from a mortarium of generally similar type to no 105. Archive nos 22 and 23.
NK76CE; annexe, south-west of bath-house, topsoil.

109. (illus 7.22.53) Ordinary, matt brown slip not only on the flange, but also on the exterior, ending in a straight line just below the flange; the internal surface does not survive. Diam 300mm. Three joining sherds. This raetian mortarium (Hartley, K F 2012a: fig 11, no 3) is the more normal, curved, Type E. Archive no 123.
NK77AL; brown soil over drain capstones in intervallum east of building 7.
Not listed: 2 indeterminate flange fragments from a different vessel. Archive nos 197 and 328 (with red-brown slip).
NK73AK; topsoil overlying men's quarters of building 3. Unattached bodysherds see archive: Archive nos 17, 24; 208; 240; 330 and 334.
NK76CE, annexe, south-west of bath-house, topsoil; NK73BS; building 3, topsoil; NK74CF; burnt daub between buildings 3 and 4; NK73AK; AR; topsoil within men's quarters of building 3; NK74BK; mixed clay deposits below topsoil and above intervallum road and drain to the east of building 7.

Fabric 8 Bearsden

110. (illus 7.22.54) (Hartley, K F 2012a: fig 11, no 4.) Diam 270mm. Two, non-joining rimsherds probably from the same raetian-type E mortarium, (Hartley, K F 2012a: fig 11, no 4), which has a small, rather delicate rim. No other examples are known in this fabric because it had been accidentally reduced to grey throughout. Archive nos 249 and 309. Four joining sherds (archive nos 202) making up a complete base probably belong to this vessel, but it is thick and heavy considering the delicate flange. This mortarium has been smoothed on the outside and on the flange. All body and base parts show evidence of wear suggesting that it was waster only in its colour. Archive nos 202, 249 and 309. (Collins RP40, Group 1, pp 163–4.)

NK75By, BT; brown soil overlying path between east ends of buildings 6 and 7;

NK77Ay; brown soil overlying Roman layer at east end of building 7; NK75CF; burnt material overlying intervallum east of building 6.

Not listed: archive no 201.

Fabric 9 Bearsden

111. (illus 7.22.55) (Hartley, K F 2012a: fig 11, no 2.) Traces of good quality, red-brown raetian slip on the flange. Six joining sherds. Diam 240mm. Of all the raetian type mortaria at Bearsden this is the best preserved, despite a little surface abrasion (Hartley, K F 2012a: fig 11, no 2). It is again a Type E; the spout varies from nos 106–7 above, but it is again a typical raetian spout. Archive no 310. A base sherd, archive no 29 is clearly from this vessel which has probably been used. (Collins RP41, Group 3, p 164.)

NK77AL; brown soil drain capstones in intervallum east of building 7.

112. (not illustrated) Traces of raetian type slip. Flange fragment. Archive no 116.

NK79Bx; brown soil overlying cobbling south of bath-house.

Fabric 10 Bearsden

113. (illus 7.22.56) (Hartley, K F 2012a: fig 11, no 5.) Diam 290mm. A raetian-type mortarium of Type E but none of the raetian slip survives. The fabric is friable and all of the surfaces are crazed probably due to misfiring. The upper surface of the flange has a burnt area. Two circular holes have been drilled through the flange 35mm apart. (See Hartley, K F 2012a: fig 11, no 5 for a drawing.) Archive no 8. A body sherd, archive no 215 is probably from this vessel.

NK73DG; immediately north of the mens' quarters of building 3, topsoil; NK73CB; lying on *via praetoria*, east of building 4.

114. (illus 7.22.57) (Hartley, K F 2012a: fig 11, no 1.) Diam 240mm. Two sherds. A raetian mortarium with tiny traces of the red-brown, raetian slip on the upper surface of the flange. This is the only example at Bearsden of the more common Type C raetian mortarium. Burnt before fracture. Archive no 4.

NK73Cx ; annexe, south-west of bath-house, below cobbles.

115. Traces of indeterminate slip. Flange fragment with groove in upper surface near distal end, a feature often present on Types B and C raetian mortaria; this is from a largish mortarium not otherwise represented. There is a waster crack in the flange. Archive no 13.

NK73AJ; annexe, south-west of bath-house, topsoil.

116. Patch of red-brown, raetian-like slip on the upper surface only. A flange fragment from a large mortarium. The slip would fit with it being raetian, but not enough of rim survives to identify the form as raetian. Archive no 12.

NK73AD; bath-house, topsoil.

Fabric 11 western sector of the Antonine Wall

117. Too powdery, eroded and disintegrating for the profile to be illustrated, but it is very close to no 118. Diam *c* 290mm A mortarium with a small rounded rim; partly disintegrated stamp of CICV[.]. Illus 7.16.7 scan. Archive no 305. (20K) Flange fragment. Archive no 140 is probably part of same vessel.

NK77BH; brown soil overlying burnt daub fill of drain north of building 8.

118. (illus 7.22.59) Fabric 11 Diam 240mm. In similar deteriorated condition to no 117, and with near identical rim-profile. Archive no 114.

NK79DA; bath-house, unstratified.

119. (illus 07.22.58) Diam 290mm. Eight joining sherds from a mortarium with a small rounded rim generally similar to no 117, but in much better condition. The right-facing stamp is too abraded to identify with certainty, but it has the two-line border used by Cicu[.], not illustrated. The rim-profile is entirely typical of his work. Archive no 296. (30K).

NK75By; brown soil overlying path between east ends of buildings 6 and 7.

120. Slight traces of cream slip. A flange fragment from a mortarium generally similar to no 119. Abraded. Archive no 216.

NK73CB; overlying *via praetoria* east of building 4.

121. Diam 270mm. Mortarium of generally similar profile to nos 117–19, but a different mortarium. Archive no 100.

NK78BA; west rampart and intervallum area.

122. (illus 7.22.60) Diam 230mm. Two sherds from the same very small mortarium with tiny curled under flange. Collins RP50 Group 3. Archive nos 188 and 148.

NK76BW; building 4, topsoil; NK76DJ; topsoil south of building 7.

123. Two joining base/bodysherds and one bodysherd. Abraded. Archive nos 105/25 and 18.
NK76CE, annexe, south-west of bath-house, topsoil; NK73AB; bath-house, topsoil.

124. (illus 7.22.61) With tan brown with orange-brown core; traces of cream slip. Diam 260mm. A hooked rim mortarium with broken, left-facing stamp, which is too abraded to be identified. An abraded bodysherd from the same vessel shows wear in use. Both sherds are slightly singed. Archive nos 306 and 11. (12K).
NK73AD; bath-house, topsoil.
Not listed: IRS, archive no 166; NK73Bu ; building 7, east end, topsoil.
Unattached bodysherds in Fabric 11: archive nos 106; 113; 194–5 and 107;
NK73AD; bath-house, topsoil; NK73AE; annexe, south-west of bath-house, topsoil; NK79Bu ; annexe, area south of steam range, topsoil; NK74Cy; topsoil overlying intervallum to east of building 7.

Fabric 12 western sector of the Antonine Wall

All sherds are abraded.

125. Fabric 12. Two flange fragments, not joining, from a mortarium with thick rounded flange, not otherwise represented. There is a broken and abraded, unidentified stamp. Archive nos 261 and 256. (38K).
NK75BT; brown soil overlying path between east ends of buildings 6 and 7.

126. With opaque brown slip on upper surface of flange only, in the raetian fashion. A flange fragment with unidentifiable stamp. Archive no 290. (32K).
NK77AI; below intervallum road east of building 12.

127. Variant of fabric 12. IRS from a very large mortarium indeed, with thick body and flange, unlike any other represented on the site. It is reminiscent in thickness and size (but not fabric) to mortaria of Verecundus 2 made at Soller in Lower Germany (Miller, Schofield and Rhodes 1986: 111, nos 1.75, 1.76); this is even thicker in the body. Too little survives to give any idea of the rim-profile. Archive no 137. NK77BH; brown soil overlying burnt daub covering gulley north of building 7.
Unlisted: disintegrating bodysherd with crazed surfaces. Archive 102.
NK78BV; intervallum west of building 4, topsoil.

Fabric 13 western sector of the Antonine Wall

128. Fabric 13 Three joined sherds making up the whole of one large, thick and heavy, base with a diameter 105mm and 20mm thick; abraded. Also five sherds from other bases, substantial, but not as thick (one showing wear as opposed

to abrasion which is common to all). Archive nos 180; 103; 155; 156; 193 and 279.

NK76AT; topsoil overlying *via praetoria* east of building 4; NK78DW; brown soil overlying intervallum west of building 4; buildings 6 and 7; NK73Cu ; NK73CL; brown clay between west fort rampart and intervallum road west of building 4; NK77AK, topsoil overlying west end of officer's quarters in building 3; NK76AT; topsoil overlying *via praetoria* east of building 4.

Not listed: One flange fragment; bodysherds (break modern). Archive no 57; Archive nos 111/128; 198

NK74DE; overlying intervallum east of building 6; NK76EZ; building 11, under cobbling; NK77AK; topsoil overlying west end of officer's quarters in building 3.

Fabric 14 western sector of the Antonine Wall

129. Fabric 14 Four bodysherds from one, heavily worn mortarium; no rim sherd survives and there is no other mortarium present in this fabric. The exterior had some minimal smoothing while the lower zone near the base was left rough. Collins RP47, Group 2. Archive nos 129–31.

NK76DQ; building 16; NK76BL; buildings 13 and 14, topsoil, NK76CS; building 16, grey silt.

7.4 SCIENTIFIC ANALYSIS OF THE POTTERY

7.4.1 Heavy mineral analysis of black-burnished ware

DAVID F WILLIAMS

A macroscopic examination was made of the black-burnished wares 1 and 2 (BB1 and BB2) recovered from excavations carried out from 1973–5. In addition, six sherds were selected for heavy mineral analysis. The BB1 sherds from Bearsden (possibly representing some 25 vessels) are in a number of fabrics, suggesting several different centres of production. BB1 from the Wareham-Poole Harbour area of Dorset seems to account for about half of the vessels present. The fabric of these latter sherds is black, or very dark grey throughout, and they contain a considerable amount of quartz sand temper. A cooking-pot rim (table 7.8.3) was chosen from amongst this group for heavy mineral separation and it produced an assemblage with a high tenor of tourmaline and no garnet, identical to the results associated with the Dorset production centre (Williams 1977: Group I).

Also present are a number of likely products from the Rossington Bridge kilns located near Doncaster, especially a dish (table 7.8.2), which has a series of zigzag basal lines which seem to be peculiar to this centre (Williams 1975: 299). It has been recognised for some time that the Rossington Bridge kilns were making BB1 from about the middle of the second century, and were possibly connected in some way with the Dorset production area, since there are similarities of form and decoration between the wares of both centres (Williams 1977). The predominant colour seems to be dark grey, the cooking-pots having a slight 'lustre' to them; also less sand temper is used than is normal, for instance, in Dorset BB1. Two of the sherds thought likely to have been made at Rossington Bridge were analysed (table 7.8.4 and 5), and both produced assemblages similar to those obtained from 'wasters' from the Rossington Bridge kilns, with a fairly high percentage of garnet recorded (Williams 1977: Group II). Possible Rossington Bridge BB1 has also been recognised by the writer in small amounts at Balmuildy, Bar Hill and Castledykes, though none seems to be present in the large group of BB1 from the west ditch at Mumrills (Williams 1977). The relatively small amount of Rossington Bridge BB1 on the Antonine Wall compared with Dorset BB1 may be due in part to the Wall's early abandonment, before the BB1 wares from the more conveniently situated Rossington Bridge site could get properly established there. The remainder of the BB1 fabrics appear different from those described above, with far less sand temper employed, and with rougher tooling and thickish lattice lines on the bowls and dishes. This suggests that other, probably smaller, kiln sites were also involved in making BB1 at this time, perhaps situated closer to the northern military sites than the large Dorset production centre. One of these sherds was analysed (table 7.8.6) and the resulting suite of minerals shows a moderate amount of garnet, but with fairly high percentages of rutile and kyanite, and falls into an undesignated group of BB1 vessels from Mumrills and Birdoswald (Williams 1977: Group III). The cooking-pot from Mumrills in this group (unstratified from the 1928 excavations) is identical to that from Bearsden. The form is similar to Gillam 1970: Type 120, but lacks the wavy line decoration round the neck. The variety of BB1 fabrics at Bearsden clearly shows that at this time BB1 in the north was being produced by several centres, although the main suppliers were Dorset and Rossington Bridge. The BB2 sherds from Bearsden (possibly representing some 11 vessels) are all well burnished and slipped, the normal colour being either black or pinkish-grey, with the core tending to have a dark brown central zone sandwiched between two thin darker layers. All of the sherds have been tempered with a medium amount of quartz sand. The bowls (mostly Gillam 1970: Type 222) outnumber the cooking-pots (Gillam 1970: Type 139) by about 3:1. BB2 vessels are outnumbered by BB1, as they are in Antonine I levels at Birrens and Castledykes. It is only in Antonine II levels, or in undivided Antonine deposits, that BB2 first occurs in excess

Table 7.7
Vessels sampled for heavy mineral analysis

No	*Context*	*Vessel type*	
1	NK73AB	BB2	triangular-rimmed bowl (G 222)
2	NK73AW	BB2	cooking pot (G 139)
3	NK73BH	BB1	cooking pot (G 127)
4	NK73AQ	BB1	flat-rimmed dish (G 308)
5	NK73BJ	BB1	plain-rimmed dish with groove (G 316)
6	NK74BR	BB1	cooking pot (G 120 variant)

G = Gillam 1970 Type.

Table 7.8
Percentages of non-opaque minerals of samples

No	*Zircon*	*Tourmaline*	*Rutile*	*Kyanite*	*Andalusite*	*Staurolite*	*Garnet*	*Apatite*	*Anatase*	*No grains counted*
1	75.9	6.8	4.6	2.9		2.8	5.7	1.3		517
2	81.9	4.1	3.3	3.5	0.6	0.6	6.0			436
3	37.7	51.4	4.5	0.9	2.2	2.7		0.6		513
4	76.1	8.2	0.6		1.3		13.2		0.6	326
5	70.9	10.7	1.4		0.9		15.3		0.8	401
6	63.7	6.9	5.6	2.7	2.9	3.8	9.7	2.9	1.8	287

of BB1 in the north. The BB2 fabric at Bearsden is fairly uniform and suggests a single origin for all the sherds. The heavy mineral assemblage produced by two of these sherds (table 7.8.1 and 2), is characterised by a high tenor of zircon combined with almost equal amounts of tourmaline and garnet, and with a moderate amount of rutile, which agrees very well with the analysis of a large group of BB2 vessels shown to have been made at Colchester (Williams 1977: Group x II). Samples of BB2 analysed from Mumrills, Newstead and now Bearsden, have all indicated a probable Colchester origin (Williams 1977).

7.4.2 Petrographical examination of pottery

G H COLLINS†

Twenty-five sherds were thin sectioned with the aim of determining if any of the rock and/or mineral fragments (grits) present in the pottery could be identified, and a possible Scottish source given. It should be emphasised that this research is dependant on the slide containing a representative selection of grits present in the pot and that the actual plane of the slide is determined to a large extent by chance. Since the grits were almost certainly obtained from glacial or recent sedimentary deposits, it necessarily follows that geological knowledge is required of a considerable greater area than that in which the pottery was found, or may have been manufactured.

Of the 25 slides examined, 16 have produced an assembly of rocks which, while not unique to Scotland, can be found within a 50km radius of Bearsden. The grits in the remaining nine are predominantly quartz and have been ignored as this mineral is too ubiquitous.

Group 1 Slides containing basic igneous rock fragments

Rounded grams of basalt, up to 4mm in diameter, are found. They contain labradorite feldspar, olivine altered to iddingsite and ilmenite altering to leucoxene. In two samples the rock is not so fresh, the feldspar being altered to secondary minerals. This basalt may be related to the lavas of Lower Carboniferous Calciferous Sandstone age, the rocks of which the Campsie Fells and the Kilpatrick Hills are composed (Macgregor & MacGregor 1948: 2). These are areas of high ground to the north and west of Bearsden.

Group 2 Slides containing rocks similar to those found along the Highland Border

These slides contain fragments of chert, chloric-schist, and serpentinites. Two samples contain rounded grains of serpentinite, pale yellow in colour, up to 0–3mm in diameter. Chert, sometimes mottled with veinlets of quartz in cryptocrystalline silica is present. Schistose-grit and chloritic-schist are found in two samples.

These rocks may be compared with rocks of Cambro-Ordovician age from the Highland Border (Johnstone 1966: 60). The nearest outcrops are in Balmaha and Aberfoyle.

Group 3 Slides containing quartzites, psammites and greywackes, similar to those of the Dalradian Assemblage

These slides contain rock fragments of quartzites, schistose-grits, alkali-feldspar and greywackes, some of which are diagnostic in themselves, but when taken together, may have been derived from the Upper Psammitic Group of the Dalradian Assemblage (Johnstone 1966: 38). Five samples contain alkali-feldspar (orthoclase and, rarely, microline) and quartz rock, similar to psammitic-schists and schistose grits. The rock crop-out in a band, from 2 to 5km wide, stretching from the Clyde to the coast of Aberdeenshire (Johnstone 1966: pl VI). One sample also contains a fragment of biotite-granite of obscure origin.

Conclusion

Since the predominant drainage pattern is from the north-west (Macgregor & MacGregor 1948: 3), rocks from north of the Highland Boundary Fault could have been eroded and carried south-easterly towards the line of the Antonine Wall. The Carboniferous basalts are relatively local in origins. Thus it should be possible to find all the types of rock mentioned in this report within a comparative small radius of Bearsden.

7.4.3 *Geological report on trituration 'grit' in mortaria fragments*

GEOFF GAUNT

7.4.3.1 Introduction

This report summarises the lithologies, insofar as they are identifiable, of trituration 'grit' in 26 mortaria (some represented by more than one fragment) from Bearsden. The fragments were examined by ×10 hand lens and low-power stereo microscope in reflected light. An attempt to obtain greater resolution by using a higher magnifying petrological microscope, also in reflected light, failed because of the uneven nature of the surfaces being examined. The word grit has severely restricted meanings in lithology and lithostratigraphy, so where in this report it is used in a trituration sense it is given in single quotes, ie, 'grit(s)'.

Most of the 'grits' are between 1mm and 4mm maximum width, the largest being 8mm. 'Grits' under 1mm wide are excluded from consideration to avoid confusion with temper in the fabric, much of which is quartz. Size data is not included in the report because, although logged originally, it became apparent that there were no relationships between size and lithology. The detailed catalogue has been lodged with the site archive but its contents are presented in table 7.9.

7.4.3.2 Limitations of the technique

In those mortaria fragments containing numerous 'grits', only between 50% and 70% of the 'grits' are lithologically identifiable. There are two main reasons why the other 'grits' are indistinct. One is that in many 'grits' the principal components, granular or crystalline, are too small to be individually discernible, and therefore to be identifiable, and in addition are devoid of recognisable textures.

The other is that, particularly in those mortaria with soft, ie slightly friable, fabrics, numerous 'grits' are obscured by extremely fine dust emanating from the fabrics. Attempts to remove the dust by blowing off, brushing off, damp wiping and full immersion were generally only partly successful. One possible reason for this problem is because, on the evidence of a well-known school-days experiment, the dust is capable of electrostatic charging and may be attracted to minerals in the 'grits' which were similarly charged during kiln firing. Additionally, in a few mortaria fragments with hard fabrics a thin veneer of fabric (ie the slip) coats some deeply embedded 'grits' partly or completely, and cannot be removed, even with a mounted needle, without damaging the 'grits'.

7.4.3.3 Previous research

'Grits' in the same or similar mortaria were examined petrologically, ie, in thin-section slides using a polarising microscope, by Collins (1986 and 7.4.2). In nine slides quartz was predominant, so these were not considered further because this mineral is so ubiquitous. The other slides were categorised in three groups.

Group 1. Three slides containing rounded 'grits' of basalt, possibly derived from Lower Carboniferous lavas cropping out on hills north and west of Bearsden. No other lithology is mentioned.

Group 2. Five slides containing chert, chloritic schist and serpentinite, with schistose grit in two of them. These rocks suggest comparison with the Lower Palaeozoic 'Highland Border' complex, the nearest outcrops of which to Bearsden are stated to be at Aberfoyle and Balmaha. (I suspect that there is a small outcrop also on the western side of Loch Lomond between Balloch and Luss.) No other lithologies are mentioned.

Group 3. Nine slides containing quartzite, psammite, schistose grit, greywacke and alkali feldspar (the last presumably as individual crystals). This assemblage suggests derivation from the Upper Psammitic Group (now renamed the Southern Highland Group) of the Dalradian complex, which crops out from Helensburgh north-eastwards to Aberdeenshire. The names psammite and schistose grit are traditionally used lithologically in Scottish Highland geology for regionally metamorphosed sandstones, the latter with at least a slightly schistose texture. Both names have lithostratigraphical connotations also in the same region.

Unfortunately the original samples sent to Dr Collins could not all be recovered but wherever possible joining fragments from the same vessel were studied by Dr Gaunt. Two fragments in Fabric 11 are new samples which had not been examined by Collins. This report amplifies his research.

7.4.3.4 The identifiable lithologies

Seven lithologies are sufficiently numerous and widespread to warrant summarising below to avoid repetition in the catalogue of mortaria fragments. All seven consist mainly or entirely of quartz, with or without secondary silica, and so probably owe their obviously robust and durable nature, and their relative abundance in the 'grits', to this fact. These seven lithologies (in no particular order) are:

Quartz: variably pale grey translucent to white opaque, and mainly sub-angular to sub-rounded. A few opaque 'grits' are angular and have sub-conchoidal fracture patterns suggesting chalcedonic silica, but these are unlikely to be chert from the 'Highland Border' complex because according to field descriptions this chert is dark coloured and laminated.

Nondescript sandstone: variably white to medium grey and pale brown, mainly fine grained and fairly well compacted, with silty or clayey matrices or intergranular voids.

Reddish sandstone: Medium to dark brownish red and fine to very fine grained (some 'grits' being in effect siltstone). Several of these 'grits' appear to be slightly friable.

Greywacke: Variably medium to dark grey, fine to coarse grained and well to highly compacted, with appreciable grains of dark minerals and/or rock fragments, and dark matrices.

Siliceous sandstone: pale grey, fine to (mainly) medium grained with subangular to (more commonly) subrounded grains in a hard siliceous matrix (has the appearance of crystalline quartz at low magnifications). In some 'grits' the longest observed axes of the grains appear to some extent to be mutually aligned, and there is in fact a textural gradation between siliceous sandstone and schistose grit (summarised below), with some 'grits' being intermediate between the two lithologies. Probably equivalent to the 'psammite' of traditional Highland usage, although siliceous sandstone is used in the catalogue as a purely descriptive term, without genetic or lithostratigraphic implications.

Metaquartzite: white to pale grey, fine to (much less commonly) medium grained and apparently highly compacted with angular grains and no matricial space, having in effect a texture known as granoblastic which distinguishes metamorphic quartzites or metaquartzites from sedimentary quartzites or orthoquartzites (has the appearance of crystalline quartz at low magnifications).

Schistose grit: pale grey, fine to medium grained with subangular to subrounded grains in a silty-looking, variably schistose matrix that in a few 'grits' includes bronze-coloured mica, presumably muscovite. In some 'grits' the longest observed axes of the grains are mutually aligned. Because of the emphasis on basalt, chert and serpentinite in the petrological report of Collins (1986; 7.4.2 above), any 'grits' that could possibly have these lithologies are logged in the catalogue. In addition, Collins emphasises chloritic schist. It would be virtually impossible with the technique used and the size of the 'grits' observed to differentiate chloritic schist from many other types of schist, and also types of phyllite. The incidence of recognisable non-quartzitic schists and phyllites generally is, therefore, included in the catalogue.

A minute number of 'grits' consists of igneous rocks that are not too dark coloured or too fine grained, and therefore are unlikely to be basalt. These are included in the catalogue also, but their incidence is too few and their lithology too diverse to have any significance.

7.4.3.5 Comments

A synopsis of the observations summarised in the catalogue is shown on table 7.9 for those mortaria fragments that contain more than about 20 'grits'. There were three main reasons for making the observations on the 'grits' – to ascertain whether (a) they can elucidate possible sources of derivation, and therefore of mortaria-manufacturing locations, (b) they are compatible with the petrological observations of Collins (1986, see 7.4.2 above), and (c) they are compatible with the fabric classification. These questions are addressed below. The subangular to subrounded shapes of the vast majority of the 'grits' indicate derivation from Quaternary deposits. In this context it should be emphasised that, on the assumption that at least some of the 'grits' came from

Table 7.9
Relative abundance of identifiable lithologies in mortarium fragments containing more than *c* 20 trituration 'grits'

Lithology	*sub = substitute*											
Fabric	5	5	5	6	6	6	8	9	11	11	13	14
Sample number	23	25 sub	26 sub	4	6	7 sub	10	11	new	new	13	17
Archive number	133	121	314	132	204	213	202	29	11	113	180	130
Catalogue number	47	48	31	104	99	98	110	111	124	no no	128	129
% identifiable	70	60	60	70	70	60	60	50	60	50	70	70
Quartz	C	C	M	M	s		M	s	C	C	C	s
Nondescript Sandstone	s	•	M	s	•	s		•	M	s		•
Reddish Sandstone	s	•	•	s		s		s	•	•	•	s
Greywacke				•		•	•	M	•		•	s
Silaceous sandstone	M	M	C	C	C	C	M	M	s	M	s	M
Metaquartzite	s	M	M	s		•	•	s		•	M	M
Schistose grit	•			s	•	•	•	•			s	•
?Serpentinite	s	•	•									
?Basalt			•?				M	s	s	s		•
?Chert		•	•?									
Schist/phyllite	•			•	s		s				•	•

C = commonly present; M = moderately present; s = sparsely present; • = One or two occurrences only the region around Glasgow, this region received glacial detritus from several northerly to westerly directions and, subsequently, fluvial detritus into the lower Clyde Valley from almost every direction except north-west. As a result, there is likely to have been considerable mixing and reworking of detritus, with no precise location having a lithologically unique or exclusive suite of deposits.

POSSIBLE SOURCES

The abundance of quartz is not surprising because this mineral is predominant in the sand and granule grades of most British Quaternary deposits. For the same reason, however, quartz has little value as evidence of source.

If the siliceous sandstone, as recorded, equates with the psammite of traditional Scottish Highland usage as suggested earlier, its abundance implies a source within, or at no great distance from, the Highlands. On the assumption that none of the mortaria was made beyond the Antonine Wall, one or more manufacturing locations where the Wall is nearest to psammite-rich outcrops, ie, towards its western end, would be the most likely. This conclusion is supported by the presence, albeit in only small amounts, of metaquartzite, schistose grit and other schists/phyllites. It is probably supported also by the generally scarce presence of greywacke, although it is not inconceivable that some greywacke could have been derived from Ordovician outcrops in the Southern Uplands via the upper Clyde Valley.

The reddish sandstone 'grits' probably originated in the belt of Old Red Sandstone, ie Devonian, outcrops that runs north-eastwards from the Clyde around Cardross and passes within 20km north of the centre of Glasgow, although a conceivable alternative source is the outcrop of 'red' Coal Measures centred on Bothwell, south-east of Glasgow. Probable sources for the nondescript sandstone 'grits' are present in many of the Carboniferous outcrops in and around Glasgow. Neither the reddish sandstone nor the nondescript sandstone is likely to be as robust and durable as the rocks reviewed in the preceding paragraph, especially during glacial transport, and this may explain their relative scarcity.

Of the remaining three lithologies included on table 7.9, basalt and chert are sufficiently durable to be possibly far-travelled, and so in view of their relative scarcity they are of little value as source indicators. The serpentinite, as Collins (1986) noted, occurs in the 'Highland Border' sequence and is likely to be from that source. The only other source at no great distance, in the Girvan area, can be discounted on known directions of glacial and fluvial transportation.

COMPATIBILITY WITH PETROLOGY

Any assessment of compatibility between the lithological summaries in this report and the petrological observations of Collins (1986, see 7.4.2 above) must allow for a major difference in emphasis between the two accounts. Collins concentrates on rock types such as basalt and serpentinite which by their presence (however minor) or absence accentuates the differences between his three groups. In contrast, this report concentrates on those rock types that are identifiable within the limits of the technique. The two accounts are, therefore, necessarily selective and focused on different aspects. Moreover, neither account covers the entire contents present in any mortaria fragment, one because of the areal limits of a thin-section slide (as Collins refers to), the other again because of limits of the technique. There is also the point that whereas Collins categorised slides from 25 mortaria (slide RP 39 being included in both groups 2 and 3), only the 12 fragments included on table 7.9 contain sufficient 'grits' to presume a representative assemblage for the fragment. Collins' slides obviously represent a much larger number of mortaria. In these circumstances only a few possible indications of compatibilities can be pointed out.

Possible basalt 'grits' are not abundant in any mortaria fragments, their most numerous occurrence being a moderate presence in sample 10 (fabric 8), which is therefore most likely to equate with one of the three Group 1 slides of Collins (it does in fact equate with RP40). The other two slides in this group could, possibly, be represented by any of five fragments – archive no 11 (fabric 11), archive no 113 (fabric 11), sample 11 (fabric 9), all with a sparse ?basalt presence, sample 2 (fabric 11) and sample 21 (fabric 8), both with only a few 'grits' but conceivably including basalt.

No mortaria fragments contain abundances of chloritic schist, serpentinite or chert. Chloritic schist would be virtually impossible to distinguish from many other schist/phyllite rocks within the limits of the technique, as mentioned earlier. However, on table 7.9 ?serpentinite, with or without ?chert, is present, albeit at best sparsely, in samples 23, 25 (substitute) and 26 (substitute), and the catalogue refers to similar presences in archive nos 152, 220 and 122, etc. All six of these mortaria fragments are attributed to fabric 5. Neither ?serpentinite nor ?chert is recorded elsewhere, so there is a possibility that the five Group 2 slides of Collins may equate with some of the fabric 5 fragments, although the number of 'grits' under consideration here is minute compared with the 30% to 40% of 'grits' in these fragments that are not lithologically identifiable, a caution that applies equally to the possible compatibilities with the basalt-bearing Group 1 slides in the previous paragraph.

The abundance in most fragments of quartz and also of siliceous sandstone (presumed to be psammite), generally with some greywacke, metaquartzite or schistose grit, makes it virtually impossible to suggest any compatibilities with the nine un-grouped quartz-rich slides or the nine Group 3 slides of Collins. The only comment that may conceivably have any validity in this context is that, within the limits of table 7.9, the sparse quartz in sample 6 (fabric 6), sample 17 (fabric 14) and sample 11 (fabric 9) are least likely to equate with the quartz-rich slides.

COMPATIBILITY WITH FABRIC CLASSIFICATION

Only fabrics 5, 6 and 11 are represented by more than one mortaria fragment on table 7.9. The possibility that on the evidence of minor constituents the fabric 5 fragments equate with the Group 3 slides of Collins is mentioned above. Moreover, there is an overall similarity of the major constituents between the three fabric 5 samples on the table (and the other three samples in the catalogue), although even within the limits of the

Table 7.10
Catalogue of mortarium samples

The catalogue is arranged primarily in order of fabric numbers and secondarily in order of sample and archive numbers. For each fragment the approximate percentage of identifiable 'grits' is given first, then assessments of the relative abundance of the seven most commonly occurring identifiable lithologies, where present, and listed in the order as summarised above, followed by other lithological occurrences as appropriate.

For fragments with more than *c* 20 'grits' the assessments are coded as:
– common (>33% of identifiable 'grits')
– moderate (20% to 33% of identifiable 'grits')
– sparse (<20% of identifiable 'grits')
with occurrences of only one or two 'grits' numbered accordingly in brackets.

FABRIC 4 (MASCELLIO)

Sample 1 archive no 133 (Collins RP31)
Rim fragment without obvious 'grit'.

FABRIC 5 (SARRIUS)

Sample 23 archive no 133
c 70% lithologically identifiable.
Quartz – Common.
Nondescript sandstone – Sparse.
Reddish sandstone – Sparse.
Siliceous sandstone – Moderate.
Metaquartzite – Sparse.
Schistose grit – (1).
? Serpentinite – mottled medium grey to greenish black, scratches with mounted needle. Sparse.
Non-basaltic igneous rocks – (2).
Schist/phyllite – (2).

Sample 25 (substitute) archive no 34
c 60% lithologically identifiable.
Quartz – Common.
Nondescript sandstone – (1)
Reddish sandstone – (2).
Siliceous sandstone – Moderate.
Metaquartzite – Moderate.
? Serpentinite – (1).
Non-basaltic igneous rocks – (2).
? Chert – Dark grey with minutely 'crackly' texture. (2).

Sample 26 (substitute) archive no 274
c 60% lithologically identifiable.
Quartz – Moderate.
Reddish sandstone – (2).
Siliceous sandstone – Common.
Metaquartzite – Moderate.
? Serpentinite – (1).
Chert or basalt – black, extremely fine grained (2).

Archive no 152
As for Sample 23 but with ?serpentinite (1) and schist/phyllite (1).

Archive no 220
As for Sample 26 (substitute) but with sparse reddish sandstone and no ?chert.

Archive no 122 etc
As for Sample 23, but with ?serpentinite (1) and the addition of greywacke (2).

FABRIC 6

Sample 4 archive no 132
c 70% lithologically identifiable.
Quartz – Moderate.
Nondescript sandstone – Sparse.
Reddish sandstone – Sparse.
Greywacke – (1).
Siliceous sandstone – Common.
Metaquartzite – Sparse.
Schistose grit – Sparse.
Non-basaltic igneous rocks – (2).
Schist/phyllite – (2).

Sample 6 (raetian) archive no 204
c 70% lithologically identifiable.
Quartz – Sparse.
Reddish sandstone – Sparse.
Siliceous sandstone – Common.
Schistose grit – (2).
Non-basaltic igneous rocks – (1)
Schist/phyllite – sparse.

Sample 7 (substitute – from the same vessel as original sample sent to Collins RP37); archive no 213
c 60% lithologically identifiable.
Quartz – Common.
Nondescript sandstone – (2).
Reddish sandstone – Sparse.
Greywacke – (1).
Siliceous sandstone – Common.
Metaquartzite – (2).
Schistose grit – (1).

Archive no 10 (raetian)
Small fragment with only *c* 15 'grits', mainly quartz and siliceous sandstone, with greywacke (1).

FABRIC 8

Sample 10 archive no 202 (Collins RP40)
c 60% lithologically identifiable.
Quartz – Moderate.

Greywacke – (2).
Siliceous sandstone – Moderate.
Metaquartzite – (2).
Schistose grit – (1).
?Basalt – Dark grey to black, extremely fine grained. Moderate.
Schist/phyllite – Sparse.

Sample 21 archive no 188 (Collins RP50)

Minute fragment with only three 'grits', all dark grey and fine grained, conceivably basalt, but otherwise indistinct.

FABRIC 9

Sample 11 archive no 29 (Collins RP41)

c 50% lithologically identifiable.
Quartz – Sparse.
Nondescript sandstone – (2).
Reddish sandstone – Sparse.
Greywacke – Moderate.
Siliceous sandstone – Moderate.
Metaquartzite – Sparse.
Schistose grit – (2).
?Basalt – Dark grey to black, extremely fine grained. Sparse.

FABRIC 10

Sample 8 (raetian) archive no 4

Rim fragment with only *c* 20 'grits' present, of which only 8 are identifiable, as quartz (4), greywacke (1), siliceous sandstone (1), metaquartzite (1) and schist/phyllite (1).

FABRIC 11

Sample 3 archive no 105

Only *c* 20 'grits' present, mainly quartz and siliceous sandstone, with metaquartzite (1) and schist/phyllite (1).

Sample 15 archive no 106

Small fragment. Only obvious 'grit' is nondescript sandstone (1).

Archive no 11 c *60% lithologically identifiable.*

Quartz – Common.
Nondescript sandstone – Moderate.
Reddish sandstone – (1).
Greywacke – (2).
Siliceous sandstone – Sparse.
?Basalt – Dark grey to black, extremely fine grained. Sparse. Non-basaltic igneous rocks. Sparse.

Archive no 194/5

Three small fragments with only *c* 15 'grit' collectively, mainly quartz and siliceous sandstone.

Archive no 113

c 50% lithologically identifiable.
Quartz – Common.
Nondescript sandstone – Moderate.
Reddish sandstone – (2).
Siliceous sandstone – Moderate.
Metaquartzite – (1).
?Basalt – Dark grey to black, extremely fine grained. Sparse.

Sample 2 (GICA or CICU[.]) archive no 296

Less than 30% lithologically identifiable (due to a particularly tenaceous fabric coating, ie slip), mainly quartz, siliceous sandstone and dark grey to black 'grits', conceivably basalt.

FABRIC 13

Sample 13 archive no 180

c 70% lithologically identifiable.
Quartz – Common.
Nondescript sandstone – Sparse.
Reddish sandstone – (1).
Greywacke – (1).
Siliceous sandstone – Sparse.
Metaquartzite – Moderate.
Schistose grit – Sparse.
Schist/phyllite – (1).

FABRIC 14

Sample 17 archive no 130

c 70% lithologically identifiable.
Quartz – Sparse.
Nondescript sandstone – (2).
Reddish sandstone – Sparse.
Greywacke – Sparse.
Siliceous sandstone – Moderate.
Metaquartzite – Moderate.
Schistose grit – (2).
?Basalt – Dark grey, extremely fine grained (2).
Schist/phyllite – (2).
Pottery fragment – Darker red than fabric (1).

table this similarity extends also to other fragments, eg archive no 113 (fabric 11), sample 4 (fabric 6) and sample 7 (substitute) (fabric 6). There is an overall similarity also between the three fabric 6 fragments except for a marked variation in the amounts of quartz present.

7.4.3.6 Conclusions

1. The abundance of siliceous sandstone, presumed to equate with the psammite of traditional Scottish Highland usage, suggests a source or sources near the western end of the Antonine Wall, ie in the Glasgow region. Other metamorphic 'grits', albeit in small numbers, support this suggestion, and there is no contradictory evidence.
2. Tentative compatibilities with the group 1 and 2 slides of Collins (1986, see 7.4.2 above) are suggested, but the magnitude of the uncertainties involved is so great that little reliance can be placed on these suggestions.
3. There is insufficient evidence to identify any compatibilities between trituration 'grit' lithologies and fabric classification.

4. Because of limitations of the technique, and other uncertainties, only the first conclusion above has a reasonably sound basis.

7.4.4 Chemical and petrological analysis of local oxidised ware

MARK GILLINGS

Thin section petrology was undertaken to examine the suite of non-plastic inclusions present within the clay matrix. This includes mineral and other inclusions natural to the exploited source clay, and those added deliberately by the potter in antiquity. Study of the plastic fraction of the ceramic is very limited as the majority of the clay minerals are destroyed at temperatures between 500 and 700°C (Williams 1983). These are commonly exceeded in even the most primitive of firing conditions.

To examine the plastic fraction of the ceramic, the clay, the technique of Neutron Activation Analysis (NAA) was employed. This enabled the individual trace chemical components of the oxidised ware fabric to be identified and their concentrations determined. For a more detailed discussion of the methodology see Tite (1972).

All of the chemical data resulting from the analysis was processed using multivariate statistics prior to interpretation. In practice this took the form of hierarchical cluster analysis. Group verification was undertaken through discriminant analysis and an independent factor analysis. For a more detailed discussion of the sampling, analytical and data processing methodologies employed see Gillings (1991).

The techniques of NAA and Thin Section Petrology were applied independently and with an equal weighting to maximise the available information and improve the conjectural credibility of resultant interpretations.

A total of 17 sherds were sampled from the principal typological groupings identified by Louise Hird during the initial study of the pottery, and two samples of daub. This yielded a total of 17 thin sections and 36 Neutron Activation Analysis samples.

Chemically the analysed vessels showed a remarkable level of homogeneity. A total of four distinct chemical groupings could be defined, largely by variations in the measured concentrations of the elements Lanthanum, Sodium, Tantalum, Thorium and Chromium. The bulk (14) of the vessels analysed fell within a single chemical grouping, suggesting that a single clay had been used for their manufacture. Outlying this were three small, chemically distinct groupings. Of these, two comprised single sherds (corresponding to a flat rimmed carinated bowl and an everted rim jar) and one comprised two sherds (both Type 25 belgic platters. [*Editorial note*: not all these vessels can be identified. The 'Belgic platters' of Type 25 (referring to Hird's original type series) are the North-African type platters 7.2.3.65–78]). These outlying groups were chemically distinct from the principal group itself and from each other. In archaeological terms, the result suggests that a different source clay was used in the production of these groups relative to the principal chemical grouping. The chemical data is presented in table 7.12.

Petrologically, the analysed sherd samples proved to be very homogenous. Three clear fabrics could be identified within the sample of 'oxidised ware' vessels.

Fabric 1: abundant fine sand-silt

An orange-brown birefringent clay matrix containing a sub-rounded to angular moderately sorted quartz fraction. This comprised occasional coarse, common medium and abundant fine grade sands along with abundant silt. The matrix also contains sub-angular flint fragments (0.1–0.2 typ. 0.125mm), sub-rounded to sub-angular feldspars (0.05–0.2mm) including sub-rounded fragments of microcline (0.175–0.25mm), rounded to sub-angular fragments of sandstone (0.37–1.5mm) and rounded to sub-angular pyroxene (0.175–0.3 typ. 0.25mm). All of the above inclusions are at the occasional level of occurrence.

Also present in the matrix are occasional rounded to sub-angular pellets of clay. Sample BD002 contains an example with basic laval inclusions and clear shape distortion due to squeezing. Sparse sub-rounded to sub-angular poorly sorted opaque grains (0.125–0.6mm) and very rare flakes of mica (0.05–0.3mm) complete the suite of mineral inclusions present.

Fabric 2: less silty

An orange-brown birefringent clay matrix with a sub-rounded to angular, moderately sorted quartz fraction comprising rare to occasional coarse sand, common medium grade sand, abundant fine grade sand and common silt. It is interesting to note that in some cases the coarser quartz grains reached 3mm in diameter which places them in the 'granule' size category. It is also worth noting that some metamorphic quartz grains are present at the very rare level of occurrence, which are strongly indicative of glacial drift.

The matrix also contains occasional sub-rounded to sub-angular feldspars (0.075–0.25mm), sparse rounded to sub-angular poorly sorted opaque grains (0.05–1.0mm) and occasional flakes of mica (0.05–0.5mm). The following inclusions are present at the very rare to occasional level of occurrence: sub-rounded to sub-angular microcline (0.14–0.2mm) and sub-rounded to angular grains of flint (0.175–0.8 typ. 0.3mm). Also present in the matrix were rare to occasional, angular fragments of igneous rock (0.5–2.0mm), angular fragments of agate (typ. 0.75mm), sub-rounded fragments of amphibole (0.125–0.2mm), sub-rounded to sub-angular grains of chert (0.25–0.75 typ. 0.37mm) and angular fragments of schist (typ. 0.625mm).

Fabric 3: less quartz

An orange-brown birefringent clay matrix containing a sub-rounded to sub-angular, poorly sorted quartz fraction. This comprised common medium and fine grade sands and common silt. Also present in the fabric at the occasional frequency level were rounded to sub-angular pellets of clay (0.5–1.0mm), sub-angular to angular fragments of sandstone (0.675–1.8mm) and sub-angular to angular feldspars (0.125–0.25mm) including sub-rounded to sub-angular grains of microcline (typ. 0.25mm). Sparse sub-rounded opaque grains (0.1–1.5mm) and sparse flakes

Table 7.11
Combined analytical results of local oxidised ware samples

Sherd code	*Chemical group*	*Petrological group*	*GSD shape*	*Textural group*	*Cat No*
BD001	Main ware	Fabric 1	Silt skewed	Main ware	No 62
BD002	Main ware	Fabric 1	Silt skewed	Main ware	No 63
BD003	Main ware	Fabric 1	Silt skewed	Main ware	No 64
BD004	Main ware	Fabric 2	Silt skewed	Outlier	No 55
BD005	Main ware	Fabric 2	Silt skewed	Main ware	
BD006	Outlier 1	Fabric 2	Silt skewed	Main ware	No 40
BD007	Main ware	Fabric 2	Silt skewed	Main ware	No 36
BD010	Main ware	Fabric 2	Silt skewed	Outlier	No 8
BD012	Outlier 2	Fabric 3	Tempered	Outlier	No 19
BD013	Main ware	Fabric 2	Silt skewed	Main ware	No 18
BD014	Main ware	Fabric 3	Silt skewed	Main ware	
BD015	Main ware	Fabric 2	Silt skewed	Main ware	
BD016	Main ware	Fabric 2	Silt skewed	Main ware	
BD017	Outlier 3	Fabric 2	Silt skewed	Main ware	No 77
BD018	Main ware	Fabric 2	Silt skewed	Outlier	
BD019	Main ware	Fabric 2	Silt skewed	Main ware	No 72
BD020	Outlier 3	Fabric 2	Silt skewed	Main ware	

of mica (0.025–0.125mm) complete the suite of observed mineral inclusions.

The fabric groupings are defined principally by changes in the quartz fraction, quartz being the most abundant mineral inclusion present in the sherd samples. This reliance on quartz is a direct result of the paucity of more diagnostic or exotic mineral inclusions present within the samples analysed. Grains of igneous rock, shale and sandstone do appear with the inclusion suite but only rarely. The groupings are differentiated largely on the basis of a progressive decrease in the silt grade fraction from group 1 through to group 3 and a drop in the same grade quartz between fabrics 2 and 3. In terms of provenance, it is clear that all of the fabrics could be derived from a single source clay outcrop.

Turning to the small number of outlying samples, with the exception of one sherd (no 12), the samples identified as chemically unique fell comfortably within the bulk petrological fabric. This apparent contradiction can be interpreted in two ways. The phenomenon could reflect a high degree of mineralogical homogeneity between chemically distinctive clay outcrops spread across the Midland Valley of Scotland. The second interpretation is based upon the notion of chemical inhomogeneity between different portions of a single clay outcrop, with the exploitation of different areas of the outcrop during the production life of the workshop leading to variations in the chemical characteristics of the produced fabric. As none of the defined chemical outliers are petrologically or stylistically unique, all are in forms present within the bulk ware group, the latter interpretation seems most likely. The single aberrant sherd is more problematic as it is both chemically unique and petrologically distinctive, falling in fabric group 3. Taken together with the results suggest that this sherd is not a member of the defined oxidised ware grouping.

The typological information for each of the sampled vessels is presented in table 7.13. Study of this reveals that petrological fabric 1 is composed entirely of type 27, large flanged bowls [*Editorial note*: type 27 in Hird's original type series corresponds to 7.2.3.62–4]. This introduces the possibility of clear links between the form and function of the vessels and manufacturing technology. Potters often employed different technologies to manufacture different types of vessel. For example, cooking pot fabrics should ideally exhibit good thermal shock resistance and water containers a low seepage rate, both factors that can be influenced by the employment of a specific manufacturing technology. To investigate these factors with respect to the oxidised ware vessels a full textural analysis was undertaken of the principal mineral inclusion, quartz. In practice, the textural

Table 7.12
Chemical data relating to oxidised wares and clay daub

Sample	*Co*	*Rb*	*Eu*	*Hf*	*Cr*	*Fe*	*Cs*	*Tb*	*Ta*	*Ce*	*Pa*	*Np*	*Yb*	*Na*	*La*	*Sm*
BD016	1.09	4.77	0.11	0.53	8.15	3754.7	0.24	0.05	0.07	4.32	0.64	0.23	0.14	426.86	2.37	0.34
BD016	1.22	3.44	0.12	0.58	9.02	4816.57	0.10	0.06	0.09	4.67	0.69	0.18	0.16	428.17	2.42	0.36
BD016	1.16	2.39	0.11	0.53	8.96	4042.56	0.10	0.06	0.09	4.42	0.67	0.13	0.17	354.14	2.52	0.36
BD018	0.88	4.97	0.11	0.64	8.05	4104.08	0.29	0.05	0.10	3.66	0.66	0.23	0.16	460.95	2.30	0.35
BD018	0.94	4.44	0.13	0.83	13.64	4469.99	0.34	0.06	0.12	5.27	0.81	0.27	0.21	606.80	2.29	0.40
BD018	0.95	3.80	0.12	0.69	9.17	4600.04	0.38	0.05	0.11	3.28	0.67	0.16	0.18	393.60	2.16	0.40
BD001	1.19	3.44	0.10	0.66	7.60	3477.71	0.19	0.06	0.07	4.19	0.61	0.21	0.17	334.63	2.41	0.33
BD001	1.24	4.06	0.10	0.61	7.58	3345.35	0.24	0.05	0.06	3.04	0.60	0.17	0.15	325.45	2.46	0.35
BD002	1.20	3.09	0.10	0.54	7.20	3420.08	0.24	0.05	0.06	4.00	0.56	0.17	0.15	322.30	2.18	0.32
BD002	1.42	2.16	0.11	0.70	8.68	3674.10	0.20	0.06	0.07	4.55	0.64	0.20	0.14	325.88	2.58	0.37
BD003	1.19	2.69	0.11	0.52	8.74	4350.08	0.12	0.05	0.07	4.54	0.70	0.21	0.19	303.90	2.63	0.38
BD003	1.27	3.07	0.13	0.57	9.55	4025.85	0.19	0.06	0.08	4.94	0.74	0.24	0.20	347.59	2.86	0.44
BD004	1.15	3.99	0.11	0.66	9.18	4641.01	0.15	0.06	0.09	5.62	0.81	0.21	0.19	380.56	2.33	0.36
BD004	1.25	2.36	0.13	0.58	8.48	5611.22	0.17	0.07	0.07	4.40	0.75	0.21	0.20	352.16	2.51	0.41
BD005	1.06	2.64	0.11	0.68	9.80	4892.60	0.23	0.06	0.08	4.03	0.81	0.23	0.17	384.97	2.36	0.36
BD005	1.16	2.26	0.11	0.62	9.05	5234.87	0.15	0.06	0.08	4.36	0.72	0.20	0.19	347.51	2.56	0.37
BD006	1.32	2.99	0.12	0.90	9.52	3625.98	0.11	0.06	0.08	3.31	0.65	0.20	0.19	526.81	2.56	0.35
BD006	1.20	2.16	0.11	0.72	8.93	3579.70	0.25	0.06	0.08	3.23	0.66	0.23	0.17	578.11	2.67	0.37
BD007	1.31	3.25	0.11	0.71	10.65	4745.98	0.12	0.06	0.09	4.88	0.77	0.12	0.18	305.52	2.90	0.37
BD010	1.27	2.13	0.11	0.51	7.70	4235.00	0.12	0.05	0.08	4.12	0.58	0.23	0.15	248.43	2.35	0.34
BD010	1.40	1.96	0.10	0.52	7.97	4504.67	0.18	0.06	0.07	4.36	0.64	0.18	0.15	279.1	2.50	0.35
BD012	1.06	2.26	0.10	0.64	7.45	4294.73	0.27	0.06	0.16	5.67	0.91	0.28	0.21	103.54	2.95	0.34
BD012	0.85	2.00	0.12	0.72	7.72	4170.51	0.23	0.05	0.17	5.24	0.96	0.35	0.20	102.75	2.77	0.35
BD013	1.00	2.94	0.11	0.56	8.43	2743.79	0.14	0.05	0.08	3.89	0.58	0.20	0.16	306.19	2.30	0.33
BD013	1.08	4.00	0.10	0.53	7.53	3109.28	0.11	0.04	0.09	4.26	0.61	0.25	0,16	328.47	2.36	0.31
BD014	1.42	5.95	0.09	0.43	7.91	3949.76	0.21	0.03	0.08	3.64	0.63	0.12	0.13	452.34	2.11	0.29
BD014	1.25	5.38	0.10	0.43	7.34	3755.83	0.18	0.04	0.07	3.89	0.58	0.09	0.15	445.44	2.21	0.31
BD015	1.4	2.96	0.11	0.55	7.22	3715.04	0.13	0.05	0.09	4,46	0.64	0.19	0.14	305.70	2.46	0.36
BD015	1.28	4.68	0.11	0.58	7.75	3414.89	0.20	0.05	0.08	4.32	0.60	0.17	0.16	347.14	2.31	0.35
BD017	0.71	4.61	0.12	0.72	9.58	4304.36	0.19	0.06	0.11	4.48	0.75	0.29	0.20	571.49	2.70	0.36
BD017	0.77	5.41	0.12	0.86	9.13	4391.39	0.16	0.05	0.10	4.54	0.81	0.28	0.20	594.05	2.77	0.36
BD019	1.17	2.69	0.11	0.51	8.89	3300.53	0.19	0.05	0.10	4.57	0.62	0.20	0.16	275.96	2.59	0.33
BD019	1.26	1.59	0.10	0.52	8.56	3616.76	0.18	0.05	0.09	4.66	0.69	0.29	0.18	296.17	2.64	0.33
BD020	1.02	3.22	0.11	0.81	9.24	3370.42	0.22	0.04	0.12	5.18	0.71	0.25	0.19	517.40	2.78	0.33
BD020	1.02	3.42	0.10	0.85	9.37	3333.26	0.22	0.06	0.11	4.70	0.71	0.25	0.18	493.78	2.81	0.34
BD007	1.32	0.46	0.10	0.65	10.45	4506.60	0.15	0.05	0.10	5.62	0.90	0.00	0.16	312.55	3.06	0.40

analysis involved the careful measurement of the maximum dimension of a random sample of 150+ quartz grains within the matrix of each of the analysed sherds. The only quartz grains excluded from measurement were the finer silt grade particles, deemed too small to be reliably and accurately measured.

The resulting measurement data was used to generate a grain size distribution for each of the sherd samples. The overall shape of the distribution is of interest as it can indicate factors such as the presence of temper – a bimodal distribution form indicating the addition of sorted quartz grains. Likewise the application of sieving and levigation techniques can result in the skewing of the distribution form. A second level of textural analysis can be furnished by breaking down the distribution into a set of frequency scores recording the number of grains falling within a series of predetermined size ranges (bins). This frequency data can then be transformed and analysed through detailed multivariate statistical techniques to enable subtle differences in the composition of the quartz fraction to be identified. These can often be related to the selection of specific clay fractions and the use by potters of specific preparation techniques (Gillings 1991). The results of the two levels of textural analysis are summarised in table 7.11.

Examining first the shape of the grain size distributions, with the exception of sherd 12, none of the oxidised ware samples showed evidence for the bimodal distribution form indicative of tempering (Rye 1981), yet all showed a distribution skewed heavily towards the fine silt fraction. This silt bias suggests either the use of clay preparation techniques to remove the bulk of the coarser quartz fraction or the selection and exploitation of a very silty source clay. The absence of temper indicators suggest that coarser grade quartz such as sand was not deliberately added to the oxidised ware fabric. The only sample to show the characteristic distribution form indicative of tempering was sherd 12, once again stressing its uniqueness with respect to the ware group as a whole.

The detailed statistical analysis of the size frequency data identified a group of four samples as texturally distinctive. This small group included sherd 12, once again reinforcing its interpretation as an outlier to the main ware grouping. Looking at the remaining three samples in the texturally modified group with respect to the form-functional information it is clear that there is no correlation; none of the typological groups show any evidence for consistent grain size modification, even the thick walled type 27 vessels. Combining this result with the lack of evidence for tempering, the observed outliers can best be interpreted as the result of between batch variations; there is certainly no evidence to suggest any specialised production linked to form or function.

This result is surprising. Looking back to the large flanged bowls (type 27) these thick walled vessels share many features in common with mortaria forms and as with mortaria some degree of specialisation would be expected in their production. The fact that they form a discrete petrological grouping suggests some degree of uniqueness with respect to the bulk of the ware group. Looking in detail at the petrological data, the separation of the vessels from the main ware group was on the basis of an increase in the finer silt fraction. As this quartz fraction was excluded from the detailed textural analysis on the grounds of measurement inconsistency, it is not surprising that it failed to isolate them. In technological terms the finer silt fraction is that least affected by potter interaction; it is too fine to be removed by preparation techniques or to be added as a discrete temper. As a result, the increased silt content in the type 27 vessels is best viewed as a between batch variation rather than reflecting a conscious decision on the part of the potter.

Table 7.13
Bearsden Oxydised ware – Sampled sherd information

Site code	*Sample code*	*Form*	*Description*
NK74CY	BD001	T.27	Large flanged bowl
NK75CU	BD002	T.27	Large flanged bowl
NK77BJ	BD003	T.27	Large flanged bowl
NK77CF	BD004	T.28	Bead rimmed bowl
NK77CJ	BD005	T.28	Bead rimmed bowl
NK77EZ	BD006	T.26	Flat rimmed carinated bowl
NK77BZ	BD007	T.26	Flat rimmed carinated bowl
NK75BH	BD009	DAUB	Structural debris
NK75CQ	BD010	T.24	Everted rim beaker
NK75FN	BD011	DAUB	Structural debris
NK73BT	BD012	T.23	Everted rim jar
NK75CQ	BD013	T.23	Everted rim jar
NK75CQ	BD014	T.23	Everted rim jar
NK76DC	BD015	T.23	Everted rim jar
NK76EB	BD016	T.25	Belgic platter
NK77AP	BD017	T.25	Belgic platter
NK76AD	BD018	T.25	Belgic platter
NK73BS	BD019	T.25	Belgic platter
NK77BU	BD020	T.25	Belgic platter

In summary, the Bearsden oxidised ware can be regarded as a discrete ceramic entity on the basis of the analyses undertaken. In technological terms, potters engaged in the production of a wide range of vessel types have two basic options:

1. specialised production: they can use different and optimum materials and firing conditions for each of the vessel types produced, such as the addition of large inclusions for the production of thick walled vessels to prevent them collapsing under their own weight;
2. undifferentiated production: they can use a single, generic fabric and apply it unmodified to all of the vessel types

within the production suite, thus compromising any of the advantages afforded by more time and labour intensive specialised production.

In the case of the oxidised ware the latter production rationale appears to have been adopted. We have a chemically and petrologically homogeneous ware group showing no evidence for any form-function related textural sub-structure. Even when faced with specialist forms there appears to be no appreciable modification to the basic fabric mix. All of the observed differences can be interpreted as resulting from natural variation.

Bearsden and other forts on the Antonine Wall

The oxidised ware samples from Bearsden were compared chemically and petrologically to possible 'local' material from the sites at Bar Hill, Cramond, Croy Hill, Duntocher and Inveresk in order to determine whether the Bearsden group was unique to that site. The same analytical methodology was used in the inter-site analysis as the intra-site; however, it should be noted that the precision of the comparative chemical analysis was greatly reduced. This was a result of the removal from the suite of potential discriminating elements of those that had proved unreliable or inhomogeneous during the respective intra-site studies. This had the effect of reducing the number of potential discriminators present in the analysis.

In chemical terms, the Bearsden oxidised ware and the Bar Hill local material proved to be indistinguishable, though chemically distinct from the remaining 'local' groupings. This suggests that both of the wares were produced from the same source. In petrological terms, the general lack of diagnostic minerals within all of the fabric groups analysed and resultant reliance upon the quartz fraction resulted in considerable overlap between site groupings. Only the Croy Hill material, with characteristic shale inclusions, and the Bar Hill sherds, with unique clay pellet temper, could be identified as petrologically unique. Combining these results it is clear that the oxidised ware/Bar Hill chemical overlap should not be interpreted as production at the same kiln or workshop. The wares were petrologically and stylistically distinct enough to suggest very different potting traditions. What the result does illustrate is the homogeneous nature of much of the clay that appears to have been exploited across the Midland Valley zone with respect to the reduced suite of potential chemical indicators.

In conclusion, although displaying a degree of chemical overlap with the Bar Hill material, the oxidised ware vessels are best regarded as a phenomenon restricted to the fort of Bearsden itself.

Was the oxidised ware produced within the vicinity of Bearsden?

In the determination of ceramic provenance, four parameters are of crucial importance:

1. Form-fabric: where a group of ceramic material is interpreted as local on the basis of a distinctive set of forms or fabric, or potting idiosyncrasies. The main source indicator is that the vessels sharing the attributes are confined within the consumption zone of a single site. This constitutes the most speculative parameter.
2. Kiln structure: the presence of structural indicators such as kilns, clay preparation and storage areas and finds related to the structure such as kiln furniture.
3. Waster material: the presence of deformed kiln seconds unlikely to have travelled far from the production source.
4. Petrological analysis: where the geology of the non-plastic mineral inclusions are compared to the known geology of the suggested production zone.

At Bearsden, identification of the oxidised ware as a local product is based solely upon parameter 1, form and fabric. The excavations have revealed no obvious kiln or related structures, nor any clear waster material. A petrological analysis undertaken by Collins revealed that the ware contained a range of rock types that, while not unique to Scotland, could be found within a 48km radius of the fort itself (7.4.2). While important, this conclusion barely moves the analysis beyond a macro-scale of source assignment. The absence of firm production indicators, such as kiln and waster material, make any attempts to assess the possibility of micro-scale production very difficult. In an attempt to overcome these limitations the decision was made to compare samples of the ware to clay outcrops in the immediate environs of the fort. The working assumption was that the basic clay chemistry and mineralogy of the pottery vessels would be closely related to that of the source clay used in their production. Hence, if local clays were used to manufacture oxidised ware, there should be close affinities between the two. The clay analysis was achieved through the comparative study of a proxy – excavated daub samples.

In the context of this study, daub has been defined as a clay fragment that had been subjected to some degree of firing, whether accidental or deliberate. One crucial criteria was that the daub artefact should not have travelled far from the site of production. This ruled out portable clay artefacts such as loom and net weights in favour of structural debris, such as oven linings. Several assumptions underlie the use of daub as an effective proxy for local clays:

- clay is unlikely to have been exported over great distances for basic structural use. The clay source exploited for the production of daub can be expected to fall close to the consumption site;
- the clay used to manufacture the daub will be chemically and petrologically characteristic of the immediate exploited clay outcrops, although difference resulting from preparation processes are to be expected;
- any excavated daub fragments will have experienced the same intra-site depositional factors as the excavated potsherds.

Samples were taken from two groups of daub fragments and these were compared petrologically and chemically to the oxidised ware samples. Petrologically the range of minerals present within the daub samples overlapped considerably with the suite recorded in the oxidised pottery. The main difference between the

Table 7.14
Pottery and daub: Np Vs Hf

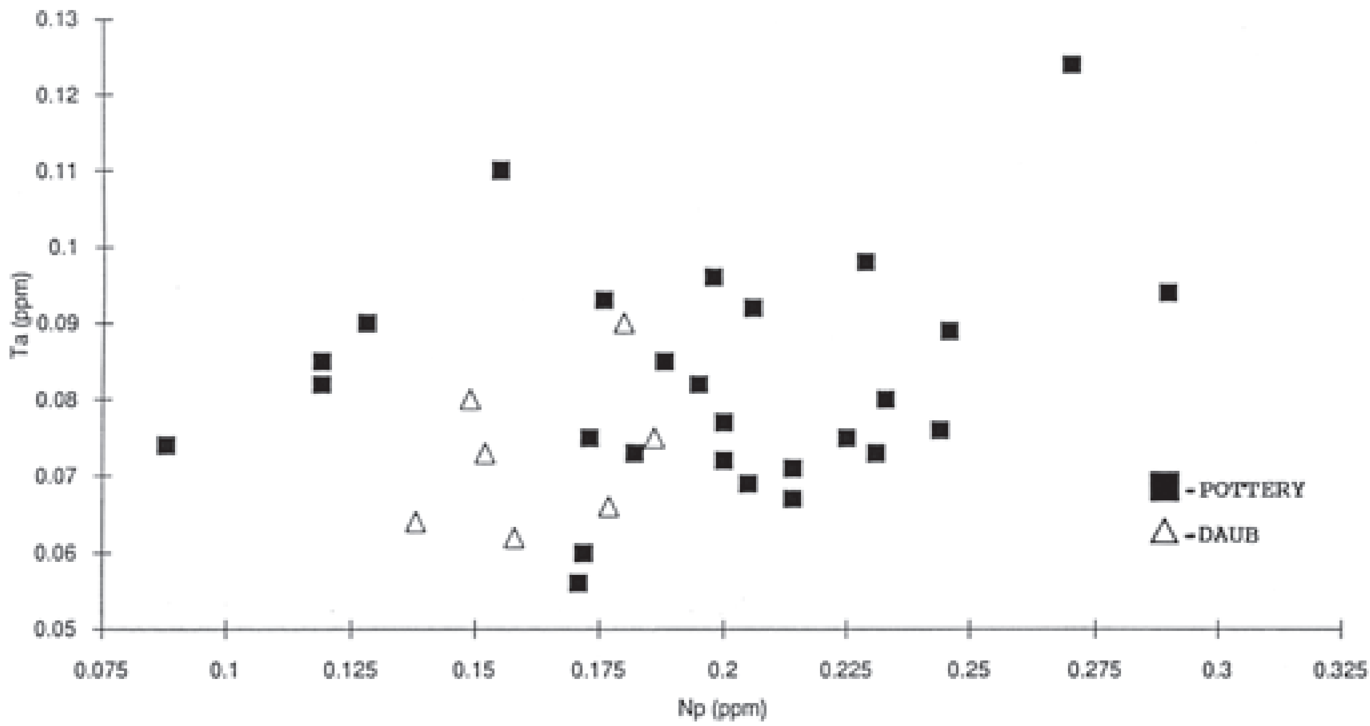
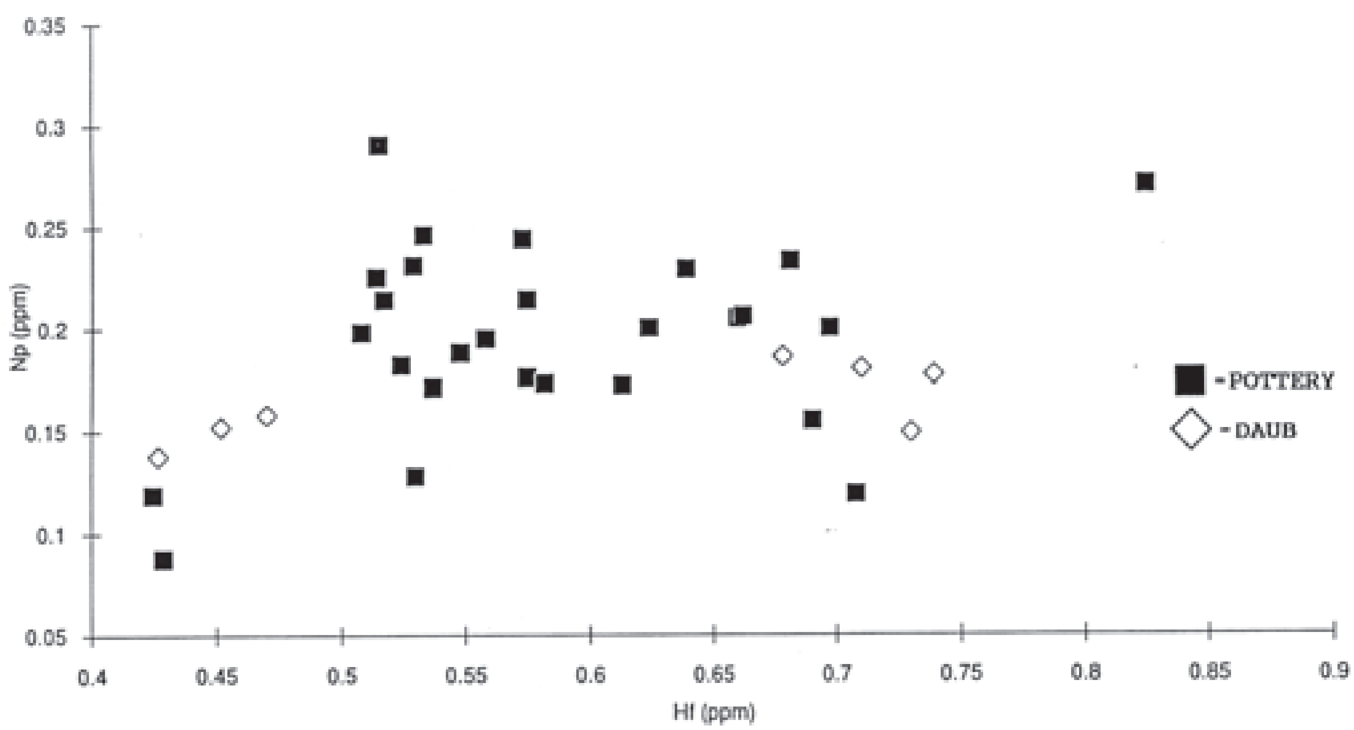


Table 7.15
Pottery and daub: Ta vs Np



daub and pottery fabrics lay with an increase within the daub of very coarse rock and shale fragments (up to 5mm). These coarse fragments represent a desirable feature in the manufacture and use of daub. The difference is best viewed as a preparation effect, with coarse material either added to the daub or removed prior to potting. Chemically, the daub samples were plotted against the oxidised ware samples using the elements Neptunium, Tantalum and Hafnium. Preparatory statistical analyses identified these as the strongest potential discriminating elements and thus those most likely to reveal any chemical differences. The results are presented in tables 7.14 and 7.15 where the daub samples can be seen to fall comfortably within the general elemental spread of the defined ware group.

In conclusion, chemical and petrological results suggest very close affinities between the pottery and daub samples, which implies the exploitation of a closely related clay source. Taking the form-fabric, petrological and analytical results together, the most straightforward interpretation is that the oxidised ware was manufactured within Scotland, in the immediate vicinity of the fort itself.

Conclusion

The analyses have confirmed the identification of the Bearsden oxidised ware as a discrete ceramic entity. In terms of production and provenance, the ware appears to have been manufactured using a largely undifferentiated and unspecialised technology in the immediate locality of the fort.

7.5 'NATIVE' POT

EUAN W MACKIE

At first glance the sherd looks like Vaul ware, a Hebridean Iron Age vase decorated with incised lines (illus 7.23). Certainly the Iron Age pottery which I have seen from the central mainland in first and second century context is nothing like it, being all the thick, plain, gritty Dunagoil ware. The sherd is hard-fired, fairly smooth-surfaced, light buff-brown ware with plenty of sand tempering. The inner surface is the same colour but the outer is mottled with grey. The piece seems to be very close to the turned-out rim. The decoration is of horizontal incised lines, set close together and forming a band up to 12mm wide. Below that there is a gap of 22–33mm with a similar horizontal band containing at least five neatly grooved lines below that. It is noticeable that the upper band of lines is less well done than the lower, having several overlaps and crossings, but there are about seven main lines. Between these two horizontal bands are diagonal strokes, running from top left to bottom right, each consisting of three or four slightly curved incised lines (convex side uppermost). Each set is up to 7mm wide with gaps of 9–10mm between the sets.

One odd thing about the horizontal bands of lines is that they look distinctly regular as if they had been done on the pot turning on a wheel or on some similar device. The inner surface of the sherd shows horizontal striations but not as regular or as even as on wheel made sherds. Nevertheless the grooves are very even, particularly the lower band.

I have seen nothing similar in the Hebridean or Orkney Iron Age wares – both of which have much incised pottery.

NK73CO; annexe, south-west of the bath-house.

Illustration 7.23
'Native' pot.

7.6 LAMP

DONALD BAILEY

A copy of a bronze type common throughout the empire from before 79 to the mid-second century (cf Walters 1914: types 84, 85 and 92). As this example is close to the bronze originals it is unlikely to have been made locally. There is a similar example at Balmuildy (Miller 1922: 94).

(surviving fragments): 90mm; (restored): 113mm.

NK77BW; building 3, the fill of the middle post-hole on the east side of the officer's quarters.

7.7 AMPHORAE

ANDREW P FITZPATRICK

7.7.1 Introduction

Some 2,129 sherds of amphorae weighing 150kg 505g were excavated. Joining sherds have been counted as one, as have the often abundant tiny flakes from sherds of Dressel 20 that have laminated and fragmented. For full fabric descriptions and petrological analyses the reader is referred to the standard work of Peacock and Williams (1986), and the National Roman Fabric Reference Collection (Tomber & Dore 1998).

The Antonine activity is treated here as a single phase and, because of this, unstratified material has been included in the calculations (table 7.16). The assemblage is dominated by southern Spanish olive oil amphorae, with other types and commodities forming less than 0.5% by sherd count and 2.5% by weight.

7.7.2 Amphorae types

Amphorae for olive oil

Dressel 20 (Peacock & Williams Class 25/Baetican amphorae: BAT AM 1–2).

This olive oil amphora from Baetica in southern Spain dominates the assemblage. On the basis of Minimum Number of Vessels (MNV), calculated using a combination of rims and other diagnostic features, not less than 19 vessels are present. Given

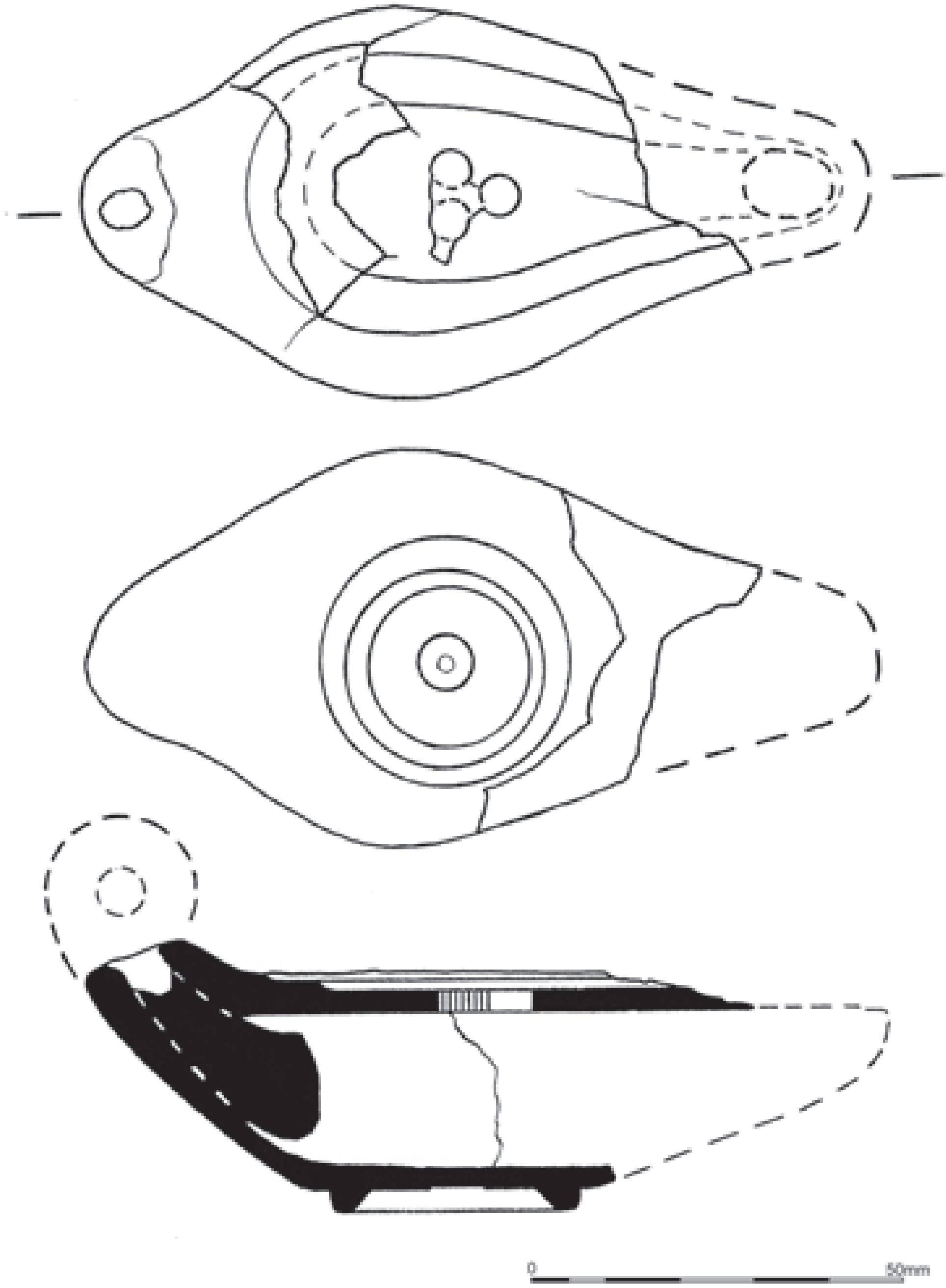


Illustration 7.24
The lamp.

Table 7.16
Quantification of amphorae fabrics and types present in the assemblage

Type	*Origin*	*Commodity*	*Weight (g)*	*No sherds*	*MNV*
Dressel 20	Southern Spain	Olive oil	146 735	2,036	19
Gauloise 4?	Southern France	Wine	1190	26	1
Beltrán II?	Southern Spain	Fish-based products	2460	64	3
Unidentified	–	–	120	3	1
Total			**150 505**	**2,129**	**24**

the mass of Dressel 20 sherds it is inevitably easier to identify different vessels in the other amphorae types present on the basis of their fabrics. Dressel 20 are larger and heavier than most other types of amphorae, but even allowing for this, the weight and number of sherds from it, which comprise *c* 97% and 99% of the assemblage respectively, seem likely to be more accurate indices of its importance than the MNV based on diagnostic sherds and fabrics. Each Dressel 20 could have contained up to about 70 litres of olive oil (Sealey 1985: 73).

None of the walls of the sherds were so thin that the presence of the thinner-walled London 555, which is also from Baetica, could be suggested (Werff 1984: 379–81; Sealey & Tyers 1989; Fitzpatrick 1989: 26). As with other Antonine assemblages in Roman Scotland, this is probably due to the type having passed out of export and/or production by this time.

The Dressel 20 are generally very fragmentary and despite the size of the assemblage no complete profiles, and few even of the rim and neck, were noted. Even so the diversity of rim forms in such a closely dated collection is noteworthy (illus 7.26.1–10). This variability is typical of other sites of Antonine date in Roman Scotland, and even of a number amphorae throughout the Roman Empire that are dated by painted inscriptions to the year 149 (Funari 1987). However, on the basis of the stratified sequence from Augst (Martin-Kilcher 1983, fig 2–3; reproduced in Peacock & Williams 1986: fig 65–6), it is likely that Dressel 20 with smaller and squarer rims and more pronounced mouldings on the upper surface are likely to be later in date (illus 7.26.8–10).

Table 7.17
Quantification of commodities represented by the amphorae

Type	*MNV*	*Capacity in litres*	*Commodities represented in litres*
Dressel 20	19	70	1,330
Gauloise 4?	1	31	31
Beltrán II?	3	14	42
Unidentified	1		

Stamps

Four stamps were identified:

1–2. DOMS. There are two stamps, one on a right handle, the other on a left handle (illus 7.26.12 and 13). Although both stamps and the handles on which they occur are similar, their fabrics suggest that they are from different vessels. The stamps, perhaps to be expanded as DOM(itii)Sy( ), were used at Alcolea del Rio during the mid-second century. *Tituli picti* on amphorae with this stamp from Monte Testaccio in Rome are dated to 146, 154 and 161 (Callender 1965, 122–3). Callender (1965), no 552, *CIL* x V, 2800, Remesal (1986), no 188.

NK73AB; annexe, south of changing room of bath-house, topsoil; NK73AJ; annexe, south-west of bath-house, topsoil.

3. SNR on a vessel with the graffiti VAG inscribed *post cocturam* (k below) (illus 7.26.14). This stamp, S N R(ufi) was used at La Catria during the mid-second century. *Tituli picti* on amphorae with this stamp from Monte Testaccio are dated to 149 and 154 (Callender 1965: 250–1). Callender (1965), no 1641; *CIL* x V, 3045; Remesal (1986), no 185.

NK74 CK; gulley north of building 1.

4. Illegible stamp, just possibly QSS or QSC.

NK73; annexe, unstratified.

The stamp DOMS from Alcolea del Rio is common in Roman Scotland having been found at seven or eight sites; Ardoch, Cadder (twice), Camelon, Mumrills, Newstead, and Rough Castle, perhaps Birrens (unprovenanced in Dumfries Museum) (Fitzpatrick 1992, 181), as well as at a number of forts in northern England. This may suggest a standardised pattern of military supply. The stamp SNR has also been found at Cadder (twice). La Catria was one of the dominant suppliers to the German *limes* (Remesal 1986).

Graffiti

Eleven graffiti inscribed *post cocturum*, and one inscribed *ante cocturam* were recorded on Dressel 20.

GRAFFITI CUT AFTER FIRING

Eleven graffiti inscribed *post cocturum* were recorded; nine on rims, one on a handle and one on a body sherd (illus 7.26.1–11). Most of the graffiti are numeric but there are three certain or possible letters or words. Although the numeric graffiti could refer to individual military units it is likely that they indicate the weight of the contents of the vessel in *modii* and *sextarii* (Werff 1989a). If graffiti (d) and (e) are x I rather than Ix , they may refer to *sextarii* alone. The numbers seem unlikely to refer, for example, to the order in which the vessels were placed in store (*RIB* II 6, 34). As the original contents of the vessels (olive oil) were well known and their weights both empty and full were clearly prescribed, often being stated in the painted inscriptions on the vessels, this combination of numbers points to the reuse of Dressel 20 as storage vessels. The letters and words may indicate the contents of the reused vessel (Werff 1989a: 371–2), or the ownership of it (Werff 1989b). This reuse of the robust Dressel 20 is particularly important when considering the composition of the assemblage and its interpretation as a source of foodstuffs. It is likely that Dressel 20 may be disproportionally represented, exaggerating their dominance in the assemblage still further.

GRAFFITI CUT BEFORE FIRING

A single shoulder sherd (not seen) found unstratified between the east rampart of the fort and the bath-house was inscribed in cursive writing *ante cocturam* [...]0 (or V)RETAR[.]SEC. | [...]FE.IG (*RIB* II. 2. 2493, 69) (illus 7.26.16). This is part of an inscription which starts with a consular date in the first line, probably including the *praenomen* and *nomen*, followed by a signature, which could occupy up to three lines (Rodriguez Almeida 1981: 123–5, fig 11, 5, 9, and pers comm). The purpose of these graffiti is likely to have been to indicate the date of the vessel and presumably the age of its contents, which were best-consumed young. This information was included only infrequently in the much better known delta section of the inscriptions painted on Dressel 20 amphorae at the time of their loading for export from Baetica.

Three other examples of these inscriptions are known from Roman Scotland; at Birrens (*RIB* 2493.4), Mumrills (*pace RIB* 2493.18) and Strageath (*RIB* 2493.65), all of which are certainly or probably of Antonine date.

GRAFFITI ON DRESSEL 20

(a) I on top of rim (illus 7.26.2).
NK73AJ; annexe, south-west of bath-house, topsoil.

(b) III on top of rim (illus 7.26.1).
NK74Au ; building 1, topsoil.

(c) IV inside the rim (illus 7.26.10).
NK76AZ; building 4, topsoil.

(d) Ix on underside of rim (illus 7.26. 4).
NK80 Du ; destruction deposit to north of warm rooms of bath-house.

(e) Ix or x I on handle (illus 7.26.11).
NK73; annexe, topsoil.

(f) x below rim (illus 7.26.8).
NK77DO; overlying road to east of building 9.

(g) VV on top of rim (illus 7.26.6).
NK75CF; burnt material at east end of building 6.

(h) VI on top of rim (illus 7.26.3).
NK75AB; building 7, topsoil.

(i) AR on top of rim (illus 7.26.9).
NK73PO; annexe, south-west of bath-house, topsoil.

(j) […]VMMID[...], perhaps Ummid[us] (*RIB* II. 2. 2494.212) (illus 7.26.15).
NK73AB; annexe, south-west of bath-house, topsoil.

(k) VAG[...] on the shoulder of vessel stamped SNR (stamp no 3 above) (*RIB* II. 2. 2494.180) (illus 7.26.14).
NK74CK; gulley to north of building 1.

Amphorae for wine

Gauloise 4? (Peacock & Williams Class 27/Gaulish: GAL AM 1).

These flat-bottomed amphorae contained wine from southern France (Laubenheimer 1985; Laubenheimer 1989). The Gauloise 4 contained about 31 litres (Sealey 1985: 114–15). No typologically diagnostic sherds were found. The vessel(s) present are identified as Gauloise 4 because it is the southern French amphorae found most frequently in Roman Scotland (Fitzpatrick 1992: 181–2, fig 5).

Amphorae for fish-based commodities

Beltrán II? (Peacock & Williams Class 18–19/Cadiz CAD AM).

This type contained a variety of fish-based commodities from southern Spain. Its capacity has been measured as c 15 litres by Sealey (1985, 81), although this seems very small. Apart from a single undiagnostic handle fragment (NK73DI; below cobbles in annexe, south-west of the bath-house; NK73DT; rubble overlying bath-house), no featured sherds were found, but the vessels represented are identified as Beltrán II as it was the dominant amphorae type from the southern shores of Spain in the second century (Peacock & Williams 1986: 122–5; Hahn 1988). On the basis of variations in their fabric at least three vessels appear to be present.

Commodity unknown

Two sherds, probably from the same vessel are unidentified. They are from a thin-walled vessel with clear signs of turning, in a hard, smooth, light reddish-brown (2.5y R 6/4) matrix. quartz and feldspar inclusions are present but the surface is vesiculated. NK74AI and AF; NK75BA; area of building 6, eastern end, topsoil.

7.7.3 Composition of the assemblage

From the evidence of the graffiti on the Dressel 20 considered above, it seems clear that many vessels were reused to store other commodities once they had been emptied of olive oil. Handles

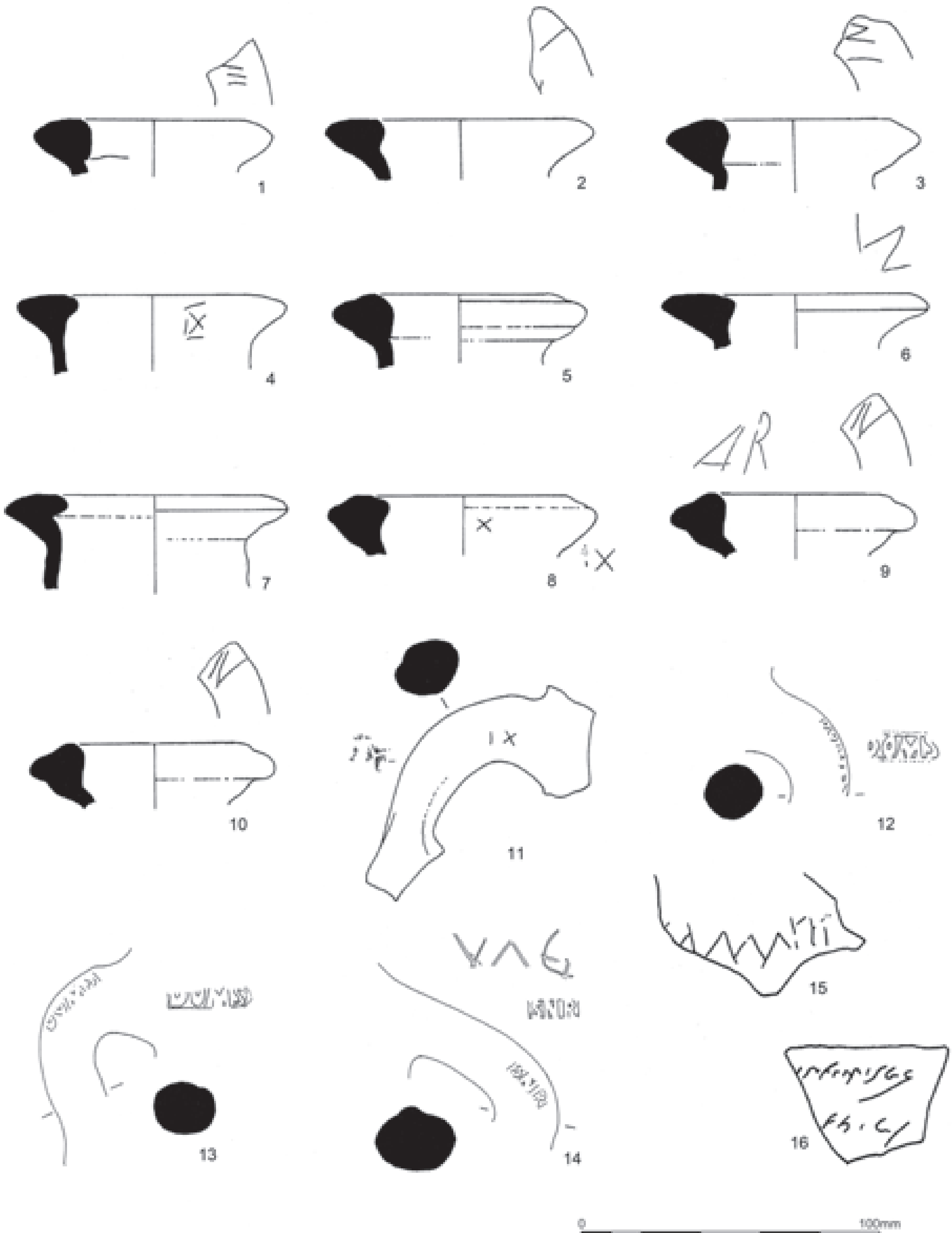


Illustration 7.25
Amphorae 1–16.

Table 7.18
Pottery (excluding amphorae and samian) shown as percentages

	Weight (%)	*Sherds (%)*	*EVEs (%)*
Mortaria			
Scotland (excl. Sarrius)	8.07	2.67	3.24
Sarrius	16.86	8.79	8.36
Mancetter-Hartshill	4.81	0.75	2.11
Colchester	1.15	0.44	0.56
Verulamium	1.14	0.36	0.29
Fine wares			
Cologne *(KOL CC)*	0.06	0.26	0.61
Colchester *(COL CC)*	0.05	0.08	0.21
Upchurch *(UPC FR)*	0.34	1.19	0.14
Coarse wares			
Local oxidised (LOC OX)	18.59	25.47	18.23
Local reduced (LOC RE)	10.07	11.18	11.60
Antonine Wall	0.21	0.34	0.63
Balmuildy oxidised	0.31	0.39	0.38
Severn Valley *(SVW OX 2)*	5.33	3.84	2.15
BB1 *(SED BB1, SOW BB1)*	16.99	22.62	24.51
BB2 *(BB 2)*	12.82	17.72	17.32
East Anglian?	0.31	0.21	0.38
Nar Valley	0.04	0.05	0.12
Verulamium? *(VER WH)*	0.11	0.39	0
Calcite-gritted	0.02	0.03	0
Non-local greys	0.45	0.81	0.68
Import?	0.09	0.13	0
Unidentified	2.19	2.33	8.45
Totals	60.451kg	3,855	10461%

Note: North Gaulish coarse ware is not included in this table as the vessel was not available for quantification.

from one (NK73DR, bath-house, fill of cold bath) and possibly another two vessels (NK73CC; annexe, south-west of the bath-house, topsoil; NK74CM; in wattle and daub fill of gulley north of building 1) have also been sawn off, perhaps to enable reuse. At least one hearth (NK73 CI; building 3), and possibly a second (NK76DW; annexe, south-west of the bath-house, topsoil), reused Dressel 20 for their bases. Numerous other uses for amphorae are possible (Callender 1965: 23–36), but the large and robust Dressel 20 was clearly particularly favoured so that its importance in the Bearsden assemblage is likely to be exaggerated still further.

Even allowing for this reuse, assessing the dominance of Dressel 20 amphorae solely in terms of diet and cuisine is not straightforward (table 7.17). A consideration of the dietary importance of olive oil at the legionary fortress of Nijmegen suggests that it was a luxury rather than a staple part of the diet (Werff 1984: 371–6). Allowing a garrison of, say, 100 men at Bearsden between 142–58, and making the (improbable) assumption that all the amphorae used and reused in antiquity are represented in the excavated assemblage, this amounts to only approximately one litre of oil *per capita*. The cuisine and diets of the legionaries garrisoned at Nijmegen may also have been very different from the auxiliaries at Bearsden. These difficulties in interpretation are increased by the possibilities that, as many of the amphorae from Bearsden come from the annexe, it is possible that they indicate the storage and/or transhipment or amphorae there, or uses associated with the bath-house.

This dominance of the Dressel 20 olive oil amphora is, however, typical of Roman Britain as a whole (Williams and Peacock 1983: 268) and it was clearly the most important foodstuff imported in amphorae. The presence of very much smaller quantities of wine from southern France and fish-based products from the coasts of southern Spain is also characteristic of what is presently known of Roman Scotland (Fitzpatrick 1992: 181).

7.8 DISCUSSION OF POTTERY

PAUL BIDWELL AND ALEX CROOM

7.8.1 Vessel types and character of the assemblage

The amphorae have been excluded from table 7.18, as they came to the site as 'packaging' rather than kitchen or table wares, but it should be noted that they made up 72% of the pottery from the site (excluding samian) by weight and 36% by sherd count. This is a very high proportion for a second-century military site in northern Britain, as it is more usual for amphorae to make up approximately 50% of the whole assemblage by weight (for example, in both the civil settlement at Inveresk and the civil settlement at South Shields it is 49%: Dore 2004: fig 71; Bidwell & McBride 2010: 109).

Approximately 85% of all the pottery from the site by sherd count (excluding amphorae and samian) is made up of just three fabrics: locally produced wares (45%), BB1 (23%) and BB2 (18%). The BB1 industries were preferred for the supply of cooking pots, making up 44% of all the cooking pots on the site, with the local kilns and the BB2 industries providing 24% and 23% respectively. On the other hand, the local kilns provided 40% of the bowls, dishes and platters on the site, followed by BB2 (*c* 30%) and then BB1 products (*c* 25%). The local kilns and the BB1 industries also produced 66% of the drinking vessels (excluding samian cups) used on the site, with colour-coated wares making up only 17% of the total. Narrow-mouthed storage jars were mainly supplied by the Severn Valley industries (over 75%). This ware is quite well represented at the site and is also common at nearby Balmuildy, where Swan has noted it is ‘more strongly represented than on any other Antonine Wall fort’ (Swan 1999: 459).

The break-down of the pottery by vessel types shows that mortaria are about twice as common as would be expected from a military assemblage (table 7.19). Over half of the mortaria found were produced locally, and although there are no certain wasters there is a high proportion of misfired vessels, and it is likely much of the mortaria assemblage consists of redeposited kiln waste (see 7.3). One such dump comes from the intervallum area to the east of building 7, which makes up approximately one quarter of all the mortaria from the site. It consists almost entirely of products by Sarrius, often misfired, with sherds coming from a minimum of eight different vessels.A comparison with other military assemblages of roughly similar date shows that Bearsden has a very low proportion of flagons (and similar vessels such as jugs and bottles). The minimum number of flagons from the site is in the region of 14 or 15 vessels, of which over 80% had been made locally, but even so flagons apparently made up only about 5% of the output of the local kilns. It is possible they were using the much larger narrow-mouthed jars (listed under ‘storage jars’ in the tables) in place of flagons, as Bearsden has a comparatively high proportion of these, or were perhaps re-using glass prismatic bottles, which are by far the most common type of glass vessel on the site (9). It would appear they were not using cooking pots/jars as flagons, as these appear in about the proportions to be expected, but the number of bowls, dishes and platters is higher at Bearsden than elsewhere.

There is one example of an imported oil lamp from Bearsden, from the officer’s quarters in building 3 (7.6). The number of mould-made pottery lamps in Britain declined rapidly after the end of the first century, but a small number of oil lamps, imported from outside the region, are known from sites along the Wall (at least seven examples: see Eckardt 2002: 58; figs 16, 18–20, and Bar Hill: Macdonald and Park 1906: 77). The low numbers of these lamps show they had come to have restricted use in a military setting, perhaps limited to use by those soldiers from parts of the Empire where their use was more widespread, or for ritual functions. Lamps were used in temples, both to provide light and as votive offerings, as well as in commemoration rituals for the dead and as grave-goods, while the army also used them in ceremonies to honour the emperor’s birthday (Eckardt 2002: 95; 97). The context of the Bearsden lamp might suggest that the officer’s quarters of building 3 contained a small domestic shrine.

Table 7.19
Vessel types from the whole site, shown as a percentage of their EVEs (excluding samian)

Vessel type	*%*
Flagon	2.8
Beaker	3.2
Coarse ware beaker	1.8
Cooking pot	36.3
Storage jar	4.1
Bowl/dish	28.9
Platter	3.6
Basin	0.5
Casserole	0.1
Mortarium	14.9
Lid	1.7
Brazier	0.4
Costrel	0.7
Other	0.9
	10,270

Key: ‘Flagon’ includes jugs and bottles. ‘Coarse ware beakers’ are small cooking pots with a rim diameter of 100mm or less. ‘Brazier’ includes possible storage jars (cf cat no 30). ‘Other’ consists of triple vases, and one miniature vessel/crucible: a *tettina* and possible *patera* were also present, but not represented by rims

Table 7.20
Comparison of vessel types with other second-century assemblages, shown as a percentage

<table>
<tr><th>Vessel type</th><th>Bearsden</th><th>Carlisle</th><th>South Shields</th><th>Wallsend</th></tr>
<tr><td>Flagon and similar</td><td>2.8</td><td>17.1</td><td>10.4</td><td>24.1</td></tr>
<tr><td>Beaker</td><td>3.2</td><td>2.5</td><td>9.0</td><td>2.5</td></tr>
<tr><td>Coarse ware beaker</td><td>1.8</td><td rowspan="2">36.7</td><td>13.0</td><td>5.7</td></tr>
<tr><td>Cooking pot</td><td>36.3</td><td>38.1</td><td>44.2</td></tr>
<tr><td>Storage jar</td><td>4.1</td><td>1.1</td><td></td><td>0.4</td></tr>
<tr><td>Bowl/dish</td><td>28.9</td><td>15.6</td><td rowspan="2">22.4</td><td rowspan="2">16.0</td></tr>
<tr><td>Platter</td><td>3.6</td><td>0.2</td></tr>
<tr><td>Basin</td><td>0.5</td><td></td><td></td><td></td></tr>
<tr><td>Casserole</td><td>0.1</td><td></td><td></td><td></td></tr>
<tr><td>Mortarium</td><td>14.9</td><td>6.2</td><td>5.6</td><td>5.2</td></tr>
<tr><td>Lid</td><td>1.7</td><td>1.0</td><td>1.5</td><td>1.9</td></tr>
<tr><td>Other</td><td>2.0</td><td>0.9</td><td></td><td></td></tr>
<tr><td>Total EVEs</td><td>10,270</td><td>4,238</td><td>4,339</td><td>3,611</td></tr>
</table>

Key: Bearsden = excludes samian. Carlisle = Carlisle Millennium site, period 5 (second half second century), excludes samian, unpublished data. South Shields = cavalry barracks, period 4 (*c* 163–*c* 205), unpublished data. Wallsend = deposit in alley 1 deposit and possible rampart building f2 (Antonine), Croom and Bidwell forthcoming

7.8.2 Local production

As well as producing the stock items required by the soldiers, local kilns serving the military also produced small numbers of more exotic items. Here they made triple vases, a *tettina* (small spouted vessel), a possible *patera* and some open lamps. Open lamps (crusies) were probably used with animal fat rather than oils as fuel. The two surviving examples are both hand-made and roughly finished, and show signs of use. An open lamp, made in a possible local grey ware, was also found at Balmuildy (Miller 1922: pl LII, no 2), and another, in an unknown fabric, at Wilderness Plantation (Eckardt 2002: fig 61, no 2).

Paterae were used in conjunction with a jug for washing hands, but were also used extensively for pouring libations in sacrifices. The jugs, like the *paterae*, were usually based on the metal prototypes, and although no examples of this type have been found at Bearsden, there is an unusual straight-sided bottle or flagon (illus 7.4.86). The function of the triple vase is unknown, but it is assumed to have a ritual use. It is possible that all of the 'exotic' items made by the local kilns were intended for religious ceremonies being carried out by the army. Four of these exotic items come from the midden dumps in the annexe and the other two (illus 7.5.106; 7.5.91) from the bath-house.

7.8.3 Distribution

One area in the annexe produced approximately 30% of all the coarse wares by weight (25% by sherd count). The material may have been used to infill the depression crossing the annexe from east to west, though the area may simply have been a rubbish dump. Parts of two vessels (139 and 168) were found in the granary and in a 'dump' to the south-west of the bath-house. There was very little difference in the make-up of the vessel types between the material in this dump and the rest of the site, other than the fact the dump did not include any storage jar rims. Although Swan suggested material, including unused vessels, had been deposited in the annexe at the abandonment of the fort (Swan 1999: 460), re-examination of the assemblage has identified plenty of sooted vessels and no higher proportion of comparatively complete vessels than found inside the fort, as would be expected if serviceable but unwanted vessels had been discarded there.

The North-African type vessels are found across the site, including the annexe dump. The only part of the site where there is an unusual quantity is the gulley between the south rampart and the intervallum south of 'building' 16, where about half of the pottery recovered consisted of sherds from at least six different platters (7.4.67; 69–70; 74–5; 77). Although this is a high number of individual vessels, many of them were represented only by two or three sherds forming less than a quarter of the complete platter. They came from a number of different contexts, from features that were difficult to interpret, so the exact interpretation of this assemblage is unclear.

Table 7.21
Vessel types in local fabrics by EVEs, shown as a percentage

Vessel type	*EVEs*
Flagon	5.6
Beaker	3.3
Small cooking pot	1.4
Cooking pot	20.7
Storage jar	2.6
Bowl/dish	22.3
Platter	9.2
Basin	1.2
Casserole	0.1
Mortarium	26.8
Lid	4.3
Brazier	0.3
Other	2.1
	4,038

Key: Other = triple vase, lamp, *tettina*, *patera.*

7.8.4 Pottery supply systems

Roughly half of the coarse wares at Bearsden were made locally. The remainder were from distant sources; the most important were those supplying black-burnished wares, which were situated between 560 and 640km south of the Antonine Wall. Kilns on Hadrian's Wall sent nothing to Bearsden and almost nothing to other early Antonine sites in Scotland: there is Lower Tyne Valley painted oxidised ware at Cramond (Bidwell & McBride 2010: 108) and small numbers of mortaria from northern England, particularly those made by Anaus (five stamps known in Scotland: Hartley 2009: 116, with references to earlier discussions of his products). The very long-distance systems that supplied amphorae and samian ware to northern England under Hadrian presumably extended their reach into early Antonine Scotland without too much difficulty. Otherwise, there was an almost complete dislocation, and the only major suppliers of coarse wares to Hadrian's Wall which then supplied the new Wall in Scotland were the BB1 industries in south-east Dorset and, less importantly, in south-west England. On the slender evidence of one group from the fort at Carlisle, there was a marked change in the scale of the importation of this ware: in Period 4B, beginning in about 125, BB1 made up 4.9% by weight and 4.3% by EREs of the coarse wares as opposed to 17% and 24.5% respectively at Bearsden (Swan et al 2009: 601–2). The Carlisle pottery is the only large Hadrianic assemblage in northern Britain which has been fully quantified; other groups of this period are needed before we can be certain that BB1 was much more important on the Antonine Wall than on Hadrian's Wall during its first two decades. This uncertainty is part of larger difficulties in understanding the transformation of supply systems following the building of the Antonine Wall which arise from the lack of well-dated and fully catalogued Hadrianic groups from the earlier Wall and from other military sites in northern England. The following survey of these changes is therefore provisional.

Whether or not the quantities of BB1 reaching northern Britain were greatly augmented when Scotland was occupied, the introduction of BB2 added a new and important strand to the supply system. The amount of the ware from Bearsden is comparable to that from Balmuildy, the next fort to the east along the line of the Wall, and is proportionately much larger in comparison with BB1 than at forts in the central and western sectors of Hadrian's Wall (Gillam 1981: 14, 18). In the Antonine period, most BB2 (but cf illus 7.7.166) came from Colchester, along with mortaria, colour-coated ware, and perhaps some other pottery (illus 7.9.99). The mortaria are types first made in the late-Hadrianic period (7.3) which are also known from the Hadrian's Wall zone (eg Bidwell & Speak 1994: 210–11). A few might have arrived in the north before the occupation of Scotland; if so, the numbers would have been negligible and would only serve to underline the far greater significance of Colchester in the supply of pottery to the Antonine Wall. An even more important source of mortaria was Mancetter-Hartshill in Warwickshire; its earliest types in the north have the same date range as those from Colchester, and the previous observations about the possibility of small-scale importation from Colchester in the late-Hadrianic period also apply to Mancetter-Hartshill mortaria. No other coarse wares from these kilns have been recognised in the north, but there was a transformation in the supply of Severn Valley ware which originated in the region immediately to the west of Mancetter-Hartshill. Small numbers of tankards in this ware reached the central and western sectors of Hadrian's Wall, apparently during the Hadrianic period (Webster 1972; Bidwell 1985: 172–4), but only one example (Miller 1928: pl x x III, no 18) is known from the Antonine Wall, where there are large numbers of narrow-mouthed jars in Severn Valley ware (illus 7.8.192–202; Webster 1977). There may be a connection between the Mancetter-Hartshill mortaria and Severn Valley jars: if transported by sea as far as was possible, they might have been parts of the same cargos loaded at or near Chester.

The coarse wares so far discussed made substantial contributions to the supply of pottery to Bearsden, but there are others occurring in much smaller quantities which might have been incorporated as make–weights in consignments of other materials or which might have been containers for the transport of food-stuffs. Sources in Britain are concentrated in East Anglia and might well have been connected with the supply of grain to the Antonine Wall by sea up the east coast. The only pottery at Bearsden which can be tied down to a specific locality is the sherd from a jar with decoration typical of the Nar Valley kilns in north Norfolk (illus 7.8.224). The other examples (illus 7.2.21(?) and 7.2.2–6, illus 7.8.218) are in the highly micaceous fabric typical of kilns in south Norfolk and north Suffolk. Elsewhere on the Antonine Wall, a Horningsea-type storage jar (from eastern Cambridgeshire if it is a Horningsea product), almost certainly used as a transport container, has been recognised at Inveresk (Dore 2004: fig 85, JA28; cf Bidwell & McBride 2010: 110, n 168). These wares occur in small numbers in third-century deposits on Hadrian's Wall, generally at its eastern end with only rare outliers, which contrast with the westward finds at Bearsden.

The North Gaulish jar (illus 7.8.219) is another example of a vessel which might have been incorporated casually in a mixed cargo. The commonest types of North-Gaulish coarse wares which reached Britain, apart from mortaria and early types of flagons, were the distinctive grey wares, often with closely spaced horizontal lines burnished on the neck or upper body of the vessels. On military sites, they are known from the Flavian to Hadrianic periods and in the Severan period, though current excavations at South Shields strongly suggest that they were also reaching this coastal fort in the mid-third century. Swan (2009), who studied them in penetrating detail, connected their presence in most instances with the movement of auxiliary troops and, from later in the second century, the activities of the British fleet, though the possibility of 'a little independent seaborne trade between North Gaul and south-east Britain' was not completely excluded. The absence of North-Gaulish grey wares on the Antonine Wall and beyond it was noted and it was argued that this was partly because by this time there was little recruitment to units in Britain from northern Gaul (Swan 2009: 85). The recognition of another type of North-Gaulish coarse ware on the Antonine Wall does not affect Swan's arguments, which depended particularly on the prevalence of *vases tronconiques* – large drinking vessels – amongst the Flavian-Hadrianic grey wares. These vessels were associated by Swan with the ethnic drinking traditions of North Gaulish recruits (though cf Fulford 2010: 69–70), but the jars in 'pâtes blanches à quartz' were probably containers, their sharply undercut rims being suitable for securing covers with cords. Another type of container from the same general area that has recently been recognised at Inveresk is the Gauloise 12 amphora (Bidwell & McBride 2010: 112–14, and at least one other example from the former Brunton Wire Works site, a site north of the fort at Inveresk which will be published by CFA; for their distribution in Britain which includes a few civilian sites in the south-east, see Tyers 1996: fig 70). Production sites for these amphorae, which probably contained wine, were mostly in Normandy, but they are found in the region south of the Somme. Whether these jars or amphorae were brought to early Antonine Scotland by the British fleet or were added at North-Gaulish ports to civilian consignments of amphorae or fine wares from further afield is uncertain.

7.8.5 Origins of the British potters working at Bearsden

Sarrius, the Mancetter-Hartshill potter, had a subsidiary workshop at Bearsden, as did a potter probably from Holt who was making raetian mortaria of Type E; there is even an outside possibility that Mascellio, who had first started stamping his mortaria in the area of Catterick or Bainesse, transferred his operation to Bearsden (7.3) and there are definite indications that other potters like GICA or CICV[.] may have been working there. Amongst the other locally produced coarse wares, the influence of North-African potters, or potters trained in the North-African tradition, is overwhelmingly apparent and is discussed in detail below. Most of the remainder appears to represent the standard Romano-British range, as usual with many imitations of black-burnished ware. Sherds probably from a single oxidised bowl with barbotine decoration (illus 7.5.93–5) represent another tradition, and similar vessels are known from four other forts in early Antonine Scotland. Vessels from Bearsden and Inveresk are regarded as products made at those forts, but the thin distribution amongst the other forts on the Wall might be taken to indicate that they were from one source. They find numerous parallels at Caerleon: older finds were collected in Webster and Webster 1998, but a kiln which made barbotine-decorated bowls, its period of production dated tentatively to the early Antonine period, is now known at Abernant Farm, 3km from the fortress (Webster et al 2004: fig 5, nos 53–4). The mortaria associated with this kiln were supplying a civilian market which extended across the Bristol Channel into Avon and Somerset as well as military and civilian sites in south Wales (Webster et al 2004: 104), but this particular technique of barbotine decoration is firmly rooted in the legionary-ware tradition (cf products of kilns at Carnuntum dating at the earliest to shortly after the middle of the second century: Gassner et al 1997: Abb 39, no 14, Abb 40, no 27, Abb 41, no 38, on a costrel). The barbotine-decorated vessels from the Antonine Wall suggest the presence of a potter familiar with pottery production at Caerleon.

7.8.6 Pottery of North-African style

In a series of wide-ranging studies, the fruit of an unrivalled knowledge of Roman coarse pottery in the western provinces, the late Vivien Swan identified cooking wares at Bearsden and at other forts on the Antonine Wall as close copies of North-African types which had been made locally. Similar copies have also been identified by Swan and others at forts on Hadrian's Wall and elsewhere in northern Britain in Severan and later contexts, and from the legionary fortresses at Caerleon, Chester and york, where their use, and in some instances their production, might have coincided with their early Antonine and Severan occurrences in the forts (Swan 1992; Swan and Monaghan 1993; Swan 1997; 1999; 2008). The implications of these two apparently separate episodes which led to the copying of North-African types for the use of the Roman army in Britain, or for some sections of it, have been explored by Swan in exemplary detail. Their circumstances seemed to have been quite different. Swan proposed that the Severan copies resulted from the presence of the Emperor Septimius Severus and his retinue in Britain, and that the earlier copies were to serve the needs of North-African recruits or soldiers who had served in North Africa and were sent or returned to Britain in about 150, after the Mauretanian war. Bearsden, the only Antonine Wall fort to have been excavated comprehensively using modern techniques of recording, was central to Swan's thinking about the earlier episode and particularly how it might elucidate modifications that were made to the Antonine Wall and its forts.

Swan always made it clear that in the second and third centuries the North-African ceramic tradition found on the Antonine Wall had also been adopted throughout the coastal areas of the Western Mediterranean, particularly in the great cities of Spain and Southern Gaul, and at Ostia and Rome. There was 'little doubt', according to Swan (1999: 421), that some of the potters working on the Antonine Wall 'had indeed originated in North Africa itself', and the possibility that at least some of them might have been from 'the immediately adjacent parts of the Mediterranean littoral' was judged 'less likely' but not entirely dismissed. Two factors seemed to weigh heavily in favour of a direct connection with North Africa. First, the commonest North-African forms on the Antonine Wall – casseroles and platters – corresponded to those that dominated the assemblages from military sites in the Mahgreb: '… the total range … in particular the relatively strong showing of platters, is quite unlike that recorded in the assemblages from the civilian ports and towns in North Africa … [where there are] proportionately more tablewares and comparatively few platters … the range of African vessel types found on the Antonine Wall may be more typical of military establishments in the Mahgreb' (Swan 1999: 463–4). Secondly, the Mauretanian war provided a possible context for the dispatch of North Africans to Scotland when the campaigns came to an end.

It has not been established beyond doubt that troops were sent from Britain to North Africa, nor that such units were returned to Britain or that North-African recruits were sent to replace them. Swan (1999: 441) made this explicit and conceded that the epigraphic evidence which hinted at these possible events would have been less persuasive without the evidence of pottery in the North-African style on the Antonine Wall: 'it would be surprising if all of these correspondences were purely coincidental'. Since the 1990s nothing further has emerged in the field of epigraphy to confirm the presence of North Africans in Britain during the occupation of the Antonine Wall. The main development has been in understanding how North Africa came to play such an important part in pottery supply and manufacture in the Western Mediterranean and elsewhere. Because Swan was able to establish similarities between the assemblages at military sites in Britain and the Mahgreb, she did not explore in detail the wider diffusion of North-African pottery styles. The general picture has been well-known for many decades. 'Vast quantities of North African pottery were imported during the second and third centuries' to Rome, Ostia and Cosa (Hayes 1972: 416), and some examples reached far-flung sites such as Irún, a port on the Atlantic coast in north-west Spain, almost on the border with modern France (Urtuega & López Colom 2000: 138, fig 14). Reynolds (1995: 102) has contrasted the 'abundance of North Tunisian cooking wares exported throughout the West [Mediterranean area] during the second and third centuries' with the smaller amounts in some later periods. These wares were not only exported in huge quantities but also copied by local potters or sometimes by immigrant North-African potters in Spain, Southern Gaul and Italy. Most of the recent research has concentrated on the late-Roman period, but one area where much has been learnt about pottery supply in the second and third centuries lies around Marseille and Narbonne. More than half (54%) of a large unstratified assemblage from the port at Fos (Bouches-du-Rhne) consisted of North-African cooking wares, the earliest type dating from the first half of the first to the first half of the second century (Marty 2004). In addition to these imports, cooking wares of North-African type were supplied on a very large scale by local industries to the east of Bziers, now known by the abbreviation BOB ('la céramique Brune Orangée Biterroise') and were presumably made by potters from North Africa. The range of North-African types – dominated by platters and casseroles (Pellecuer and Pomaredes 1991, C2/C4/C6 and B1/C3) – produced by some of these kilns was very similar to those on the Antonine Wall; further similarities are that local types were also fired in these kilns, as at Bearsden, and table wares were not amongst their main products. Pottery from other BOB kilns seems to have been made by Italian potters. One of these foreign craftsmen was a slave of eastern origin: *Onesiphori Naturiorum*, or *Onesiphorus* of the *Naturii*, a family company (Mauné and Lescure 2008: 813–14; cf Greene 1977: 125–8, suggesting that slaves from the east were involved in the manufacture of legionary wares). In their recent survey of the BOB industry, Mauné and Lescure (2008) dated its establishment to about 110/120. It began, they argued, with the installation of foreign potters, who were to produce, presumably at less cost than imports, types of pottery which were in use in the great cities of the Mediterranean, as well as amphorae and ceramic building materials. The types of cooking wares produced by the BOB kilns involved the introduction of new ways of preparing food such as frying and sautéing, though one might add that in at least some households metal vessels were perhaps already used for these types of cooking and that in these instances pottery vessels were introduced successfully because they were cheaper than metal ones. Mauné and Lescure (2008: 814) associated the establishment and development of this industry with the 'spectacular development' of the economy in Gallia Narbonensis between the middle of the first century and the second half of the second century, in particular with the great increase in viniculture.

Parallels with pottery supply to the Antonine Wall – similarities in the range of the North-African copies and their manufacture alongside local types – might seem to signify little because the social and economic contexts were so different and the distance from North Africa, of course, so very much greater than to southern Gaul. However, wine from Gallia Narbonensis and the Rhône Valley was supplied to the army in Britain. Gauloise amphorae likely to have come from Gallia Narbonensis are known from the Antonine Wall (including Bearsden, see comment after illus 7.9.259, and 7.7.2), where, as on Hadrian's Wall until the mid-third century, they are not only the commonest but almost the only type of wine amphora that is known. Even so, the numbers of Gauloise amphorae are very small in comparison with those from southern Britain, which makes it almost certain that most of the wine, a staple of the military diet, was sent to the two Walls in barrels (Bidwell & Speak 1994: 214–16). The Rhineland was thought to have been the most likely source of this wine until the discovery in pre-Hadrianic levels at Vindolanda of barrels made of fir and larch which probably came from the Rhône Valley, though the wine they contained might well have been from Gallia Narbonensis (Marlière 2003: 145). Despite the remoteness of the northern frontiers in Britain from Gallia Narbonensis, there were thus economic ties between the two areas. Even if the supply system was controlled by middlemen, those concerned with the direction of the BOB industry, which produced amphorae as well as cooking wares (Mauné and Lescure 2008: 813–14), would surely have been aware, even if at second hand, of changes in a major market with which they were concerned. It could have presented them with the opportunity to repeat in northern Britain what they had begun so successfully in Gallia Narbonensis two or three decades earlier: the establishment in a new and lucrative market of an industry producing types of pottery which widened the functional range of cooking wares previously available to the army in Britain.

In the Severan period, there is a much more direct link between northern Britain, Gallia Narbonensis and the production of North-African types. A distinctive type of jar apparently made in the vicinity of York provides a direct link with Gallia Narbonensis at about this time, as Swan has observed (1992: 9; 1994; 2002: 62). It has a rim with a triangular section and lid-seating, closely resembling the Dales-Ware type which, Swan argued, might have developed, at least partly, from the York type. Jars with similar detailing were produced in large numbers by the BOB industry alongside North-African types; the jars represented continued production of types well established in the region before the development of the BOB industry (Mauné and Lescure 2008: 815, Forme A1). In her earliest study of the York pottery (1992: 9), Swan was careful to take account of the possibility that the North-African types made at York in the Severan period, at the same time as the BOB-type jars, were being produced by potters from Gallia Narbonensis or from elsewhere on the north-western Mediterranean littoral, providing parallels from these areas as well as North Africa. Later, when Swan realised that the range of types made in Britain and found at military sites in the Mahgreb were similar, parallels from beyond North Africa seemed less relevant, the further similarity with the range of types made by the BOB industry having become fully apparent only in recent years.

As has already been shown in our consideration of pottery at Bearsden from elsewhere in Britain and from northern Gaul, the early Antonine advance into Scotland caused an almost total disruption of the existing supply systems, resulting in opportunities for the relocation or expansion of existing production centres. The creation of new markets in which potters and merchants involved in trade from Gallia Narbonensis already had an interest might explain the dispatch of potters from North Africa, or working in the North-African tradition, to Scotland, in an attempt to repeat the success of the BOB industry. The alternative explanation favoured by Swan, that the potters came from North Africa to serve North-African soldiers or soldiers that had become accustomed to the cooking traditions of North Africa while serving there, is of course still possible though Fulford (2010), considering Swan's ideas in particular, has set out powerful objections to the identification of ethnic incomers to Roman Britain based solely on pottery use. Better understanding of these questions is most likely to result from studying the wider phenomenon of exotic pottery manufactured on the frontiers and particularly the origins and identity of the potters making 'legionary wares' (cf Swan 2004).

Chapter 8

MORTAR ANALYSIS

G C MORGAN

The samples, all from the bath-house, were examined physically before the lime matrix was dissolved in dilute acid. The residues were then graded and identified. The samples were somewhat friable but were all very resistant to dissolution in the dilute hydrochloric acid used to dissolve the lime matrix. It was necessary to heat the samples for a week before the lime finally dissolved. This led to the loss of some of the iron bearing compounds.

Table 8.1
Analysis of mortars

The breakdown of the mortars into the insoluble aggregate grades and the amount of soluble material, which is mainly lime but includes any other acid soluble material. The sizes are: 'gravel' > 2mm, 'sand' 0.15mm–2mm, 'silt' < 0.15mm.

	Gravel	*Sand*	*Silt*	*'Lime'*
1	43%	31%	26%	19%
2	53	18	29	32
3	46	31	23	21

The particle size distribution graphs show that sample two has a lower 'sand' size content and that they all have a similar, very high, silt (silica) content.

1. Floor sample. A coarse friable pink to grey gravel mortar with decayed tile traces. The residue was mainly red, orange and yellow, with some black, crushed brick or tile with quantities of vitrified clay or brick. Also present was; quartz, sandstone, quartzite and micaceous schist. The finer quartz sizes, 0.25–0.15mm, were mainly round to sub-angular sand, probably derived from the sand in the tile.
2. Cold bath. A coarse friable pink brown mortar. The residue was very similar to 1 without the yellow or black tile or the vitrified clay.
3. Hot bath. A very coarse and friable pink to brown mortar with large stones. The residues were similar to 1 with the addition of pebbles of a fine pink granite like rock and quantities of vitrified clay. Amongst this were fragments of what appeared to be iron working furnace lining, although this may possibly have been tile kiln lining, it must have been heated to around 1,000°C, which is much hotter than a tile kiln would have needed to be and too hot for a lime kiln. It may have been accidentally produced but the result is a pozzolanic material which produced an excellent hydraulic mortar. The vitrified fragments in the other samples would have had a similar effect.

The grading of the samples was fairly typical for crushed tile or brick based mortar, but the very fine silt size particles contained very large amounts of fine or colloidal silica resulting from the hydraulic mixture (table 8.1). It is possible that some of the silica may have come from the lime used but without comparison of local limestones this is conjectural.

Chapter 9

GLASS

JENNIFER PRICE

9.1 INTRODUCTION

During the excavations 141 pieces of Roman glass were recorded, of which 137 come from vessels (9.2.1–55), three from window panes (9.2.56–58) while one is a bead (9.2.59). The vessel fragments are either free-blown or blown into body and base moulds, and apart from two colourless vessels (9.2.1–2) and the dark coloured, appearing black, bead (9.2.59), the glass is bluish green or pale greenish in colour.

The vessel fragments were recovered from many parts of the site (illus 21.29). The greatest concentrations of finds came from the bath-house and the annexe (9.2.7–9; 11; 13–14; 18; 19; 23; 31; 34–41), and from the two barrack-blocks in the fort, building 3 (9.2.2; 5; 27; 32–33; 48–50) and building 7 (9.2.1; 4; 6; 17; 21; 24; 26). Smaller groups were found in the northern granary (9.2.29; 30; 51), and in the areas between buildings 6 and 7 (9.2.20; 43; 44) and buildings 7 and 8 (9.2.22; 42; 53; 55), while one or two pieces came from buildings 1 (9.2.52), 2 (9.2.15), 6 (9.2.28), 13 (9.2.3) and 16 (9.2.16), the intervallum roads west of the northern granary (9.2.54) and east of building 6 (9.2.10) , the inner west ditch (9.2.12) and the areas to the west (9.2.33; 45) and east (9.2.46–47) of the fort. No glass was recorded in buildings 10, 11 and 15, thought to be the headquarters building, or in building 12, which may have been a workshop or store building. The window glass fragments were found in a pit south of the cold room in the bath-house, the intervallum road to the east of building 12 and building 3 (9.2.56–58) and the glass bead (9.2.59) came from topsoil in an area to the bottom of the slope south of the fort.

The very fragmentary state of the glass finds suggests that broken glass was systematically collected for recycling while the fort was occupied. Most vessels are represented by a single fragment or a group of joining fragments from one context, apart from three (9.2.7, 11; 33) which have joining fragments from two or more contexts. The majority of the finds are body fragments, generally the thinner parts of the vessels, whereas the heavier parts, such as the rims, necks, handles and bases are either absent or scarce and appear to have been deliberately targeted for collection. Only one vessel, a rectangular bottle (9.2.7), has survived in pieces large enough for the body and base to be reconstructed. This was presumably complete until close to the end of the life of the fort, but it also appears to have been partially collected for recycling as it lacks the rim, neck and handles. This bottle and many other fragments (eg 9.2.5; 7–9; 11; 14; 16; 18; 21; 30–2; 37; 40; 47; 49; 51–5) from different areas of the fort and annexe have melted or distorted surfaces or are heavily cracked and fractured as a result of intense heat, perhaps when the buildings were burned during the destruction and abandonment of the fort.

There is no information about where the collected glass was recycled. No evidence for any kind of glass working has been recorded at Bearsden, and at present the only evidence for vessel production on the Antonine frontier is at Camelon (Price 2002: 90, and Price in Maxfield forthcoming). It is possible that such material was transported to workshops in legionary fortresses or to urban centres further south in the province.

The range of vessel forms at Bearsden is very limited. Glass drinking vessels and other tablewares (9.2.1–4) are represented by seven fragments from four vessels (5.1% of the total) and the remaining 130 vessel fragments (94.9% of the total) come from containers, all prismatic vessels and almost certainly bottles (nos 6–55), except for one probable flask (9.2.5).

The overwhelming dominance of containers (95% of the surviving fragments) raises questions about the functions of glass vessels on the Antonine frontier. Nothing is known about official supplies of glass tablewares to military units and it is possible that these were personal possessions whereas the glass bottles must have arrived as the containers for foodstuffs and other commodities reaching the fort, whether these were officially issued to the unit in garrison or acquired by individual soldiers.

The patterns of use of glass tablewares at military sites on the northern frontier in Britain changes markedly between the late first and the mid-second century. Bottle fragments always account for a large percentage of the glass on these military sites, but forts with Flavian occupation in Scotland have generally produced a range of glass tablewares as well as containers. For example, a selection of the cups, bowls, jars and jugs found elsewhere in Britain occur in forts such as Newstead (Curle 1911: 271–3), Inchtuthil (Price 1985), Strageath (Price 1989), Elginhaugh (Price & Worrell 2007) and Camelon (Price in Maxfield forthcoming). By contrast, glass tablewares are sparsely represented in the military sites in Scotland occupied in the Antonine period, although a wide range of forms were in circulation in the military urban and rural settlements elsewhere in Britain. The lack of variety at Bearsden is mirrored in assemblages from other Antonine forts in Scotland, such as Strageath and Camelon, Old Kilpatrick (Miller 1928, 50), Balmuildy (Miller 1922, 95–6), Bar Hill (Keppie 1975, 118–20), Rough Castle (Charlesworth 1980), Cramond (Maxwell 1974, 197–9; Price 2003), Inveravon (Dunwell & Ralston 1995, 562) and Inveresk (Allen 2004).

The reasons for this striking reduction in the personal use of glass by frontier units are unclear. The glass itself may have become more costly or difficult to obtain, or changes in origin or status in the units in garrison may have introduced personnel with little interest in using glass, perhaps preferring drinking vessels and other tablewares in another material. The report on the coarse pottery (section 7.2) mentions some beakers among the forms present at Bearsden, and vessels in wood or horn might also have been available.

The tablewares

Two colourless tableware vessels were found. 9.2.1 is part of the upper body of a convex cup or beaker with two bands of horizontal wheel-cut lines. When complete, the vessel would have had a small curved rim with a cracked off and ground edge, and a concave or more complex base. It belongs to a group of colourless drinking vessels with similar rims and wheel-cutting and various body and base forms found in Britain in the second and third quarters of the second century (see Price & Cottam 1998: 91–2, 94–7). They are known in the northern frontier region, though not in large numbers. Convex beakers generally similar to the Bearsden fragment came from Camelon (Price no 19 in Maxfield forthcoming) and perhaps from Cramond (Maxwell 1974: 198, fig 16, 4), while other wheel-cut examples from Scottish sites include cylindrical cups with flat bases at Castlecary (Christison et al 1903: 337–8, fig 35; Charlesworth 1959: 49, fig 7 no 6) and Camelon (Price no 17 in Maxfield forthcoming), fragments perhaps from a beaker or beakers with a carinated body and applied foot from Inveresk (Allen 2004: 168 nos 6–7, fig 115), and another body fragment from Inveresk (information from Dr Ewan Campbell).

9.2.2 is from the convex lower body, tubular base-ring and almost flat base of a thin-walled vessel of good quality. This is a different vessel from no 1, and is also likely to be a cup or beaker, rather than a larger vessel such as a bowl or jug, but too little survives for the form to be identified. A thin-walled body, tubular base-ring and flat base fragment from Inveresk fort (information from Dr Ewan Campbell) which has an abraded line at the change of angle on the body may come from a very similar cup. The Bearsden piece is less likely to be from a cylindrical cup with fire-rounded rim and double-base-ring, a form appearing in Britain in the third quarter of the second century and becoming extremely common late in the second and first half of the third century (Price & Cottam 1998: 99–103) as these vessels are thicker and more robust.

9.2.3 is a fragment from a bluish green open base ring of a kind often found on globular jars and convex and conical long-necked jugs. These vessels occur at many sites in Britain in the later first century and first three-quarters of the second century (Price & Cottam 1998: 137–8, 150–2, 155–7) but are difficult to identify precisely from fragments unless the characteristic figure-of-eight folded rim of the jars or the folded rim, long neck or angular handle of the jugs have survived. Few open base fragments have been noted in northern Britain, apart from ones from Birrens (Robertson 1975: 133.12, fig 46.1), Strageath (Price 1989: 198 no 10, fig 100) and Camelon (Price no 38 in Maxfield forthcoming).

9.2.4, a neatly formed bluish green diagonally folded rim fragment with a narrow cylindrical neck, belongs to either a flask or a small jug. No trace of a handle survives and the piece is too small for close identification to be possible. Some conical and globular jugs, mentioned above in connection with 9.2.3, have diagonal rims, while others, such as the conical jug from Turriff, Aberdeenshire (Thorpe 1934) have more nearly horizontal rims, but these vessels are generally much larger than the Bearsden piece.

The containers

The convex lower body and simple concave base (9.2.5) comes from a fairly robust bluish green vessel, perhaps a flask, although it is not possible to establish the precise form, as many vessels have similar bases. The piece has many internal strain cracks, suggesting either that it was not annealed properly after it was blown or, more probably, that its structure was subsequently affected by heat. As noted above, similar strain cracks and fracturing are also seen among the prismatic bottle fragments. The remainder of the vessel glass comes from prismatic containers. With the exception of the hexagonal bottle (9.2.6) and rectangular bottle (9.2.7), their precise forms are not identifiable because the rims are absent, but it is very probable that they were square bottles, rather than jars. Square bottles were produced in vast numbers in the Roman world in the later first and second centuries, particularly in the western provinces (see discussion in Charlesworth 1966; Cool & Price 1995: 179–99; Foy and Nenna 2006a, 2006b, 2011), and they occur on virtually every site in Britain occupied during the second century (Price & Cottam 1998: 194–8; Price 2011). They were made to contain and transport liquid and semi-liquid foodstuffs, and their presence at Bearsden indicates that such commodities were regularly reaching the frontier troops.

The number of bottles present in the Bearsden assemblage is unknown. At least ten are identifiable, two from the shape of the body (9.2.6–7), six from the designs on the base (9.2.7; 11–15) and two from the dimensions of the body (9.2.9–10). Otherwise the fragments are too small and undiagnostic for individual vessels to be recognised although the differences in colour and thickness show that a considerable number are represented. Some of them are likely to have had tall narrow bodies, and it is noteworthy that no pontil marks are visible on any of the bases. Virtually all of the bottle fragments are in various shades of bluish green but a small number (eg 9.2.10; 18; 22; 37) are pale greenish in colour. This is an unusual colour among second-century bottles, although at least one pale greenish square bottle was found at Cramond (Price 2003: 90, 93 no 12, illus 79, 12).

The hexagonal fragment (79.2.6) is from a bottle form that occurs in Britain in both the later first and second centuries, though in much smaller numbers than the square bottle (Price & Cottam 1998: 198–200). Other finds in Scotland have been noted in Flavian contexts at Elginhaugh (Price & Worrell 2007: 452, 464 no 52, fig 10.44) and Camelon (Price no 63 in Maxfield forthcoming), and in an Antonine context at Strageath (Price 1989: 199–200 no 23).

The rectangular bottle with an inscription on the base (9.2.7) is an interesting and unusual vessel. Much of the base is present, and parts of the two long sides survive to the edge of the shoulder. As explained above, the state of preservation of this vessel may point to its breakage very late in the life of the fort, and to a large part of the vessel being abandoned with other debris in and around the bath-house, where some pieces became melted or fractured by heat (illus 9.3). The bottle had been in use for some time before it was broken as the sides are heavily scored with vertical striations, probably from storing it in a close fitting wickerwork or wooden box when not in use, and the base is heavily worn, particularly along one of the long sides where it has rested unevenly (illus 9.1). It has slightly convex long sides and rounded angles to the base, and some of the letters in the inscription are thick and unevenly formed. The complete vessel would have had a wide rim, a wide neck and two angular handles applied to the top of the short sides and attached to the neck below the rim.

The size of this vessel and the inscription on the base make it remarkable among rectangular bottles in Britain. These bottles are not uncommon in mid- to later second-century contexts but they are generally smaller with sharply angled bodies and bases (Price & Cottam 1998: 200–2), and geometric designs or initials on the base (*RIB* II.2, 2419.95–100, 139–42; Price 2011, GB-REC. 003–022, pls 18–20). Large rectangular bottles similar to the Bearsden example are scarce in the north-west provinces and the closest parallels in size and shape are from the Upper Danube region, as at Faimingen and Gunzburg (Fasold & Hssen 1985: 296, 309 no 14, fig 8.1, pl 27.1), Kempten (Rottloff 2006: 158 D-RA 37, pl 14) and Linz (Glockner 2006: 190, 199 Au S 68–69, pls 6–7).

Illustration 9.1
The base of a rectangular glass bottle with C ASINI MARTIAL (7).
Photo: Jeff Veitch.

The inscription on the base is also very uncommon. Few complete names (*tria nomina*) occur on prismatic bottles in the north-western provinces in the second century, although some are found in other parts of the western provinces, as in the northern Adriatic and upper Danube regions (eg Rottloff 2006: passim, Glöckner 2006: Au S 56–7, 62, Amrein 2006, CH31, Lazar 2006: SI81).

The surviving parts of the inscription are

GN ASINI[
MARTIAL[

in two horizontal rows, running from left to right (illus 9.1 and 9.3). The right-hand part of the base is missing, but the width of the long sides shows that the base was originally at least 30mm longer than it is now, leaving room for two further letters in each row. It is therefore possible that the name was shown as Gn[aeus] Asinius Martialis, that is, in the nominative rather than the genitive case (pace *RIB* 2419.106; Cool et al 1995, 1581), unless the inscription was arranged asymmetrically on the base.A base fragment from a rectangular bottle probably from the same mould as the Bearsden bottle found in Blake Street, york (Cool et al 1995: 1581, 1659 no 6180, fig 747) has parts of ...IAL, and the vertical bar of a further letter, probably ..I.. , showing that there were at least eight letters in the lower row. The letters in the two rows appear to have been spaced to occupy the same line length, so the additional letters would make the lower row containing the cognomen more prominent than the upper row with the *praenomen* and *gentilicium*, unless that also has two additional letters, such as VS at the right-hand end.

Two further prismatic bases that may show parts of the same name are known: a square bottle or jar from Empuries in north-eastern Spain (Gudiol Ricart 1936: fig 9.2; Price 1981: 369–70 no 47 fig 113; Price 2006: 291 E-CAR 048, pl 5) and another from Caerleon in south Wales (*RIB* 2419.107; Price 2011: 20, 36 GB-CAR.012, pl 5). The Empuries base has two concentric rings enclosing GN.....VSMARTIALIS running clockwise. The *gentilicium* is in the nominative case and though insufficient survives to be certain that it is ASINIVS, the similarity of the *praenomen* and *cognomen* to the other examples is persuasive. The Caerleon base, which is smaller in size, also has two concentric rings enclosing GNASI......TIAL reading clockwise. Here, the *gentilicium* is probably ASINIVS, but the case in which it is presented is uncertain. This matter will not be completely resolved until the right-hand end of the base of a rectangular bottle with a similar inscription is found, but the square base from Empuries provides support for the use of the nominative case.

Three of the four bottles were found on military sites in Britain, and the distribution of these small group of bottles suggests that they were made in the western, or north-western, provinces but the sample is too small for identification of centres of production to be possible. The evidence for dating the group to the mid-second century is derived from the Bearsden and york examples; nothing is known about the context of the Empuries base, and the Caerleon base was unstratified. The Bearsden bottle was in use late in the life of the fort, but judging from the degree of wear, it may have been in circulation for some time before breakage. The fragment from Blake Street, York came from a Period 4a context, and is likely to have been deposited after *c* 160 (Dr H E M Cool, pers comm).

The remaining basal designs at Bearsden are much more fragmentary. One other piece, a square bottle probably with a narrow tall body (9.2.11), has a part of a letter from an inscription running horizontally across the centre of the base. It is not clear whether this is an S, in which case it could be either the initial or the end letter, or a C or G, in which case it must be the end letter. Close parallels have been difficult to find as most examples in Britain with horizontal inscriptions across the centre of the base have frames round the letters, as on a square bottle from Cramond (*RIB* 2419, 139–43; Price 2011, GB-CAR 078), or corner supports, as on several bottles in southern Britain (*RIB* II.2, 2419.144–6, 152; Price 2011, GB-CAR 078–081, 083–084). The rest of the base fragments have very common geometric designs. 9.2.12–14 show one or more concentric rings, 9.2.14 being from a larger bottle than the others, and 9.2.15 has two straight lines converging to a point, which may be either part of a ring with internal spokes or a diagonal cross, both being motifs recorded at other northern frontier forts.A few of the bottle fragments (eg 9.2.9; 37; 39) have been grosed and reshaped for a secondary purpose. This is likely to have occurred at the fort and the purposes can only be guessed at, but 9.2.9, which has been formed into a sizeable rectangular block, might have provided as a flat surface similar to a palette, or served as a smoother for leather or wood.

Three fragments of bluish green window panes with one matt and one glossy surface (9.2.56–58) were found. This is a remarkably small quantity, as to prevent heat loss window panes must have been fitted into the window apertures of the steam range of the bath-house, which housed two warm rooms, a hot room and a hot dry room, and were probably also used in the residential quarters of officers in the fort. It seems probable that the window panes themselves were seen as reusable and were therefore carefully removed and taken away when the fort was demolished and abandoned rather than being broken on site and collected as cullet for recycling. The fragment from the pit near the cold room of the bath-house (9.2.56) provides an unusual insight into the way that glass panes were sometimes fitted into window apertures. The piece (illus 9.7) has been carefully cut and grosed to form a square or rectangular shape, measuring 95mm on the complete side (presumably one of the short sides). This indicates that one of the window apertures (presumably in the bath-house) had a wooden frame fitted with glazing bars to support the small panes. Information of this kind has rarely been noted in Britain; two fragments of wooden window frame with grooves for glass panes were found at Cramond (Holmes & Raisen 2003: 130–1) but these do not seem to have evidence for glazing bars.

The practice of removing window glass may have occurred at other forts in the northern frontier region. Very small quantities of fragments have been noted at Antonine forts in Scotland such as Old Kilpatrick (Miller 1928: 50), Duntocher (Robertson 1957: 5), Cramond (Price 2003: 90, 94 no 13) and Inveresk (Allen 2004: 167; 169), although some sites have produced larger quantities. For example, fragments were found in the headquarters building, the commander's house and the fort bath-house at Balmuildy (Miller 1922: 95), 32 pieces were listed at Bar Hill (Keppie: 118, 1–3) and there were 18 at Camelon, mostly found in an area with furnaces and evidence of craft activity (Price in Maxfield forthcoming).

There is a marked dearth of glass objects at Bearsden. The absence of melon beads, other glass beads and bangles, and counters or gaming pieces, is noteworthy, as these are common finds at many of the first and second century military sites in northern Britain. The one globular bead (9.2.59) is not a stratified find or a common second-century type. It is made in dark coloured glass, appearing black, which was used for beads and other small personal items in the fourth-fifth century, but might also be a post-medieval object.

9.2 CATALOGUE

9.2.1 Vessels

Tablewares

1. Four joining body fragments, cup or small bowl (illus 9.2.1). Colourless. Convex side. Two horizontal bands of two close-set wheel-cut lines. Dimensions 41mm × 38.5mm; thickness 1.2–1.7mm.

   NK75CT; building 7, officer's quarters.

2. Thin-walled base fragment, cup(?) (illus 9.2.2). Colourless. Lower body tapering in, narrow tubular base ring, flat base. Present height 6mm; base Diam 41mm; thickness 0.5–1mm.

   NK75CS; between east ends of buildings 3 and 4.

3. Lower body and base fragment, jar or jug (illus 9.2.3). Bluish green. Wide convex lower body tapering in, constriction above open base ring, concave base, mostly missing. Ring of usage scratches at edge of base. Present height 12mm; base Diam *c* 90mm; thickness 2.5mm.

   NK76Cu ; building 13, topsoil.

4. Rim and neck fragment, flask or jug (illus 9.2.4). Bluish green. Narrow folded rim edge, bent out and diagonally upwards, small funnel mouth, narrow cylindrical neck. Present height 17.5mm; rim Diam 36mm; thickness 2mm.

   NK73BF; building 7, room 6, Roman level.

Containers

FLASK

5. Six base fragments, some joining, perhaps flask (illus 9.2.5). Bluish green. Affected by heat; many strain cracks, crazed. Rounded base edge and concave base. Present height 8mm; thickness 3.5mm.

   NK73CM; building 3, room 1.

Prismatic bottles (all bluish green, except where stated)

HEXAGONAL

6. Body fragment, hexagonal bottle (illus 9.2.6). Parts of two sides. No visible weathering or wear.

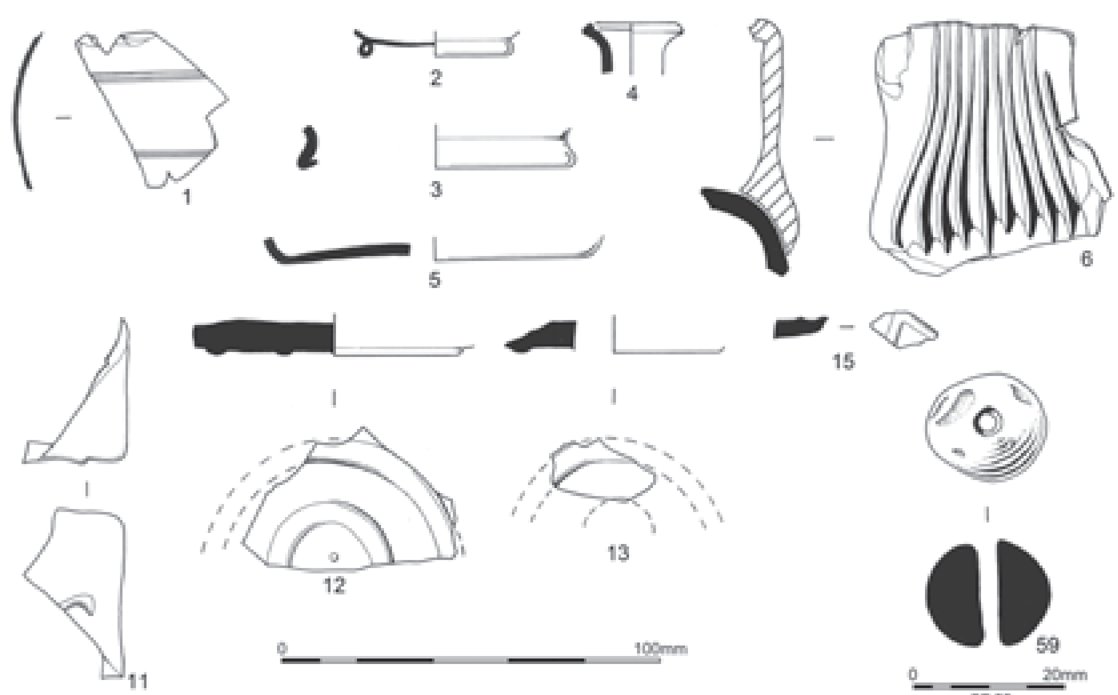


Illustration 9.2
Glass 1–6, 11–13, 15, 59.

Dimensions 48mm × 43mm, thickness 3.5–5mm

NK73Cu ; between buildings 6 and 7, overlying clay.

RECTANGULAR

7. Twenty-eight joining body and base fragments, rectangular bottle (illus 9.1 and 9.3). Dull, some fragments distorted by heat. Two vertical sides with slightly convex profiles, concave base. Across long side of base, two rows of thick and uneven letters in raised relief, reading:

C N A S I N I [..
M A R T I A L [..

Vertical usage scratches and patches of wear on sides, heavy wear on base, especially at corners, on edges and on letters. Present height 156mm; maximum L of side 198mm; thickness 2–5mm.

NK73DL; bath-house, cold bath; NK73DS; bath-house, rubble by hot bath; NK79AG; NK79 BG; NK80EO; fill of drain to south of first warm room of bath-house; NK79BZ;

Illustration 9.3
Glass 7.

pit to south of first warm room of bath-house; NK80BT; lower fill of drain through annexe rampart.

SQUARE

8. Four joining fragments, shoulder, body and handle. Surfaces affected by heat. Broad angular ribbon handle with reeding, applied to shoulder and pulled into ten points on upper body. Present height 65mm; width of handle 64mm.

   NK76FP; annexe, south-west of bath-house, topsoil.

9. Five joined fragments, body and edge of base. Dull, fractured by heat. Three edges grosed to form rectangular piece for secondary purpose. Edges worn. Present height 110mm; width of side 90mm.

   NK79AG; bath-house, drain south of first warm room.

10. Five fragments, joined in two pieces, body and edge of base. Pale greenish. Strain cracks. Two straight sides. Scratches on body, wear at corners of base. Present height 59mm; width of side 72mm.

    NK73AO; intervallum east of building 6.

11. Two joining fragments, body and base. Some surfaces affected by heat (illus 9.2.11; 9.4). Two sides, slightly concave base. Part of curved letter with serif [C, G or S] close to edge at centre of base. Small wear patches at corner of base and on serif of letter. Present height 35mm; maximum L of side 48mm; thickness 3–5mm.

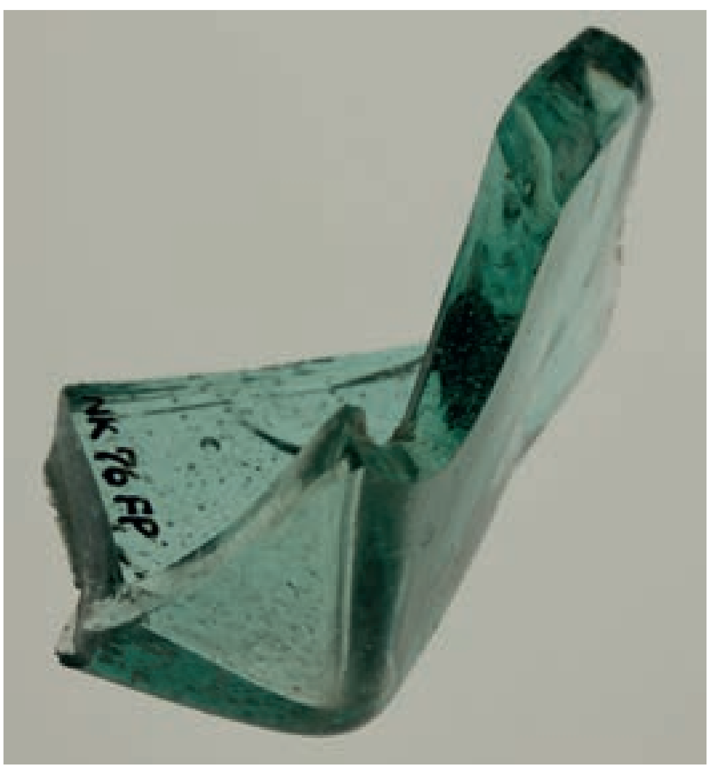


Illustration 9.4
The body and base of a square glass bottle (11).
Photo: Val McManus.

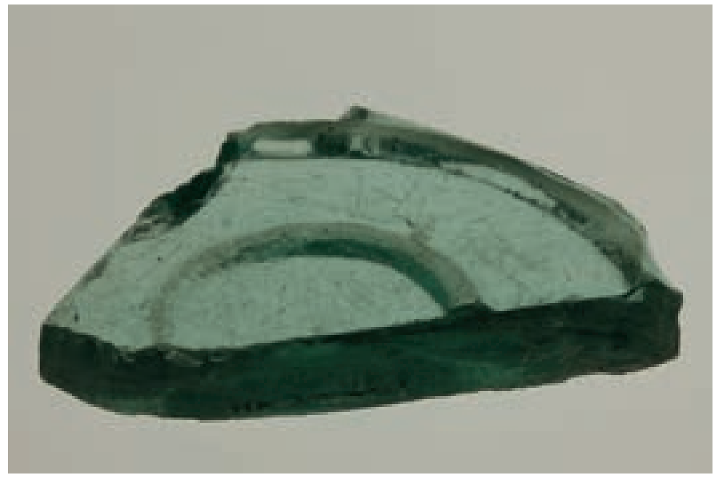


Illustration 9.5
The base of a square glass bottle with two raised concentric rings (12).
Photo: Val McManus.

NK76EN and FP; annexe, south-west of bath-house, topsoil.

12. Fragment, base (illus 9.2.12; 9.5). Flat base, two concentric rings with central dot. Wear on both rings. Dimensions 56mm × 35.5mm; Diam of outer ring 60mm; thickness 7.5mm

    NK75Au ; topsoil above inner west ditch.

13. Fragment, base (illus 9.2.13). Many strain cracks. Slightly concave base, ring with edge of another design element inside. Wear on ring. Dimensions 26.5mm × 15mm; thickness 8mm.

    NK73BG; annexe, between bath-house and annexe rampart, topsoil.

14. Fragment, base, large vessel (illus 9.6). Dull, melted and distorted by heat. One ring.

    Dimensions 61.5mm × 21mm; thickness *c* 8.5mm.

    NK73CK; annexe, south-west of bath-house, topsoil.

15. Small fragment, base (illus 9.2.15). Dull, scratches on inside surface. Parts of two joining lines, perhaps from diagonal cross or circle with internal spokes. Dimensions 12.5mm × 13mm; thickness 4–5mm.

    NK74BM; central area of building 2, topsoil.

UNCERTAIN FORMS

16. Four joining neck fragments. Crazed, surfaces distorted by heat. Dimensions (largest fragment) 25mm × 32.5mm; thickness 5mm.

    NK76GK; building 16, post-hole.

17. Fragment, base of neck and curved shoulder. Scratches on outside surface.

    Dimensions 31mm × 35mm; thickness 5.5mm.

    NK75CK; building 7, officer's quarters, overlying occupation layer.

18. Small convex fragment, probably shoulder. Pale greenish. Dull, affected by heat.
Dimensions 17 mm × 15mm; thickness 3.5mm.
NK76FP; annexe, south-west of bath-house, overlying cobble surface.

19. Three joining handle fragments Part of broad angular ribbon handle with vertical reeding. Dimensions 28.5mm × 28mm.
NK76BM; annexe, south-west of bath-house.

20. Small handle fragment. Broad angular ribbon handle with vertical reeding.
Dimensions 17mm × 18mm.
NK73Cu ; between buildings 6 and 7, overlying clay.

21. Handle fragment. Distorted by heat. Lower part and angle of reeded ribbon handle.
Dimensions 32.8mm × 19mm.
NK74Bu ; building 7, officer's quarters, beside burnt wattle and daub.

22. Body fragment. Pale greenish. 31mm × 22mm.
NK75CK; overlying metalling between buildings 7 and 8.

23. Edge of shoulder and body fragment. 30mm × 33mm.
NK80DG; bath-house, hot dry room, burnt soil and daub.

24. Body fragment. 17mm × 13.5mm.
NK74BZ; building 7, officer's quarters, burnt wattle and daub.

25. Body fragment. 11.5mm × 35mm.
NK75CN; over road between buildings 3 and 4.

26. Body fragment. 42mm × 25mm.
NK75CT; building 7, officer's quarters.

27. Body fragment. 16mm × 25mm.
NK75CS; building 3, east end, southern edge.

28. Body fragment. 7mm × 23mm.
NK75CF; burnt layer at south-east corner of building 6.

29. Body fragment. 5mm × 30.5mm.
NK76Cx ; building 4, daub fill drain at north-east corner.

30. Body fragment. Affected by heat, crazed. 26mm × 19mm.
NK76Cx ; building 4, daub fill of drain at north-east corner.

31. Four joined fragments. Affected by heat, crazed. 24mm × 16.5mm.
NK80BL; annexe, rubble and brown silt overlying drain from stoke-pit to latrine.

32. Three joined fragments. Affected by heat, crazed. 22mm × 23.5mm.
NK78EQ; building 3, officer's quarters.

33. Two joined thick-walled fragments. 39mm × 67mm.
NK78EW; area to west of fort; NK73BS, building 3, officer's quarters, topsoil.

34. Body fragment. Strain cracks. 35mm × 40mm.
NK73AD; annexe, south-west of bath-house, topsoil.

35. Body fragment. Strain cracks. 27.5mm × 18mm.
NK73BM; annexe, south-west of bath-house, topsoil.

36. Body fragment. 35mm × 25.5mm.
Annexe, topsoil.

37. Three joined fragments, grosed for secondary purpose. Greenish. Fractured by heat. 33.5mm × 36.5mm.
NK73CE, annexe, south of cold room of bath-house, overlying road.

38. Thin fragment, perhaps bottle (or post medieval window glass). 30mm × 34mm.
NK73CD; bath-house, above paving of cold room.

39. Body fragment, two edges grosed for secondary purpose. 46mm × 45.5mm.
NK80DI; burnt layer in primary bath-house.

40. Melted body fragment and ten chips. 25mm × 32mm.
NK80DI; burnt layer in primary bath-house.

41. Body fragment. Dull. 24mm × 11mm
NK79BB; bath-house, first warm room, drain.

42. Three body fragments, the largest 67mm × 12.5mm.
NK73CT; overlying road surface between buildings 7 and 8.

43. Body fragment. 48mm × 39mm.
NK73Cu ; east end of buildings 6 and 7, topsoil.

44. Body fragment. 22mm × 21.5mm
NK73Cu ; east end of buildings 6 and 7, topsoil.

45. Five small chips, probably body fragment.
NK78EL; area to west of fort.

Illustration 9.6
A melted glass bottle base with one raised ring (14).
Photo: Val McManus.

46. Body fragment. 17mm × 22.5mm
NK78Bx ; area to east of fort, grey clay below topsoil and above grey sand.

47. Melted body fragment. 70mm × 34mm
NK78Bx ; area to east of fort, grey clay below topsoil and above grey sand.

48. Five body fragments. Strain cracks. Largest piece 58mm × 43mm.
NK73BS; building 3, room 1, topsoil.

49. Two body fragments, nine chips. Affected by heat, disintegrating, many strain cracks. Largest fragment 24mm × 40mm.
NK73AR; building 3, room 4, overlying clay.

50. Thick body fragment. 3.5mm × 38.5mm.
NK73CM; building 3, room 1, topsoil.

51. Body fragment. Affected by heat, many strain cracks. 32mm × 22mm.
NK73BD, rubble overlying building 4.

52. Body fragment. Affected by heat, strain cracks. 15.5mm × 23.5mm.
NK74AV; central area of building 1.

53. Two small body fragments. Melted and fused together.
NK76W34; between buildings 7 and 8.

54. Thick body fragment. Melted and deformed, probably prismatic bottle.
NK78DD; intervallum to west of building 4.

55. Thick body fragment. Melted and deformed, probably prismatic bottle.
NK75CA; brown soil below topsoil between buildings 7 and 8.

9.2.2 Window glass

56. Fragment (illus 9.7). Pale bluish green. Matt and glossy surfaces; large bubble visible on glossy surface. Part of square or rectangular quarry with three grosed edges.
Dimensions 94.5mm × 26mm; thickness 3.5mm.
NK73FL; annexe, pit south of cold room.

57. Small fragment. Pale bluish green. Matt and glossy surfaces.
Dimensions 21mm × 4.5mm; thickness 4mm.
NK77CM; beneath cobbles of intervallum road to east of building 12.

58. Fragment. Pale bluish green. Matt and glossy surfaces. One edge grosed.
Dimensions 44mm × 20.5mm; thickness 3.5mm.
NK73CI; building 3, hearth in room 2.

9.2.3 Object

59. Globular bead (illus 9.2.59). Dark glass appearing black. Small perforation, some distortion through melting. No visible wear.
Height 13mm; diameter 14.5mm; diameter of perforation 3mm.
NK78BF; area at bottom of slope south of fort, topsoil.

Illustration 9.7
Fragments of a small rectangular window pane (56).
Photo: Jeff Veitch.

Chapter 10

THE INTAGLIOS

MARTIN HENIG

10.1 CATALOGUE

1. Intaglio of cornelian, orange in colour with a few black inclusions (illus 10.1). Dimensions: 15mm × 11m × 3mm thick slightly convex, oval (Type A5).

   The device is Minerva standing with her body towards the spectator but facing left. She wears a peplos and on her head is a crested helmet. In her right hand is a spear, its point downwards and she lowers her left hand to the shield by her side. The type is, of course, a free adaptation of the *Athena Parthenos*. Similar adaptations are recorded from near Oxford, Canterbury (in an Anglo-Saxon setting), Cologne and Aquileia (Henig 1978: no 230; no 231; Henkel 1913: no 1208, Chiesa 1966: nos 132–3).

   More interesting than this is the evidence that the Bearsden find provides, that the rich, bold style of Antonine gem-cutting was in existence before 158. The gem may be compared with other intagli showing Minerva from the fortress baths at Caerleon (late second century context) from the legionary depot at Holt, Denbighshire, and from a lead-mining site probably under military control at Charterhouse-on-Mendip, Somerset (Henig 1978: nos 234, 242 and 237). All these stones testify to the popularity of the goddess amongst members of the imperial army. In addition two gems from Scotland, less well executed but evidently also second-century in date, should be noted. One was found in the fort at Newstead and the other is from the cremation of a Roman auxiliary at High Torrs, Luce Bay (Henig 1978: nos 243 and 235). This glyptic evidence does not, of course, stand alone but is fully supported by epigraphic finds.

   NK73CD; bath-house, cold room, lying on the floor.

Illustration 10.1
Intaglio of Minerva.

2. Intaglio of red jasper. Dimensions: (upper-surface) 9mm × 6mm × 3mm thick (illus 10.2). The stone is flat with levelled edge, oval (type F2) and is set in an iron ring of normal early second-century type (Henig 1978: no 381. Marshall 1907, x LVI, Type E x VII and cf no 1469). The device is much more personal than that on the other intaglio and British inscriptions do not help in elucidating its significance. The intaglio is a well executed representation of a shrimp (probably *Peneus kerathurus*), with long antennae curving down under the body and the back arched so that the creature's tail almost touches them. A shrimp is depicted on a gem from Colchester and probably on another from york, but the crustacean on an intaglio from Silchester is almost certainly a crawfish (Henig 1978: nos 716, 715 and 717). The type is by no means rare and fine examples of intagli which portray shrimps are published from Aquileia and elsewhere (Chiesa 1966: nos 1388–92; Fossing 1929: nos 1512–13). The Romans ate all sorts of seafood and this taste is

Illustration 10.2
Ring and intaglio of a shrimp.

Illustration 10.3
Intaglio of a shrimp.

reflected both in literature and art (Apicius, *Artis Magiricae* Ix. Pliny, 9, 168–74; Toynbee 1973: 209–215, pl CVIII). However a personal signet is likely to have had more than merely culinary significance. Pliny lists a number of cures for ailments which make use of fish. Furthermore crustacea appear to have been invested with apotrapaic qualities.

NK73CQ; drain to west of building 4.

For the sake of completeness, mention should be made of a chance find in 1933, when a cornelian intaglio depicting a figure of Ceres was found on the site. This is now in the National Museum at Edinburgh. The type is attested at military sites including Holt and Corbridge, but the idea behind it reflects the essentially agrarian ethos of all men in Antiquity, the hope for prosperity on a good harvest.

10.2 THE 'SHRIMP'

SUSAN CHAMBERS

The specimen is without a head (illus 10.2 and 10.3). The main upper part of the body is divided into 6 segments with a tail fan which are characters of the Crustacean group Caridean decapods (Shrimps and Prawns, see Smaldon 1979: no 15). However, the long jointed appendages on the front of the body are confusing. If it was a shrimp or a prawn these structures would be attached to the carapace. From the illustration the point of attachment could be the posterior part of the carapace, which has been torn from the body.

The other possibility is that the joint appendages are antennae of another group of Crustacean the Amphipoda. These are commonly known as sand hoppers and have long antennae, no carapace, and more 'body' segments.

The intaglio is possibly a composite of the two groups or the front pair of jointed limbs have been exaggerated in length in which case it is a Caridean decapod. On reflection I prefer the latter idea.

Chapter 11

METALWORK

LAWRENCE KEPPIE

11.1 COPPER ALLOY (illus 11.1)

1. Ring. Diam: 25mm.
   NK75AI; building 4, topsoil.
2. Stud. Diam: 10mm, with remnant of a shank. Cf Crummy 1983: 116, fig 120 no 3161.
   NK73AW; annexe, south-west of bath-house, topsoil.
3. Flat strip. L: 40mm, with curving edge and small nail-hole.
   NK73CJ, buildings 6 and 7, topsoil.

Illustration 11.1
Copper alloy 1–10.

4. Nail, with flat circular head and square-sectioned stem. L: 29mm.
   NK73Bu ; building 7, topsoil.
5. Nail, with flat circular head and square-sectioned stem. L: 24mm.
   NK73CA: west intervallum beside building 3.
6. Spatula. L: 66mm, with stamped lettering, modern?
   NK78AT; building 2, lying on subsoil.
7. Domed fitment or stud. L: 23mm, with shank at either extremity.
   NK79DI; annexe, south of bath-house, topsoil.
8. Stud. Diam: 14mm, with remnant of shank.
   NK78By; area east of annexe, grey clay below topsoil and above grey sand.

   Cf Bishop 1996, 62 nos 371–403
9. Shank from a button-and-loop fastener. L: 25mm. Cf Curle 1911: 302 pl 75, nos 7–8; Macdonald & Curle 1929: 554, fig 115, no 13; Robertson 1957: 70, fig 12.1; Wild 1970: figs 1–2.
   NK80DK; primary bath-house, burning round hearth.
10. Belt or strap fitting. L: 45mm.
    NK77BC; building 5, daub.

There were also some very small fragments, with various provenances.

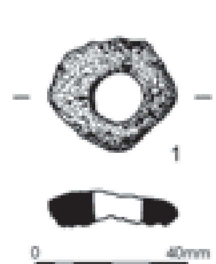


Illustration 11.2
Lead 1.

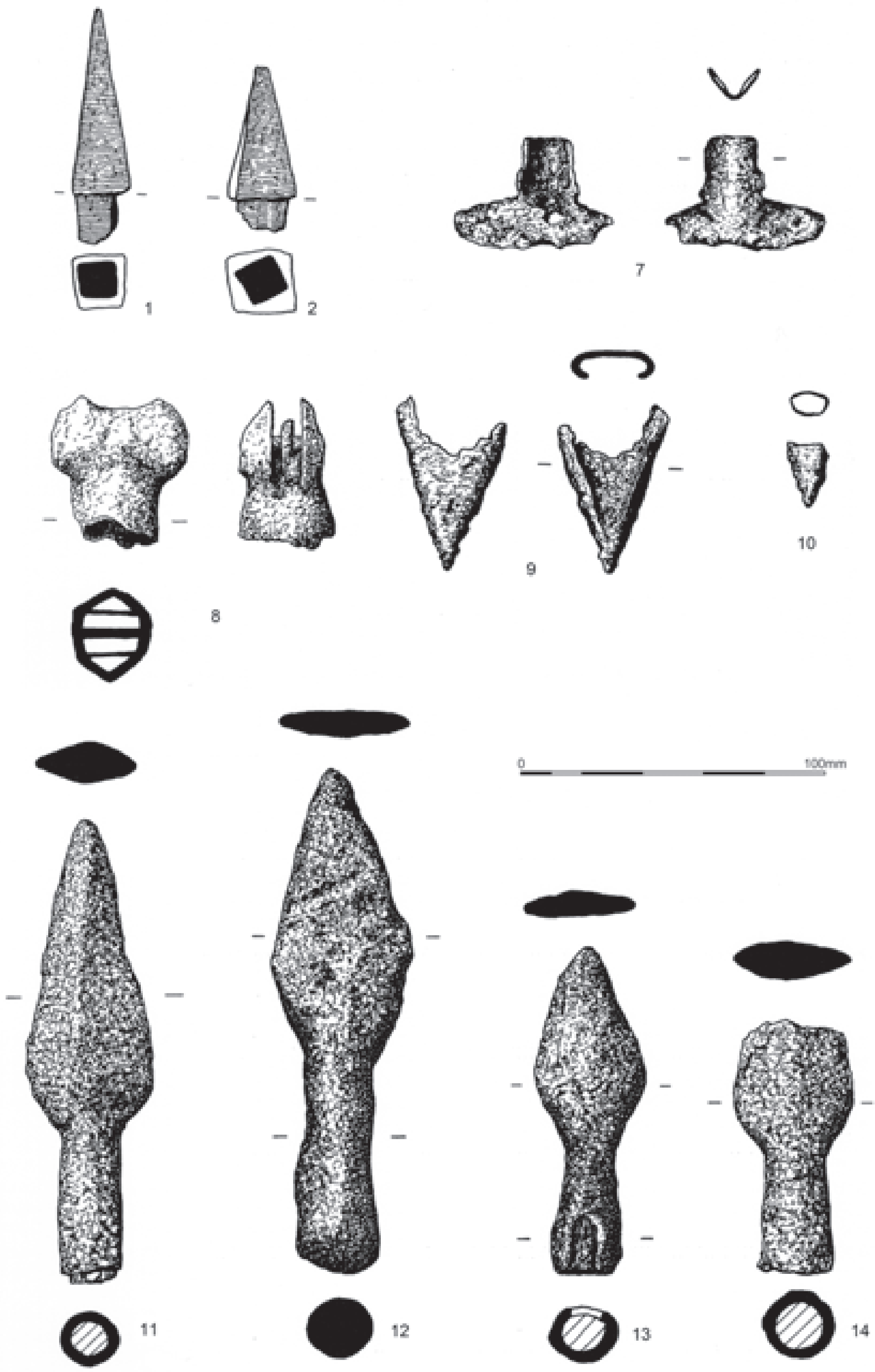


Illustration 11.3
Ironwork 1, 2, 7–10, 11–14.

Illustration 11.4
Ironwork from the middle west ditch.

11.2 LEAD

1. 'Ring'. Diam: 35mm; Th: 10mm, pierced with circular hole 15mm in diameter (illus 11.2).

   NK74CO; building 4, rubble.

2. Fragment, 44mm × 28mm, possibly of a vessel or container .

   NK75CO; bath-house, under floor of changing room.

3. Six fragments.

   NK73EP; bath-house hot room, dark soil in fill; NK73CD; bath-house cold room, above paving; NK75CO; bath-house, changing room under floor; NK75CE; east intervallum beside building 7; NK78DM; area east of annexe ditches; NK73EE; bath-house, debris over hot room.

11.3 IRON

11.3.1 Weapons

1–6. Six *pilum* heads (illus 11.3.1 and 2). L: 55–75mm; W: 12–20mm. All are broken off at or near the top of the shank. Where the tip has survived, it is bent or blunted from use. One example has an arrowhead fused to it. Similar heads have been recovered on the Antonine Wall at Bar Hill (Keppie 1975: 100, fig 33 no 18) and at Seabegs Wood (Keppie & Walker 1981: 146, fig 4 no 2). Larger than the accepted norm for *pila* (for which see Bishop & Coulston 2006: 129), they have sometimes been supposed to be carpenters' bits (for which see Manning 1985: 27, pl 12 nos B58–73).

   NK78AS; middle west ditch, silt below organic layer.

7. Fragment of T-shaped hilt-mounting of dagger (*pugio*). L: 130mm; W: 65mm, preserving part of the crossbar and upright (illus 11.3.7). Cf Keppie 1975: 99, fig 32 no 15; Manning 1985: pl 73–4, nos V6–13.

   NK76BN; building 11, north range, topsoil.

8. Fragment of pommel of T-shaped hilt-mounting of dagger (*pugio*). L: 47mm; W: 42mm, preserving both sides and central rivet (illus 11.3.8). Cf Bishop and Coulston 2006: 84 fig 42; 135 fig 80; 165 fig 104.

   NK78DW; intervallum west of building 4, red/brown soil below topsoil.

9. Part of scabbard chape of a *gladius*. L: 59mm; W: 40mm; Th: 8mm (illus 11.3.9).

   NK73W9; intervallum west of building 3.

10. Terminal of scabbard chape of a *gladius*. L: 21mm (illus 11.3.10). Cf Webster 1979: 67, fig 29 no 5; Bishop and Coulston 2006: 81 fig 41.3–5.

    NK73W9; intervallum, west of building 3.

11. Socketed spearhead, total L: 145mm; L of blade 98mm; Diam of socket: 12mm (illus 11.3.11 and 11.6). Protruding from one

Illustration 11.5
Ironwork from the middle west ditch.

Illustration 11.6
Ironwork 11, a spearhead.

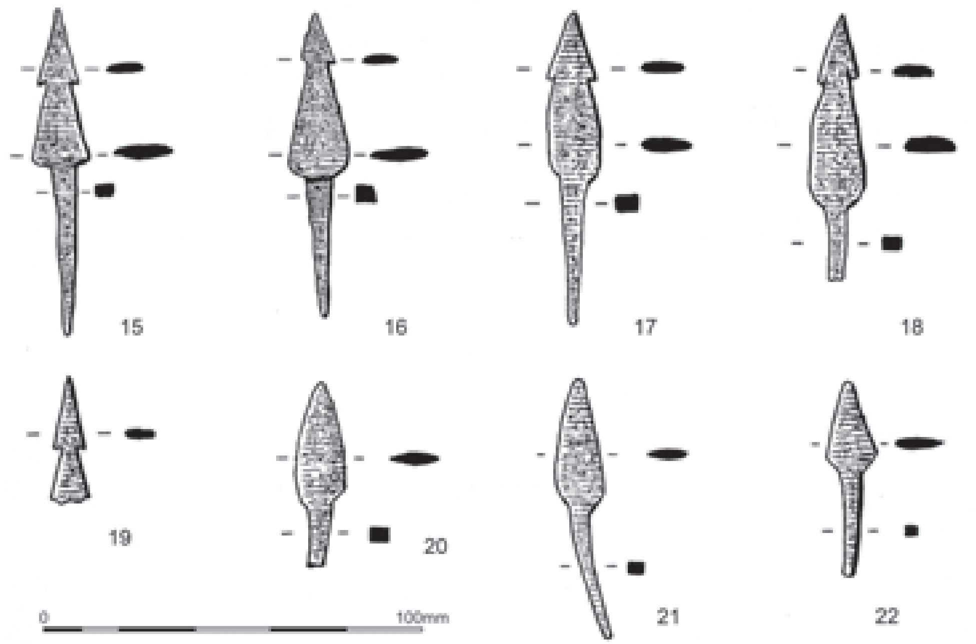


Illustration 11.7
Ironwork 15–22, arrowheads.

Illustration 11.8
Arrowheads from the middle west ditch.

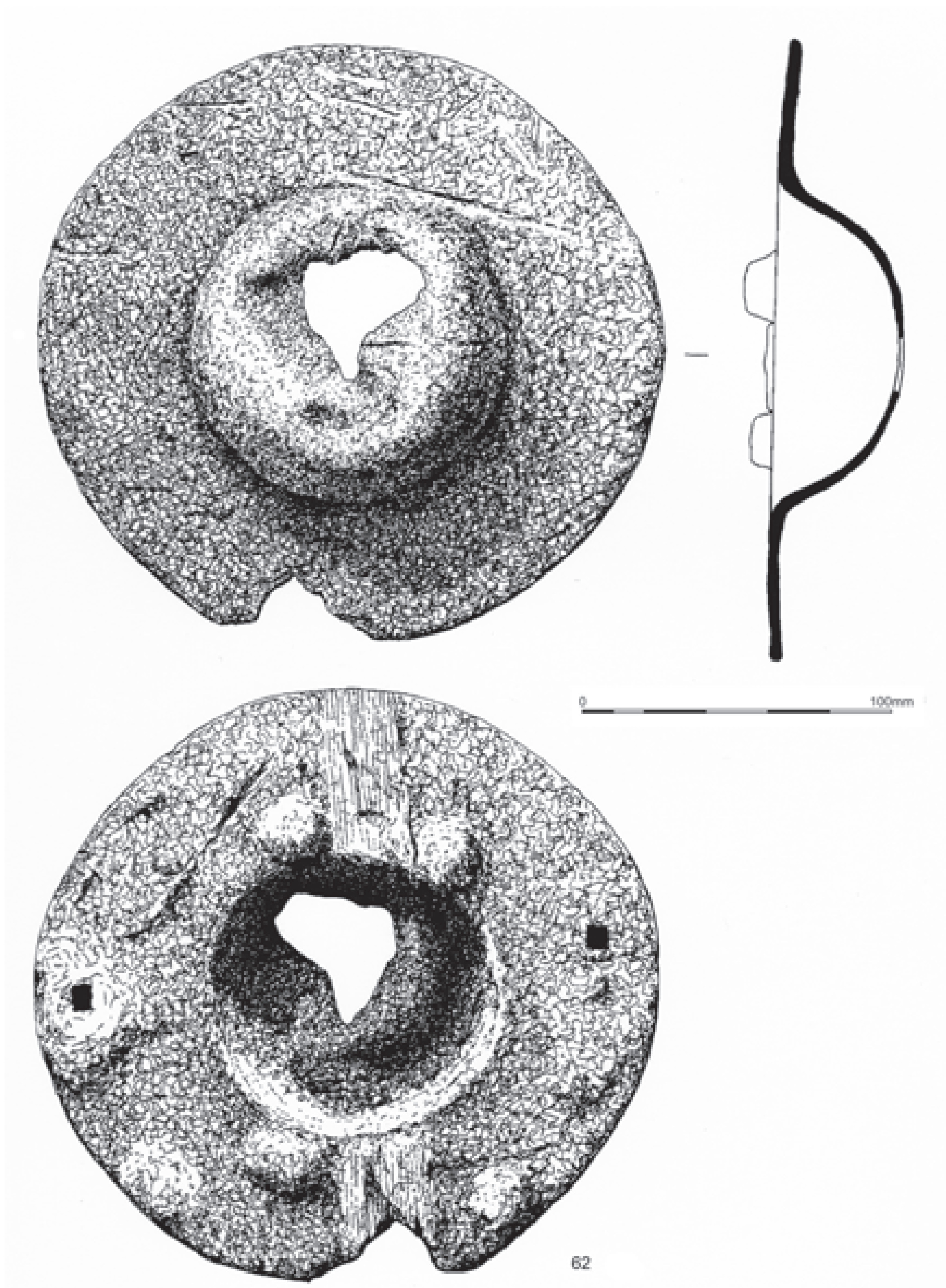


Illustration 11.9
Ironwork, 62, shield boss.

Illustration 11.10
Ironwork 62, the exterior face of the shield boss.

Illustration 11.11
Ironwork 62, the interior face of the shield boss.

side is an apparent tang; however x-rays showed that this was not an integral part of the object, but the result of corrosion.

NK76CZ; building 3, destruction level.

12. Socketed spearhead, total L: 165mm; L of blade 67mm: Diam of socket: 17mm (illus 11.3.12).

    NK77ES; building 7, officer's quarters, daub.

13. Socketed spearhead, total L: 107mm; L of blade: 60mm; Diam of socket: 16mm (illus 11.3.13).

    NK76EG; buildings 13 and 14, topsoil.

14. Fragment of socketed spearhead, total L: 80mm; Diam of socket: 15mm (illus 11.3.14).

    NK74AZ; intervallum west of building 1, topsoil.

In general, on spearheads, see Scott 1980; Manning 1985: 160–70, pl 76–81 nos V26–140; Marchant 1990; Manning 2006.

15–61. 47 arrowheads with flattened head and triangular blade; maximum L: 90mm, with maximum shank L: 52mm (illus 11.7.15–22; cf 11.8). 13 are intact, or nearly intact. One arrowhead is fused to a *pilum* head (see above). The majority are clearly barbed (illus 11.7.15–19); a few (illus 11.6, 20–22) have plain points. None exhibits conclusive evidence of use. Some fragments of shanks also survive separately.

NK78AS; middle west ditch, silt below organic layer.

This type of arrowhead is highly unusual, but cf Bushe-Fox 1949: 153 pl LIx no 302; Bidwell 1985: 136, no 31; Bishop and Coulston 2006: 205 fig 131.3. Coulston (1985: 266) suggests that the Bearsden arrowheads were 'locally produced for mural defence', or 'simply for hunting purposes'.

62. Shield boss. Diam: 205mm, with flange 45–50mm wide; damaged and scored across its surface (illus 11.9–11.11). The central dome has been pushed in by a heavy blow; a small segment of the flange is lost. No rivet holes are visible on the flange, but x-rays revealed two diametrically opposite holes, 4mm × 3mm. Others probably existed in line with the hand-grip. On the back are traces of wood, likely to be a vertical spar, part of the hand-grip, set between what seem to be domed rivets.

    NK73DH; over west fort rampart west of building 4.

63. Four adjoining fragments preserving about one-third of a shield boss (illus 11.12). Diam: about 210mm, with central dome, badly dented and flattened, and flange 45mm wide. There are no visible rivet holes.

    NK78EN; daub fill of gulley outside south-east corner of building 2.

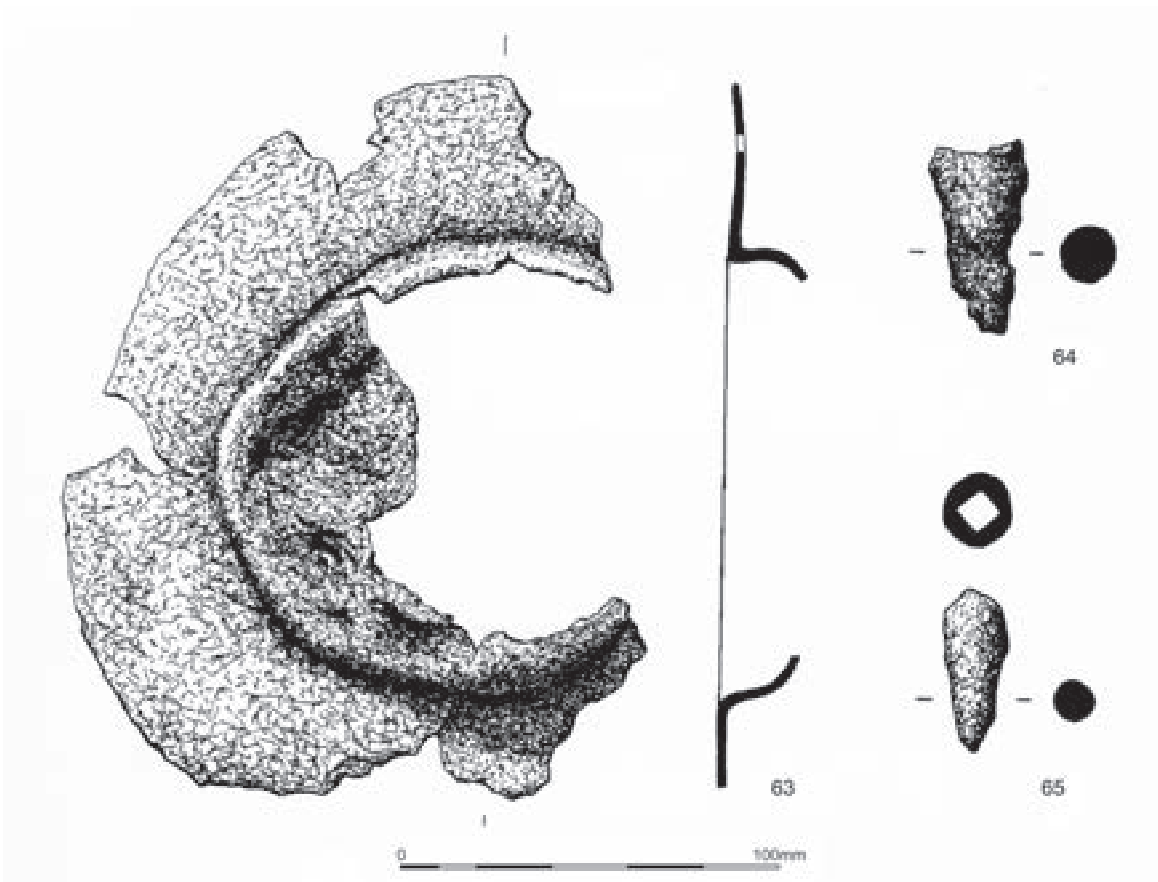


Illustration 11.12
Ironwork 63–65.

The bosses are of the circular type associated with the oval shields carried chiefly by auxiliaries, rather than the rectangular form with central dome on the shields of legionaries. Cf Jacobi 1897: taf 40, nos 20–1; Curle 1911: 180 pl 34.3; Piggott 1953: 36 figs 9 (C 38), 12 (B 30); Burley 1956: 200, no 382; Jarrett 1976: 72, fig 20.1; Buckland 1978; Webster 1979: 70, no 90, fig 33; Bidwell 1985: 130–1, fig 47.1; Barrett et al 2000: 124 fig 59.18, 128, fig 62.54–5; Bishop and Coulston 2006: 138 fig 83 no 5; Rushworth 2009: 458 fig 14.14 no 312; Ferris 2010: 367 no 55; etc.

64. Ferrule. L: 50mm; maximum Diam: 24mm tapering to 13mm (illus 11.12.64). Probably a spear-butt.

NK73BS; building 3, room 1, topsoil.

65. Ferrule, length 40mm, maximum Diam: 17mm tapering to 3mm (illus 11.12.65). Probably a spear butt.

NK73Fy; annexe, south of changing room of bath-house, occupation layer immediately under topsoil.

Cf Manning 1976: 21, fig 13, nos 24–6; Manning 1985: 140–1, pl 66 nos S57–83; Bishop and Dore 1988: 195, fig 91, nos 16–18; Frere and Wilkes 1989: 143, fig 70.17; Bishop and Coulston 2006: 77 fig 38 nos 17–24; Rushworth 2009: 459 fig 14.15 no 322.

66–87. Shield stiffeners. The oval shields of the auxiliaries were strengthened by narrow iron strips, flat on one side and convex on the other, with the ends flattened to receive rivets. Some of the strips here seem rather flimsy (see also below no 159).

66. Fragment of strip, circular in section. L: 55mm; Diam: 9mm; flattened at one end to receive rivet.

NK77ET; building 16, pit.

67. Fragment of strip, rectangular in section. L: 52mm; maximum W: 15mm, with rounded end.

NK74AZ; intervallum west of building 1, topsoil.

68–73. Six fragments of narrow strip. L: 25mm–75mm, with one side flat and the other convex.

NK73Cu ; between buildings 6 and 7 beside officer's quarters, overlying clay.

74–5. Two fragments of narrow strip, flat on one side, convex on the other; one has been flattened at one end to receive a rivet. L: 34 and 40mm.

NK79W9; intervallum west of building 4; topsoil.

76–81. Six fragments of strips, flat on one side, convex on the other. L: 21–45mm.

NK73AWW; annexe, south of changing room of bath-house, topsoil.

82–6. Five fragments of strips, flat one side, convex on the other. L: 30mm–40mm.

NK73AW; annexe, south of changing room of bath-house, topsoil.

87. Fragment of strip, convex on one side, almost flat on the other. L: 70mm.

NK73Cu ; between buildings 6 and 7 beside officer's quarter, overlying clay.

Cf Curle 1911: 180 pl 34.1, 12; Keppie 1975: 100, fig 33, no 19; Buckland 1978: 250 fig 3; Manning 1985: 147, pl 71 nos T9–10; Bishop & Coulston 2006: fig 49 nos 5–6; Howard-Davis 2009: 706, fig 356.

11.3.2 Tools and implements

88. Note on the iron hoe by SIAN REES (illus 11.13)

The iron tool is almost certainly an example of the type of hoe which White (1967: 66) suggested is the *ascia/rastrum* described by classical authors (Palladius, *Opus Agriculturae* 1.43.3) as a small agricultural tool used to aerate the soil, remove weeds on a smaller, more delicate scale than would be possible with the other types of Roman hoe. Some 14 of these tools are known from Romano-British contexts and they are also relatively common on Roman sites on the Continent (Rees 1979: 309–10). The tool type is distinguished by having a short, stout blade on one side of the head, and two tines on the other. The tines would be used to loosen the soil, the blade to draw it. The heavily corroded example from Bearsden, now 245mm in length, has a wide oval-shaped blade on one side of the head 135mm long, 85mm wide; only one of the forking tines remains, though the stump of the second survives sufficiently clearly to make the identification of the tool quite secure. The length of the tool would have originally been probably somewhat greater as the surviving tine is diminished by corrosion, though as is frequently the case with these tools, the tines were probably originally considerably shorter than the blade. The tines and the blade are set at the slight angle to the head which is normal on such tools, so that the working edges strike the ground at an effective angle when in use. The Bearsden tool fits comfortably into the size range displayed by other Romano-British examples (162–265mm), and the short, forking tines are, again, entirely characteristic of the type. The only somewhat unusual feature of the tool is the blade which, though similar in length to many other examples, is rather wider than normal; its oval shape also is uncommon, as the more normal blade shapes are triangular, chisel-shaped or spade-shaped.Few of the *ascia/rastrum* hoes found on Romano-British sites are well dated. The presence of an example from an early context on a site in London indicates a date of introduction into this country early in the Roman period, while the example found at Richborough is in a stratum where a fourth century coin indicated a late date, suggesting that the tool had a continued use throughout the Roman period. The tools appear to come mainly from highly Romanised sites rather than native sites, and are found on both civilian and, less commonly, on military sites. The identification of the tool as having an exclusively agricultural

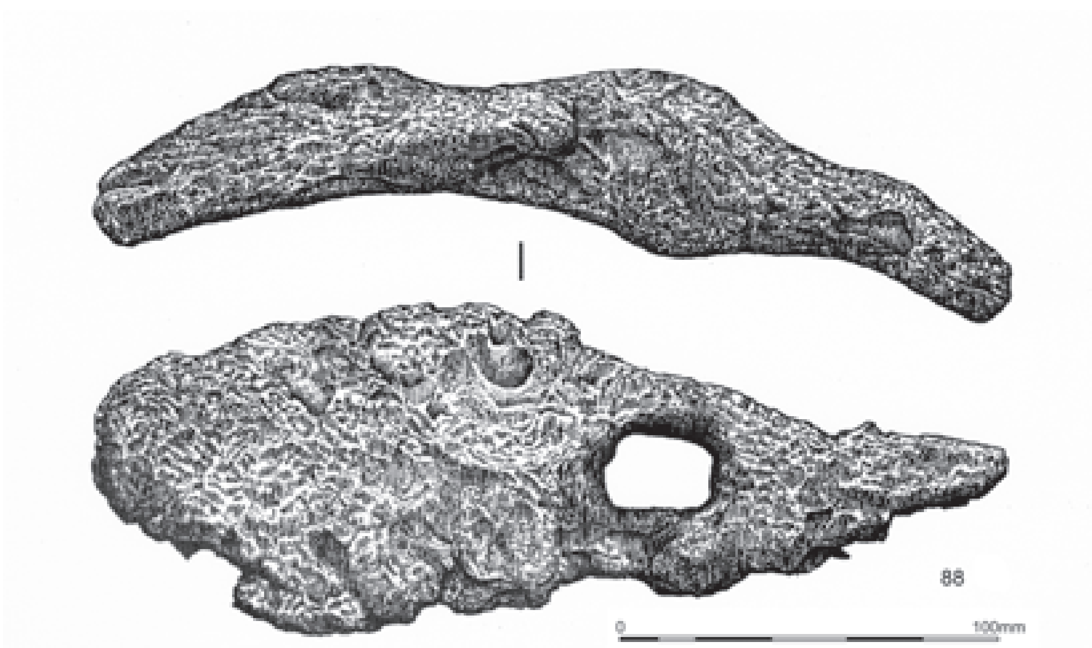


Illustration 11.13
Ironwork 88, hoe.

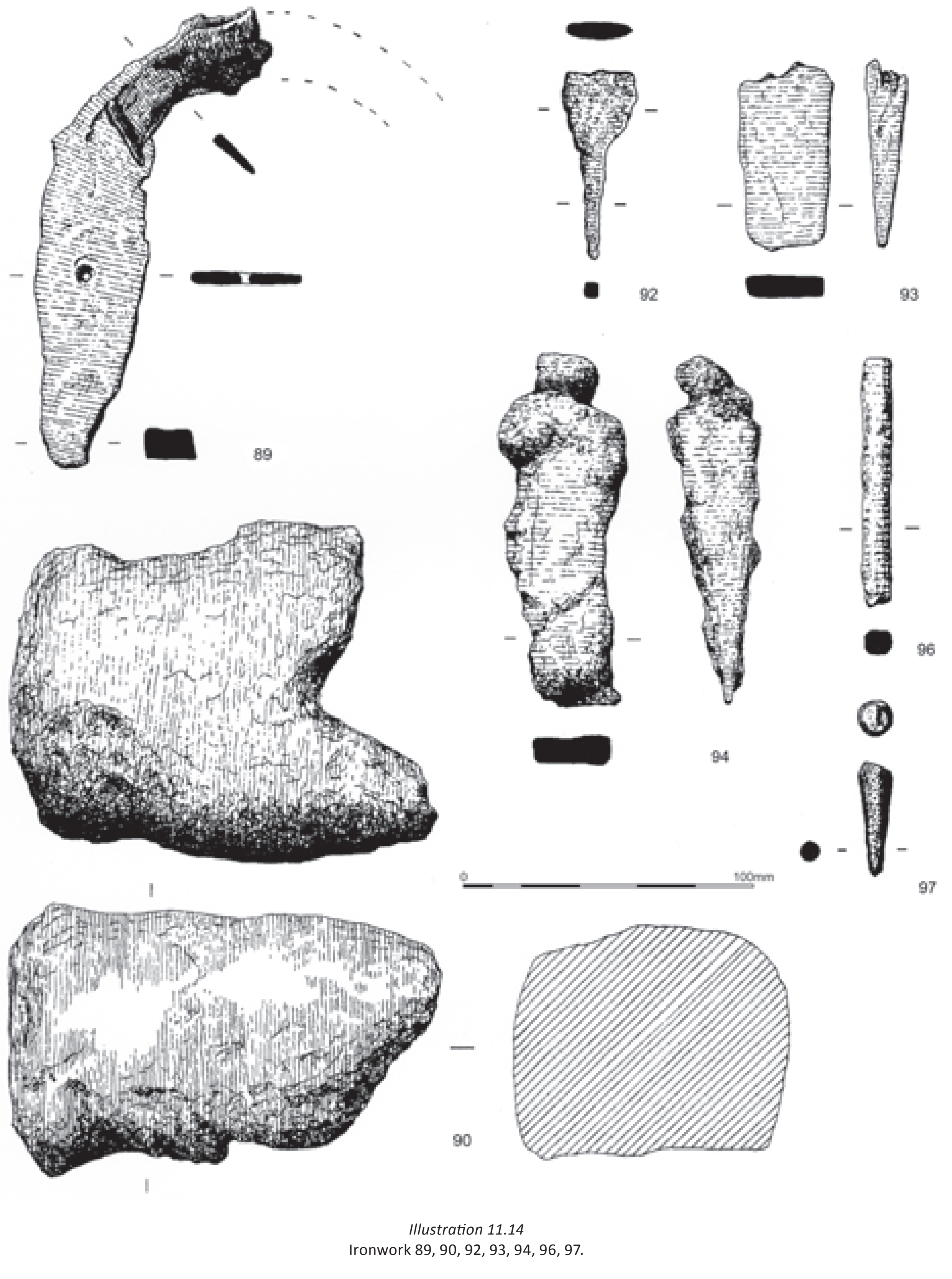


Illustration 11.14
Ironwork 89, 90, 92, 93, 94, 96, 97.

Illustration 11.15
Ironwork 90, the anvil.

function is acceptable for tools found in towns, at small settlements and villas, but is perhaps more questionable for examples from military sites. The hoes are found throughout Britain but are less commonly found in the north and west. One was found at Rough Castle (Buchanan et al 1905: 494, fig 2) and this is the only Scottish parallel known to me; another example comes from Housesteads (Manning 1976: 29 no 82).

Bath-house, unstratified.

89. Tanged reaping hook, bent over. Total L: 245mm; maximum W: 36mm, one end thickening to form tang; nail hole for rivet, to attach wooden handle (illus 11.14.89). Cf Curle 1911: pl 61.2, 5; Rees 1979: 455–9.
    NK73BS; building 3, topsoil.

90. ?Block anvil. L: 140mm; W: 120mm; Th 80. The top is slightly domed (illus 11.14.90 and 11.15). Cf Manning 1985, 3, pl 1 nos A1–3.
    NK74DB; gulley to west of building 3.

91. Tang of knife-blade or chisel. L: 45mm; W: 25mm.
    NK74AZ; intervallum to west of building 1, topsoil.
    Cf Bishop 1996, 86 nos 549–67.

92. Tang of knife-blade or chisel. L: 110mm; maximum W: 20mm; tang W: 12mm (illus 11.14.92). Cf Manning 1985, 115–6, pl 55 nos Q48–54.
    NK76Eu ; building 16, post-hole.

93. Fragment of tapering blade. L: 60mm; W: 30mm: Th: tapering from 11mm to 3mm (illus 11.14.93).
    NK74CM; burnt wattle and daub fill of gulley north of building 1.

94. Chisel with remnant of ?tang. L: 120mm; W: 25mm: Th: tapering from about 15mm to 2mm (illus 11.14.94).
    NK77Dx ; drain between south rampart and intervallum.

95. Fragment of ?blade. L: 64mm; W: 21mm, with circular hole near one end, revealed by x -ray.
    NK77AD; intervallum to east of building 7, topsoil.

96. Part of a ?file. L: 85mm; Diam: 10mm tapering to 4mm, with serrated surfaces (illus 11.14.96).
    NK73Cu ; area between buildings 6 and 7 beside officer's quarters, overlying clay.

97. Part of a punch. L: 39mm; Diam: 10mm, tapering to 4mm (illus 11.14.97).
    NK78AS; middle west ditch, silt below organic layer.

98. Heavy triangular ?wedge. L: 185mm W: 57mm, ending in a point; Th: 10mm (illus 11.16.98).
    NK73Cu ; intervallum to east of building 7, topsoil.

99. Part of axe-blade (visible on x -ray). L of blade: 110mm; Th: tapering from 25 to 8mm (illus 11.16.99).
    NK74AZ; intervallum to west of building 1, topsoil.

11.3.3 Structural items

100. Fragments of drop-hinge. The largest fragment, L: 105mm, preserves the thickened u-curve and part of one arm (illus 11.17.100). Cf Manning 1985: 126, pl 58 nos R8, R9.
    NK78DC; gulley to north of building 1.

101. Slide bolt of tumbler lock. L: 70mm: W: 16mm; Th: 11mm tapering to 2mm (illus 11.17.101). Most examples are in copper alloy, eg Curle 1911: 306 pl 78, 7–8; Crummy 1983: 124 fig 136, nos 4133–6; Bishop & Dore 1988: 167 fig 79, no 73; Frere & Wilkes 1989: 156, fig 78, no 82; Bishop 1996: 77 nos 467–8; Cool & Philo 1998: nos 643–4; Hanson 2007: 411 no 55, fig 10.30; Rushworth 2009: 441, fig 14.7 nos 62–3; etc. A few are in iron, as here, eg Jacobi 1897: Taf 45, nos 1–5; Bidwell 1985: 148, fig 54 no 109.
    NK78AS; middle west ditch, in silt below organic layer, together with no 102.

102. Small bolt-plate. L: 40mm, with hole (diameter 8mm) to receive bolt (illus 11.17.102). Cf Curle 1911: 286 pl 64.8; Manning 1985 124, pl 58, no R3.
    NK78AS; middle west ditch, in silt below organic layer, together with no 101.

103. Joiner's dog. L: 155mm; maximum W: 27mm, with tangs, 10mm long, at both ends (illus 11.17.103). Cf Keppie 1975: 110, fig 37 no 56; Manning 1976: fig 25 no 164; Crummy 1983: 120, fig 127 no 4072; Manning 1985: 131, pl 61 nos R52–3; Frere & Wilkes 1989: 171, fig 89 no 196; etc.

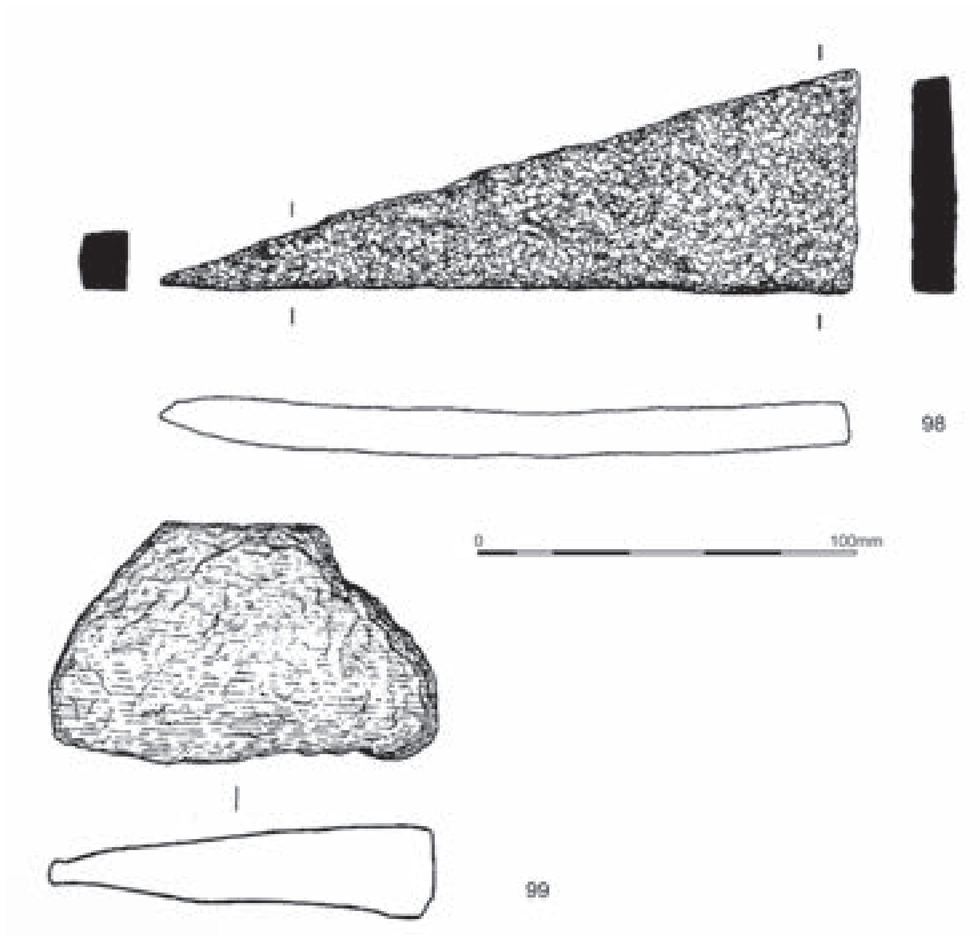


Illustration 11.16
Ironwork 98, 99.

NK73S3; annexe, south of changing room of bath-house, topsoil.

104. Fragment of ?joiner's dog. L: 72mm; W: 25mm, with one tang, 27mm long, surviving (illus 11.17.104).
NK73BS; building 3, topsoil.

105. One leg of holdfast. L: 50mm; W: 10mm; Th: 16mm, tapering to 3mm (illus 11.17.105).
NK78AS; middle west ditch, in silt below organic layer.

106. Fragment of holdfast. L: 70mm; W: 12mm; L of surviving leg 80mm (illus 11.17.106).
NK78AS; middle west ditch, in silt below organic layer.

107. Fragment of holdfast. L: 60mm; W: 14mm; L of surviving legs: 25mm (illus 11.17.107).
NK78AS; middle west ditch, in silt below organic layer.

108. Fragment of holdfast. L: 64mm; W: 11mm: L of surviving leg: 48mm (illus 11.17.108).
NK78AS; middle west ditch, in silt below organic layer.

109. Thin holdfast. L: 50mm; W: 3mm; L of surviving tang: 7mm.
NK74M; burnt wattle and daub fill of gulley to north of building 1.

110. Leg of ?holdfast. L: 51mm; W: 10mm.
NK74BK; intervallum east of building 8, overlying natural.

111. Fragment of holdfast. L: 53mm.
NK80CK; primary bath-house, robber trench of south wall.

112. Linked-pin fragment. L: 31mm; Diam of pin: 20mm (illus 11.17.112).
NK75CG; brown soil below topsoil and above clay, east end of buildings 6 and 7.

113–14. Two linked-pin fragments. L: 90mm and 55mm (illus 11.17.103 and 114).
NK74CK, gulley to north of building 1.

115. u pright arm of L-shaped staple, to support drop-hinge. L: 57mm; Th: 10–12mm (illus 11.17.115).
NK78AS; middle west ditch, in silt below organic layer.

116. ?L-shaped staple to support drop hinge. L of each arm: 52mm.
NK77ER; intervallum east of building 7.

Illustration 11.17
Ironwork 100–9, 112–15, 119.

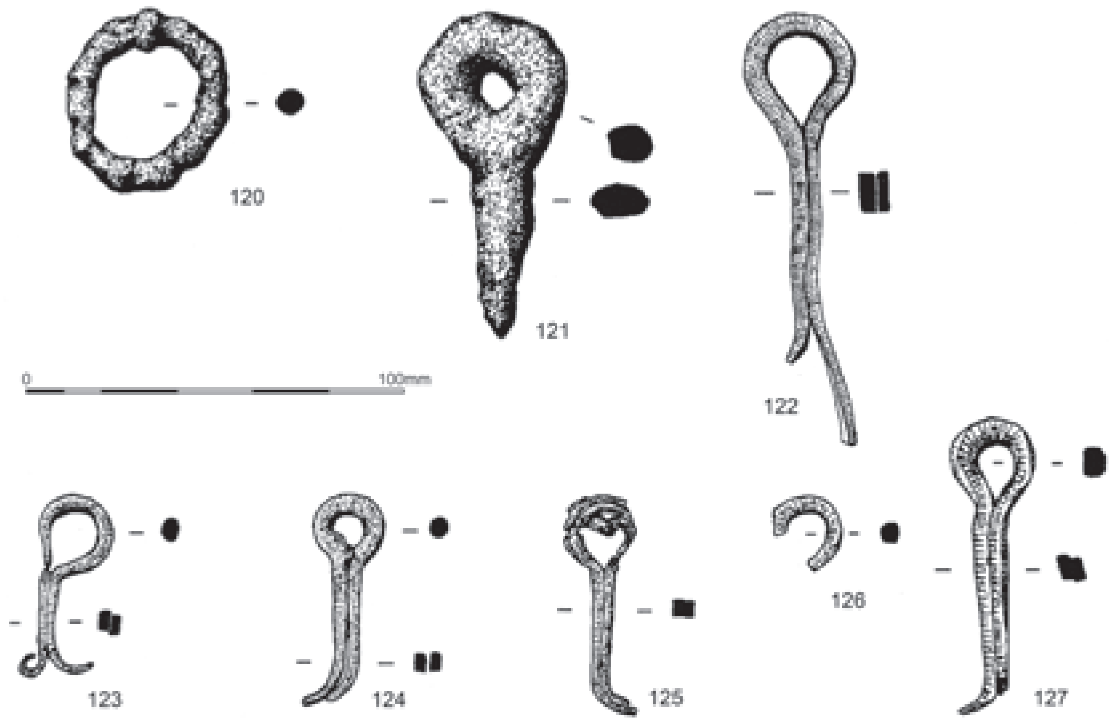


Illustration 11.18
Ironwork 120–127.

117. ?L-shaped staple, to support drop hinge. L: 65mm .
NK75BQ; western pit to west of bath-house changing room.

118. ?L-shaped staple, to support drop hinge. L: 66mm.
NK74CZ; wattle and daub fill of gulley to north-west of building 3.

119. L-shaped staple, to support drop hinge. L: 55mm (illus 11.17.119).
NK80AZ; bath-house, hot dry room, furnace.

For L-shaped staples cf Macdonald & Curle 1929: 563 nos 8–9; Manning 1972b: 180 no 58; Keppie 1975: 106, fig 35 no 38.

120. Ring. Diam: 47mm; Th: 6mm (illus 11.18.120). Cf Keppie 1975, 111, fig 38 nos 61–2; Webster 1979: fig 36 no 137, fig 39, no 198.
NK74BC; clay surface in intervallum east of building 8.

121. Ring-headed pin L: 85mm; external Diam of ring: 33mm (illus 11.18.121). Cf Manning, 1972: 187 fig 69, nos 95–8.
NK77ET; pit in south intervallum area south-east of building 16.

122. Double-spiked loop. Diam of ring: 28mm; L of legs: 80mm (illus 11.18.122).
NK78AS; middle west ditch, in silt below organic layer.

123–6. Fragments of double-spiked loops. Diam of ring: 18mm; L of legs: 25mm–35mm, two with legs bent over (illus 11.18.123–6).
NK78AS; middle west ditch, in silt below organic layer.

127. Double-spiked loop. Diam of ring: 22mm; L of legs: 50mm (illus 11.18.127).
NK78AS; middle west ditch, in silt below organic layer.

128. One leg of double-spiked loop. L: 86mm.
NK78AS; middle west ditch, in silt below organic layer.

129. Part of ?leg of double-spiked loop. L: 45mm.
NK78AS; middle west ditch, in silt below organic layer.

130. Small fragment of leg of double-spiked loop. L: 32mm.
NK78AS; middle west ditch, in silt below organic layer.

131. Fragment of small holdfast or double-spiked loop. L: 15mm.
NK78AS; middle west ditch, in silt below organic layer.

For double-spiked loops cf Curle 1911: 290, pl 67 nos 6, 10–13; Manning 1972: 184, fig 68 nos 90–4; Keppie 1975: 97, fig 31.1; Webster 1979: 81, fig 39 no 180; Crummy 1983: 119, figs 125–26 nos 4059–69; Manning 1985: 130 and pl 61 nos R34–47; Howard-Davis 2009: 755 fig 428; etc.

Illustration 11.19
Ironwork 132, 134, 136, 137, 144, 152–154.

132. T-shaped clamp, crossbar. L: 120mm; surviving shank L: 195mm (illus 11.19.132).
NK73EP; bath-house, hot room.

133. T-shaped clamp (now partially disintegrated). Crossbar L: about 120mm; original L of shank: 140mm.
NK79DL; bath-house, hot room, behind west wall-flag on north wall.

134. ?Shank of T-shaped clamp. L: 127mm; Th: 11mm (illus 11.19.134).
NK73BW; drain through east annexe rampart.

135. Shank of corroded T-shaped clamp. L: 78mm; W: 9mm.
NK73W5; building 3, topsoil.

136. Two adjoining fragments of T-shaped clamp. Crossbar L: 80mm; shank L: 85mm (illus 11.19.136).
NK73S4; annexe, south of cold room of bath-house, topsoil.

137. Small T-shaped clamp. Crossbar L: 55mm; L of shank: 30mm (illus 11.19.137).
NK75CK; building 7, overlying occupation layer.

138. Part of a T-shaped clamp. Crossbar L: originally 120mm; L of surviving shank: 38mm.
NK79DL; bath-house, hot room.

139. Part of small T-shaped clamp, with corroded nail stem attached .
NK79AN; bath-house, second warm room between *pilae*.

140. ?T-shaped clamp. L: 170mm .
NK79AZ; bath-house, basement of second warm room between *pilae*.

141. Part of T-shaped clamp, and iron object adhering to stone.
NK80BE; bath-house, basement of hot dry room, between dwarf walls.

142. T-shaped clamp, and clump of nails.
Bath-house.
T-shaped clamps held in place box-flue tiles against the internal walls of a bath-house. Cf Curle 1911: 290 pl 67.1–4; Macdonald 1931: 278, 294; Manning 1972: 185, fig 68 no 82; Manning 1976: 40, fig 25 nos 157–62; Bidwell 1979: 242, fig 76 nos 91–3; Crummy 1983: 169, fig 206 no 4677; Manning 1985: 131, pl 62 nos R65–9; Gillam, Jobey & Welsby 1993: 29, fig 9 no 7; Birley, A 2001: 42, fig 56; Holmes 2003: 115 illus 109. They are sometimes found in association with baked-clay 'spacers' (Money 1974: 278 with pl lviib; Bishop 1998: 42). At Bearsden some retained stone cladding in the hot room (*caldarium*) (illus 3.3.42), as they do at Chesters (Macdonald 1931: 278) and Risingham (Manning 1985: 131 no R67).

143. Hook fragment. Diam: 9mm; L: 35m.
NK76Cx ; burnt wattle and daub fill of gulley crossing *via praetoria*.

144. Hook fragment. L: 45mm; maximum Diam: 12mm (illus 11.19.44).
NK76DD; annexe, south-west of bath-house, topsoil.

145. Hook fragment. L: 38mm; maximum Diam: 13mm.
NK73S3; annexe, south of changing room of bath-house, topsoil.

146. ?Hook fragment. L: 40mm; Diam: 7mm.
NK75AM; annexe, western pit west of bath-house changing room.

147. ?Hook fragment. L: 54mm; maximum Diam: 9mm.
NK74BK; intervallum east of building 8.

148. ?Hook fragment. L: 40mm.
NK74Cy; fill of gulley to north-west of building 3.

For hooks cf Curle 1911: 290, pl 67.8; Manning 1976: 43, fig 26 nos 187–8.

149–51. Three short lengths of bars. Diam: 15mm; L: 116, 110, 95mm. A piece of wood, found in association, is *Picea* (spruce) or *Larix* (larch).
NK77AD; intervallum east of building 7, brown soil beneath topsoil.

152. Cylindrical bar. L: 135mm. Diam: 13mm, with possible nail hole visible on x -ray (illus 11.19.152). Cf Keppie 1975: 106, fig 35 no 36.
NK76CZ; building 3, south-east corner, destruction level.

153. Cylindrical bar, length 100mm, diameter 16mm, with flange near one end, confirmed on x -ray (illus 11.19.153).
NK76CZ; building 3, south-east corner, destruction level.

154. Fragment of ?bar, length 70mm, tapering in diameter from 20 to 14mm (illus 11.19.154).
NK76BM; annexe, south-west of bath-house, clay below topsoil.

155. Length of square-sectioned bar or bolt. L: 70mm; W: 15mm.
NK74DB; gulley to west of building 3.

156. Fragment of square-sectioned bar or bolt. L: about 110mm; W: 16–20mm.
Unstratified.

157. Square-sectioned ?collar. L: 25mm; W: 25mm.
Unstratified.

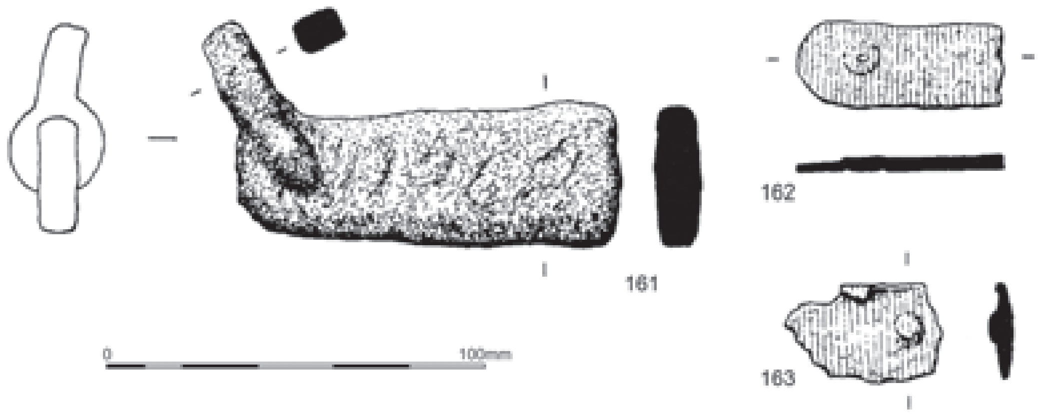


Illustration 11.20
Ironwork 161–163.

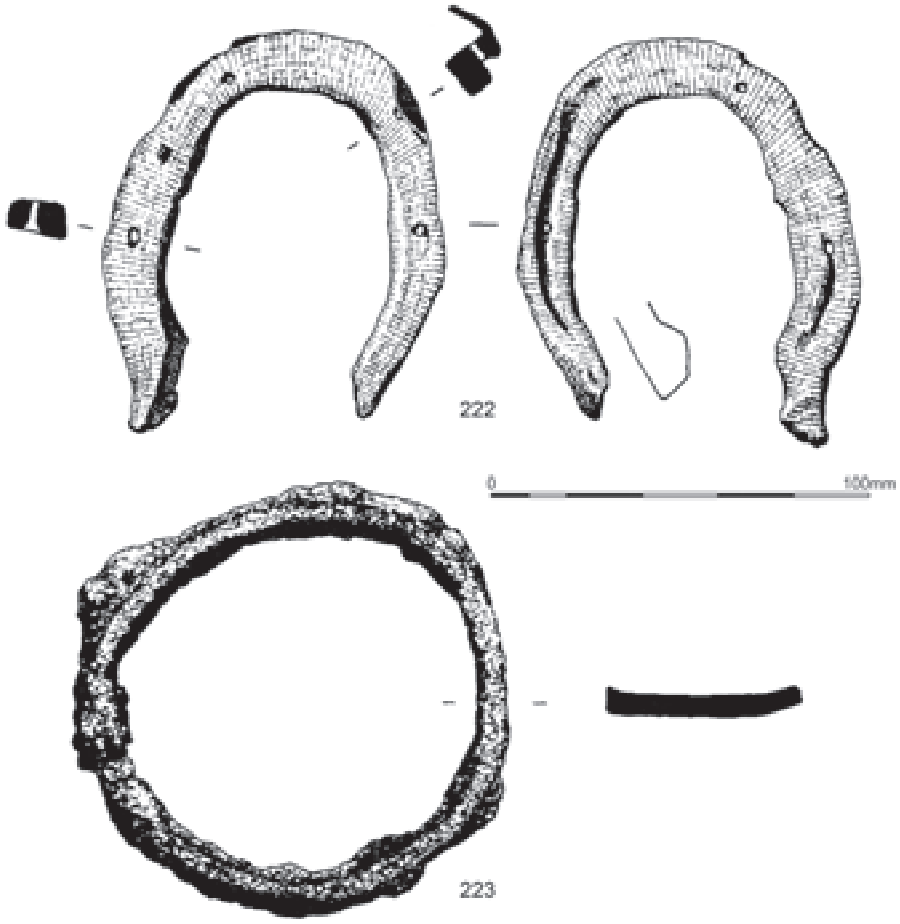


Illustration 11.21
Ironwork 222, 223.

11.3.4 Strappings and sheeting

158. Short length of thin strapping, with square end. L: 74mm; W: 30mm.
     NK78AS; middle west ditch, in silt below organic layer.

159. Small fragments of thin metal strip. Maximum L: 52mm; W: 25mm. Several fragments are rounded over, and one has a small nail driven through it.
     NK79AN; bath-house, second warm room, in hypocaust.

160. Fragment of strapping. L: 125mm W: 27mm (as seen in section), with nail hole near one end, revealed by x -ray.
     NK76BM; annexe, south-west of bath-house, reddish clay below topsoil.

161. Fragment of strapping, with chain link attached. L: 100mm (illus 11.20.161).
     NK74CM; burnt wattle and daub fill of gulley to north of building 1.

162. Fragment of strapping with rounded end, and nail head surviving. L: 52mm (illus 11.20.162).
     NK74CM; burnt wattle and daub fill of gulley to north of building 1.

163. Fragment of strapping, with nail? L: 43mm (illus 11.20.163).
     NK74CM; burnt wattle and daub fill of gulley to north of building 1.

164. Fragment of strapping, somewhat convex, length 57mm.
     NK74DB; gulley to east of building 3.

165. Length of strapping with nail. L: 100mm; W: 38mm
     NK79CJ; drain through annexe rampart north of latrine.

166. Fragment of strapping. L: 30mm, with shaped end broadened for nail.
     NK74CM; burnt wattle and daub fill of gulley to north of building 1.

167. Fragment of strapping, length 67mm, very corroded, with part of a nail.
     NK75CF; burnt material over intervallum to east of buildings 6 and 7.

Illustration 11.22
Ironwork 223, the hub lining.

168. Short length of strapping. L: 59mm, with nail hole.
Unstratified.

169. Fragment of strapping. L: 72mm; W: 25mm.
NK73BN; annexe, south-west of bath-house, topsoil.

170. Length of strapping. L: 70mm; W: 30mm, with rounded end.
NK73BS; building 3, topsoil.

171–2. Two fragments of strapping. L: 43 and 30mm W: 27mm.
NK77AL; topsoil over capping of drain through fort rampart east of building 7.

173–82. Ten small fragments of sheeting, found together with some nails.
NK76CW; fill of depression south-east of building 4.

183. Fragment of ?strapping. L: 30mm; W: 25mm.
NK74Cu ; building 3, topsoil.

184–5. Two fragments of strapping. L: 25 and 35mm. W: 24mm.
NK77DW; intervallum east of building 16, post-hole.

186. End-piece of ?strapping. L: 20mm; W: 20mm.
NK74CG; west end of building 5, topsoil.

187. Triangular fragment of thin sheeting. L: 50mm; W: 45mm.
NK74CM; burnt wattle and daub fill of gulley to north of building 1.

188. Fragment of sheeting. L: 105mm; W: 55mm, with curving edge.
NK73S3; annexe, south of changing room of bath-house, topsoil.

189. Short length of strapping. L: 70mm: W: 15mm.
NK74AZ; intervallum to north of building 1, topsoil.

190. Short length of strapping. L: 40mm; W: 15mm.
NK77EN; intervallum south-east of building 16, pit.

191–6. Six fragments of strapping, and nails. Maximum L: 55mm; W: 15mm
NK74CK; gulley to north of building 1.

197–221. Some 25 fragments of narrow strapping, too small to merit individual description, came from various locations. Perhaps from doors, window grilles and other structural items. Cf Keppie 1975: 102; Crummy 1983: 123, fig 134 nos 4122, 4127; 169, fig 206 no 4668.

11.3.5 Transport

222. Horseshoe, 110mm × 90mm, with small external flange and nail-holes, of which three are set in grooves (illus 11.21.222). The holes (seen also on x-ray) were rectangular and measured 4mm × 3mm. Cf Jacobi 1897: Taf 41 nos 8–12; Manning 1976: figs 19–20 nos 89–96, especially no 92; Allason-Jones & Miket 1984: 294 nos 5.69–71; Manning (1976: 31) discusses the arguments for and against a Roman date for horseshoes found on Romano-British sites.
NK74BO; building 7, east end, topsoil.

223. Hub lining. W: 50mm; Diam: 110mm (illus 11.21.223). Cf Keppie 1975, 111, figs 38–9 nos 63–7; Manning 1985, 72, nos H35–8 with pl 30.
NK75BN; annexe, western pit to west of bath-house changing room.

11.3.6 Footwear

Note: for leather see section 19.

224. Seven hobnails.
NK74Bx ; intervallum road to west of building 1, topsoil.

225. Fused clump of hobnails.
NK73W9; lying over intervallum road west of building 4.

226. Ten hobnails and fragments.
NK73CK; annexe, south-west of bath-house, topsoil.

227. Fused clump of hobnails.
NK74CH; east end of building 5, post-hole.

228. 35 hobnails.
NK73W9, lying over intervallum road west of building 4.

229. Fused clump of hobnails.
NK76FA; grey clay overlying natural to south of building 7.

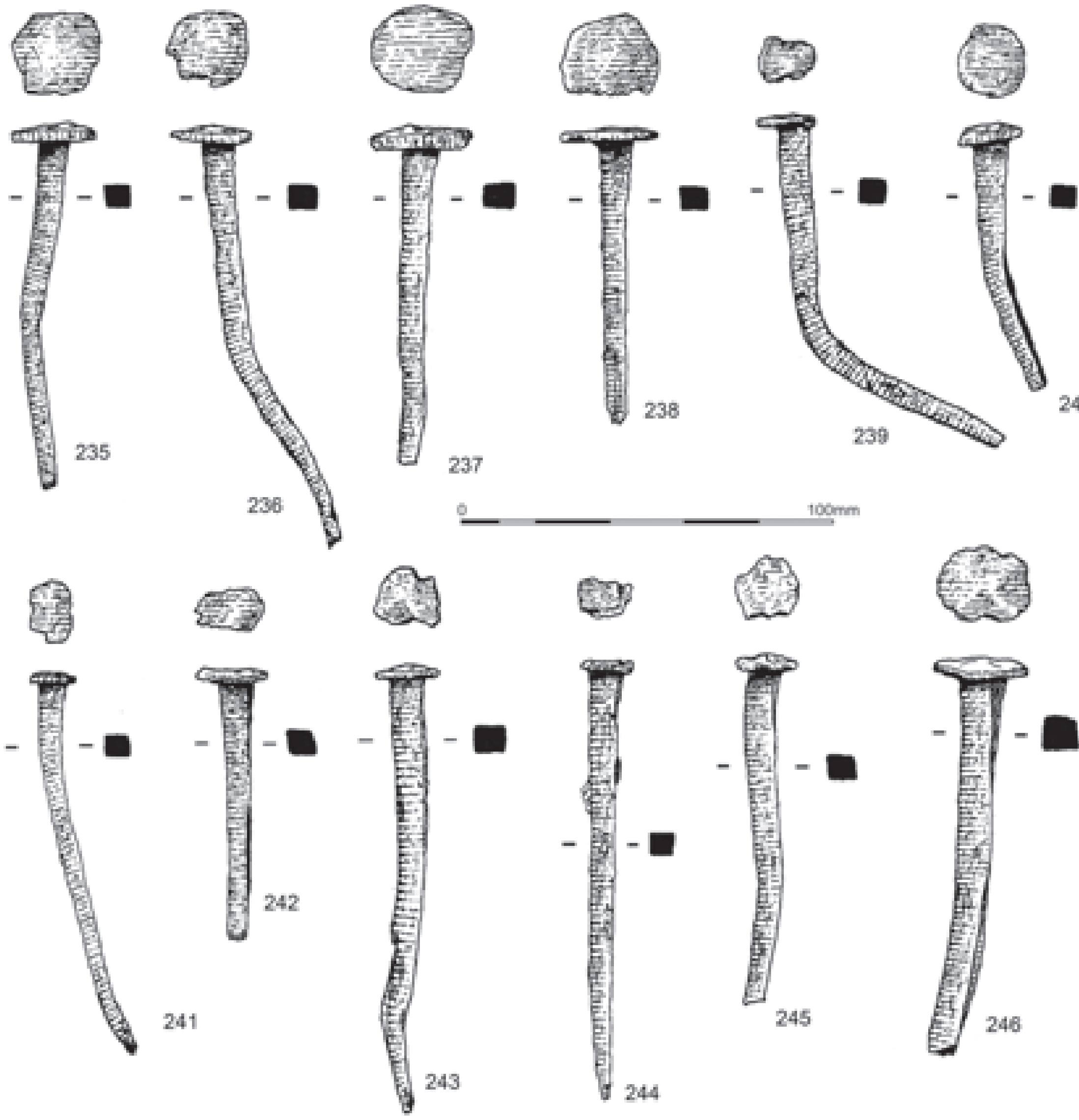


Illustration 11.23
Ironwork 235–46.

230. Two fused clumps of hobnails.
NK73BJ; building 3, topsoil.

231. Fused clump of hobnails, and some individual hobnails.
NK73S3; annexe, south-west of bath-house, topsoil.

232. Hobnail (or small tack?). L: 15mm.
NK75BH; building 3, unstratified.

233. Hobnail (or small tack?). L: 15mm.
NK75CG; brown soil overlying clay in intervallum to east of building 6.

234. Six hobnails.
NK80AO; bath-house, south of furnace to steam range.

11.3.7 Nails

Of the *c* 90 nails which survived intact or nearly intact at Bearsden, most belong easily within the classification system devised by Manning (1972: 186; 1985: 134). Only a few are illustrated here as examples of each class, except a group found together in the middle west ditch in 1978 which is extensively illustrated.

Manning Type 1

Type 1 has a square-sectioned tapering stem. Larger examples (Type 1A) have round, conical or pyramidical heads, flattened by hammering; smaller examples (Type 1B) generally have flat heads. See Manning 1985: 136 pl 63 nos R88–92.

Illustration 11.24
Ironwork 247–56, 277, 286–8.

235–76. 42 nails. L: 38mm–120mm, many with heavy square heads, some pyramidical and with square-section, tapering shafts, two with other fragments of iron adhering. There is a considerable variety among the types of head. Illus 11.23–4 show a selection. Some are complete, but others have been cut off at a point 30mm below the head, probably deliberately.

NK78AS; middle west ditch, in silt below organic layer.

Other complete or near complete examples of Manning Type 1 were recovered:

277. Nail with pyramidical head. L: 126mm.
NK73BE; building 3, topsoil.

278. Nail. L: 62mm.
NK74DE; intervallum road to east of building 8.

279. Nail. L: 100mm, with large rectangular head.
NK77AE; intervallum east of building 7, topsoil.

280–3. Four nail fragments without heads, one with wood adhering. L: 52–85mm. The wood is identifiable as cf *Picea* (spruce).
NK77AD; intervallum east of building 7, topsoil.

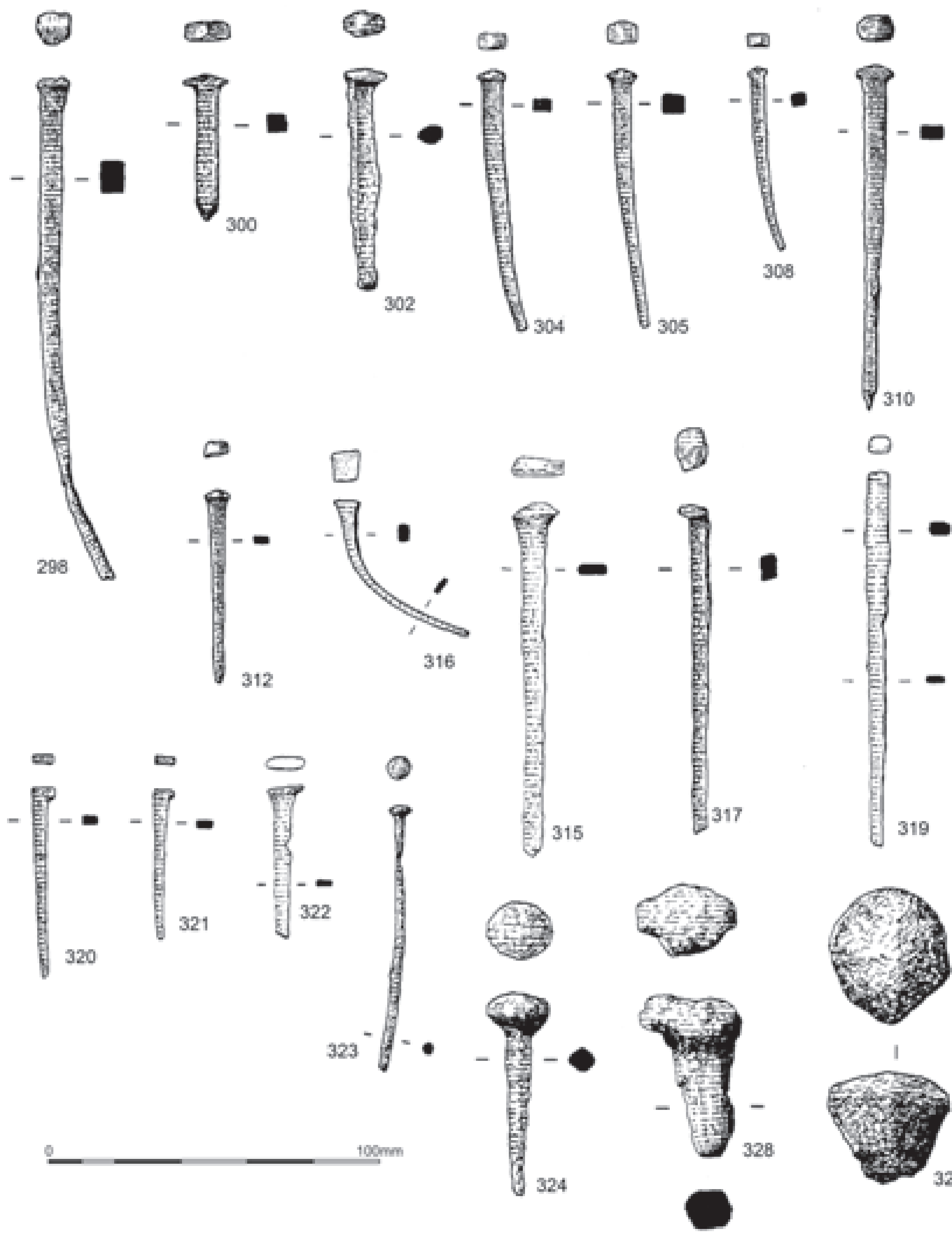


Illustration 11.25
Ironwork 298, 300, 302, 304, 305, 310, 312, 315–17, 319–24, 328, 329.

284. Nail. L: 74mm.
NK76DL; building 12, unstratified.

285. Nail. L: 80mm.
NK76DK; to south of road south of building 12.

286. Nail with large, flat circular head and round stem. L: 55mm.
NK73W3, building 7, topsoil.

287. Nail with rectangular head. L: 40mm.
Unstratified.

288. Nail. L: 58mm.
NK73EP, bath-house, unstratified.

289–91. Three fragments of nails. L: 15–30mm.
NK78AS; middle west ditch, in silt above organic layer.

The following nails, though corroded, seem likely to have belonged to Manning Type 1:

292. Nail. L: 75mm (and other fragments).
NK74W10; building 7, room 1.

293. Nail. L: 42mm.
NK74CE; daub in gulley to north of building 3.

294. Number not used.

295. Nail with circular head. L: 45mm.
NK75BI; unstratified.

296. Nail with circular head. L: 41mm.
NK74CE; daub in gulley to north of building 3.

297. Corroded mass of large nails. L of each: about 90mm, and strapping.
Demolition deposit within the fort.

Manning Type 2

Type 2 has a rectangular tapering stem and a triangular head, the same thickness as the stem (illus 11.25.298–319). The Bearsden examples are smaller than the norm, and the head is much less triangular than the classic specimens, even when allowance has been made for flattening as a result of hammering. See Manning 1985: 136, pl 63 nos 93–8.

298. Nail. L: 152 mm.
NK73BE; *via praetoria*, between building 4 and 7, topsoil.

299. Nail. L: 67mm.
NK73BF; building 7, top of natural clay.

300. Nail. L: 45mm.
NK73BF; building 7, top of natural clay.

301–3. Three nails. L: 27–47mm.
NK73Bu ; building 7, topsoil.

304–6. Three nails. L: 58–79mm.
NK75AH; bath-house, changing room, patch of burning beside south wall.

307–8. Two nails. L: 38 and 60mm.
NK76AF; building 16, topsoil.

309. Nail. L: 65mm.
NK75AO; building 7, east end, unstratified.

310. Nail. L: 100mm.
NK77AZ; building 5, north-east corner, topsoil.

311. Nail. L: 78mm (and many other fragments).
NK74DE; intervallum road to east of building 8.

312. Nail. L: 37mm.
NK74BM; between buildings 2 and 3, topsoil.

313. Nail. L: 44mm.
NK77AG; building 4, east end, topsoil.

314. Nail. L: 46mm.
NK73Cu ; between buildings 6 and 7, beside officer's quarters, overlying clay.

315. Nail. L: 105mm.
NK80BO; in soil over annexe rampart east of bath-house.

316. Nail with square flat head and broad stem. L: 55mm.
NK76AM; building 11 and 12, topsoil.

317. Nail. L: 100mm.
NK75W21; building 3, unstratified.

There are some examples of this group with indistinct heads, close to Manning Type 5 (Manning 1985: 136, pl 63 no 100).

318. Nail. L: 78mm.
NK73S1; annexe, south-west of bath-house, topsoil.

319. Nail, with almost no 'head'. L: 103mm.
NK73Cu ; between buildings 6 and 7, beside officer's quarters, overlying clay.

Manning Type 4

Type 4 has an L-shaped head, width matching the stem (illus 11.25.320–2). See Manning 1974: 173, fig 74, nos 487–8, 497–8.

320–1. Two nails. L: 58 and 45mm.
NK75AH; bath-house, changing room, patch of burning by south wall.

322. Nail (and other fragments). L: 45mm.
NK76AQ; buildings 11 and 12, topsoil.

Miscellaneous nails

323. Nail or pin with small circular head and stem. L: 85mm.
NK77AZ; building 5, north-east corner, topsoil.

324. Nail with circular head. L: 59mm (illus 11.25.324).
NK74BK; intervallum east of building 8, Roman level.

325. Nail stem embedded in wood, identified as *Coniferae* (conifer).
NK75Au ; inner west ditch, brown clayey soil below topsoil.

326. Nail stem, with wood adhering. The wood is *Quercus* (oak).
NK74AZ, intervallum west of building 3, topsoil.

327. Nail, with wood adhering. The wood is *Quercus* (oak).
NK76BM; annexe, south-west of bath-house, reddish clay below topsoil.

Large nails and bolts

328. Heavy bolt-head, roughly made. L: 50mm (illus 11.25.328).
NK74Cy; fill of gulley to north of building 3.

329. Large bolt-head. Diam: 45mm (illus 11.25.329).
NK76EG; buildings 13 and 14, overlying clay.

Other nail fragments

The other nails and fragments of nails are too badly preserved to be assigned to any particular category. The following is a list of their provenances only.

Fort: outer west ditch, silt (1); middle west ditch, silt below organic layer (2); gulley to north of building 1 (1); intervallum to west of building 1, topsoil (1); intervallum to west of building 3 (11); burnt wattle and daub in gulley to west of building 3 (10); intervallum to east of building 7 (2); intervallum to east of building 8 (8); south intervallum (3); gulley beside *via praetoria* (6); *via praetoria* (1); overlaying *via decumana* (1); building 1, topsoil (16); building 1, burnt daub (1); officer's quarters of building 3 (1); men's quarters of building 3 (19); overlying path between buildings 3 and 4 (3); building 4 (4); post-hole in men's quarters of building 5 (2); building 6 (3); officer's quarters of building 7 (15); men's quarters of building 7 (10); path between east ends of buildings 6 and 7 (3); area between buildings 7 and 8 (3); fill of gulley in building 10 (1); modern feature in building 11 (2); building 12 (1); overlying gulley to north of building 13 (7); post-hole in building 14 (3); burnt patch in building 16.

Annexe: hearth in the primary bath-house (4); outside east wall of primary bath-house (6); robber trench of south wall of primary bath-house (2); bath-house (5); post-holes in cold room (2); in drain below floor of cold room (nail and hobnail fragments); hot bath (10); furnace of steam range (8); burnt debris in hot dry room (20); drain south of first warm room (1); area south of bath-house (15); south-west of bath-house (area A) (25); western pit to west of changing room (8); black layer to west of latrine (1); drain through east rampart (1).

Area to east of fort/annexe (1).

11.3.8 Miscellaneous

330. Stud. Diam: 30mm, with shank. L: 18mm (illus 11.26.330). Cf Curle 1911, 290, pl 67 nos 19, 20, 35.
NK78AS; middle west ditch, in silt below organic layer.

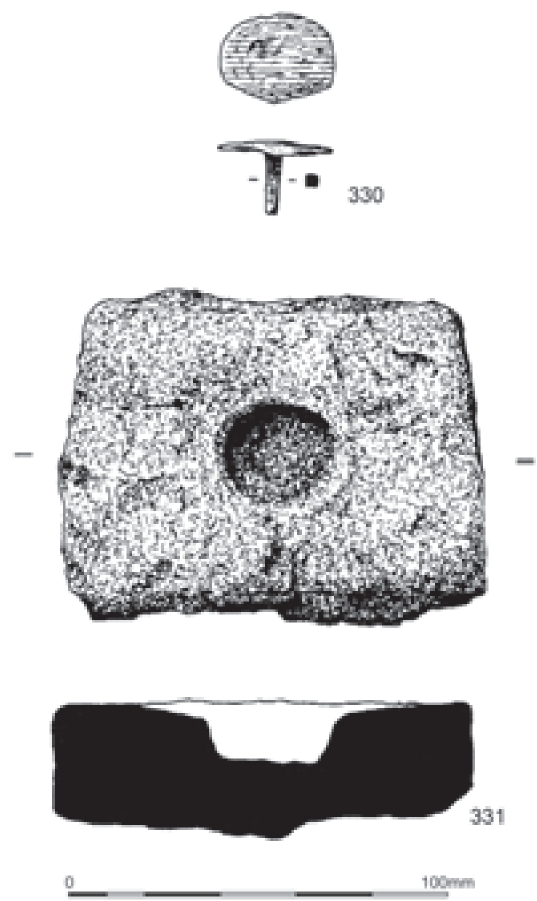


Illustration 11.26
Ironwork 330, 331.

Illustration 11.27
Ironwork 331, the ?pivot-block.

331. Rectangular pivot?-block, 110mm × 80mm × 30mm with central circular semi-perforation (illus 11.26.331 and 11.27). NK73BW; annexe rampart, drain.

332. Straight, square-sectioned rod, 8mm across, tapering to 3mm at both ends; length 210mm. While this could simply be a very long nail, other functions, eg part of a gridiron, fleshing hook or lamp-holder, may be considered. NK73FG; bath-house, hot room, topsoil.

Some relatively modern pieces of ironwork were also recovered during the excavation.

Chapter 12

COINS

ANNE S ROBERTSON†

1. *Denarius*. Most likely a legionary denarius of Mark Antony (*c* 32–31 BC). BMCRR 196.
   Extremely worn. AR Wt 2.781g. Size 18mm. Axis ↖.
   Obv: ANT AVG above galley IIIVIR R P C below
   Rev: LEG V Aquila r between two standards.
   NK73CI; building 3, room 2, hearth.

2. *Dupondius* of Trajan; *c* 115–16. C 353. RIC 674. BMC 1027f.
   Corroded. Fairly worn. AE Wt 7.39g. Size 26mm. Axis ↓.
   Obv: IMP CAES NER TRAIANO OPTIMO AVG GER DAC P M TR P COS VI P P
   Bust of Trajan, radiate, draped, r.
   Rev: SENATVS POPVLVSQVE ROMANVS
   S C (1 and r in field).
   Felicitas, draped, standing 1, holding caduceus and cornucopiae.
   NK73FC; bath-house, first warm room, between flagstones of lower floor.

3. *Denarius* of Trajan; *c* 115–16. RIC 318. BMC 577. Fairly well worn. AR. Wt 2.55g. Size 19mm. Axis ↓.
   Obv: IMP CAES NER TRAIANO OPTIMO AVG GER DAC
   Bust of Trajan, laureate, draped, r. drapery on left shoulder.
   Rev: P M TR P COS VI P P S P Q R FORT RED (in exergue)
   Fortuna, veiled, draped, seated l, holding rudder on ground, and cornucopiae.
   NK74AA; building 1, west end, topsoil.

4. *Denarius*, possibly of Trajan; *c* 116–17. RIC 331. BMC 617. Much corroded; burnt? AR. Wt 3.06g. Size 19mm. Axis ↓.
   Obv: IMP CAES NER TRAIAN OPTIM AVG GERM DAC
   Bust of Trajan, laureate, draped, r.
   Rev: PARTHICO P M TR P COS VI P P S P Q R
   Mars, naked except for cloak round waist, advancing r, holding transverse spear, and trophy over l shoulder.
   NK74BL; building 6, topsoil.

5. *As*, probably Hadrian. Possibly BMC 1174.
   Much corroded.
   NK73CD; bath-house, cold room, burning overlying flagged floor.

6. Possibly a very much corroded *As*. May just possibly be of Trajan, or early Hadrian (from its 'look').
   Surface all gone. AE Wt 8.804g. Size 27mm. Axis uncertain.
   NK73Cu ; building 7, room 1, northern end of room.

7. Dupondius of Antoninus Pius. 154–5. RIC 933. BMC 1970.
   Edges of coins much corroded; almost unworn. AE Wt 11.013g. Size 27mm. Axis ↘.
   Obv: ANTONINVS AVG PI VS P P TR P x VIII
   Bust of Antoninus Pius, radiate r., drapery on 1. shoulder.
   Rev: LIBERTAS COS IIII; S C (1 and r, low in field)
   Libertas, draped, standing 1, holding pileus and sceptre.
   NK73DS; bath-house, rubble overlying hot bath.

8. *As* of Antoninus Pius 140–4 (COS III) or 145–61 (COS IIII). RIC 684 (COS III); RIC 823 (COS IIII); cf BMC 1753 (COS IIII)
   Fairly worn. AE Wt 6.443g. Size 25mm. Axis ↙.
   Obv: ANTONINVS AVG PIVS P P TR P COS III or IIII;
   Head of Antoninus Pius, laureate, r.
   Rev: PIETAS AVG; S C (1. and r. low in field)
   Pietas, draped, standing 1, raising r, hand, 1 hand on side.
   NK73FC; bath-house, warm room 1, in the build up for the upper flagged floor.

9. *Dupondius* or *As* of Marcus Aurelius, Caesar. 153–4 (TR P VIII) or 154–5 (TR P VIIII). BMC 1960 (TR P VIII). BMC 1985f (TR P VIIII). RIC 1321 (TR P VIIII).
   Almost unworn. AE Size 24mm. Axis ↑.
   Obv: AVREL[IVS] SAR AVG PII FIL
   Bust of Marcus Aurelius, Caesar, bare-headed, draped, r.
   Rev: TR POT [VIII or VIIII] COS II S C (l and r, low in field).
   Minerva, helmeted, draped, standing l, holding owl and spear; to r, shield.

NK82AA; bath-house, changing room, in back-fill over south wall.

10. *As*, fragments. Illegible.
    NK73AJ; annexe, south-west of bath-house.

11. Possible *As*.
    AE Size about 22mm.
    K73CB; *via praetoria*, rubble lying to east of building 4.

12. Bronze disc, possibly a coin.
    NK73Cu ; building 7, room 1.

Discussion

The coins fit neatly into the pattern of Roman coinage current in the Antonine period in Scotland. Long-lived legionary *denarii* of Mark Antony, minted *c* 32–31 BC, have been commonly found in both Antonine and Severan forts in Scotland, but not apparently on purely Flavian sites. The absence of Flavian silver and bronze from Bearsden is also in agreement with evidence from other Bearsden material in indicating no first century occupation.

Of the remaining datable coins from Bearsden (excluding three of uncertain emperors), there are two *denarii* and one *dupondius* of Trajan, one probable *as* of Hadrian, one possible *As* of either of Trajan and Hadrian, one *dupondius* and one *As* of Antoninus Pius, and one *dupondius* or *As* of Marcus Aurelius as Caesar. To these may be added two earlier, isolated finds, a *dupondius* of Trajan, and a *denarius* of Hadrian (Macdonald 1918: 225–6; 1939: 242).

The sum total of five coins of Trajan and Hadrian, plus two possibles, confirms that coinage current in the reign of any one emperor was almost always made up of a higher proportion of coins of his immediate predecessors than of himself.

The three coins dating to the reign of Antoninus Pius are a fairly worn *As* of Antoninus Pius of 140–4 or 145–61, a *dupondius* or *As* of Marcus Aurelius, Caesar, of 153–4 or 154–6, and a *dupondius* of Antoninus Pius of 154–5. The last two were almost unworn, and seem to have reached Bearsden just before the end of the occupation of that site.

The *dupondius* of Antoninus Pius of 154–5 has also a peculiar interest of its own. The smaller denomination of the same year, the *as*, has as its commonest reverse the legend and type *BRITANNIA*, Britannia seated left. Several of these form an easily recognisable group of asses found in Scotland. It has been shown that the bronze currency in the hands of Antonine troops in about 155 also included *sestsertii* and *dupondii*, almost monopolised by the reverse *LIBERTAS*. Bearsden has provided an example of this group.

ADDENDUM

An *antoninianus* of Probus (276–80) minted at Antioch, was found in the 1990s 'at the latrine outlet' (Bateson and Holmes 2006: 162). This area had previously been completely excavated.

Chapter 13

PLANT REMAINS

CAMILLA DICKSON AND J H DICKSON

13.1 INTRODUCTION

In 1973 JHD visited the excavation and saw the section of the east annexe ditch and in particular the lower layers dark in colour. Obviously organic and waterlogged, these deposits seemed very promising of important results and so it quickly proved with the recognition of cereal bran, fig pips and mosses in the laboratory. More than sixty years before, H F Tagg's work (1911) on Roman fort at Newstead, Borders, produced a lengthy appendix on 'vegetable remains'. It concerned only larger plant remains because this was before anyone had carried out any kind of detailed pollen analysis in Britain (not till the 1920s were pollen diagrams produced). Carried out by A Raistrick in 1939, the first pollen analysis from a Scottish Roman site was from an 'earth sample' taken from the fort at Fendoch, Perthshire (Raistrick 1939). In 1944 Danes Knut Jessen and Hans Helbaek published on carbonised cereals from some Roman sites in Scotland. This investigation at Bearsden is by no means the first deliberate botanical study of Roman deposits in Scotland. However, involving both numerous pollen and macroscopic fossil analyses, it is by far the most thorough, highly detailed and informative concerning the military diet and the environment of Scotland in Roman times. Identification was by reference to modern pollen, fruits, seeds, leaves, wood, charcoal and other plant structures. The nomenclature follows, for flowering plants, Clapham et al (1981) and, for mosses, Smith (1978).

13.2 OUTER EAST ANNEXE DITCH

13.2.1 Macroscopic plant remains

A column 1.8m × 100mm × 100mm square was taken through the organic deposits from near the butt-end of the outer of the two ditches. The stratigraphy is as follows:

0–150mm grey-brown clayey silt with decayed wood

150mm–390mm woody detritus brown clay-mud, the top 0.12m disturbed

390mm–500mm laminated dark brown clay-mud

500mm–600mm transition to brown clayey silt

600mm–1.8m brown organic clayey silt with wood and charcoal fragments and occasional vivianite becoming less organic towards the base

1.80m–downwards light brown silty clay

Material above 280mm was considered too disturbed to analyse. Samples 20mm thick were taken from six levels for the detailed examination of plant remains (table 13.1). The samples were broken up in dilute sodium hydroxide and sieved. The sieved plant debris was examined using a low-power stereo-microscope and over a hundred taxa represented as fruits, seeds, moss leaves and other remains were identified.

The ditch samples, except for the uppermost sample, 0.48m–0.5m, all produced similar plant remains dominated by fragments of *Triticum/Secale* (wheat/rye) bran (the uncarbonised grain wall). The bran forms about half of the organic part of the ditch infilling. Such bran has now been recognised from a number of archaeological sites (Hall et al 1983). The bran fragments, mainly 2 or 3mm in diameter, are similar in general appearance to those produced when grain is pounded in a mortar or ground in a rotary quern, but with the outer bran layers and the proteinaceous (aleurone) and starch cells decayed away. It is notable that Helbaek (1958) found bran fragments of wheat and barley in the stomach contents of two Iron Age bog corpses. An explanation of the origin of the bran fragments was given when the excretory product of meals containing bran was sieved and compared with the sieved ditch samples; the bran fragments were basically similar in both contexts.

Subsequent biochemical tests revealed the presence of cholesterol and other sterols present in the bran-bearing material but not in the succeeding levels. These sterols are characteristic of food which has passed through the mammalian gut. The biochemical work also hints at a mainly vegetarian diet (Knights et al 1983: 150). See Addendum A.

Further corroborative evidence comes from internal parasite eggs of *Ascaris* and *Trichuris* investigated by Jones and Maytom (section 18). These three lines of evidence led to the conclusion that the ditch contained sewage. Later excavation revealed the bath-house latrine, with a drain leading towards the east annexe ditches, as the probable source of the sewage. The diet represented, as described in the following pages, confirms the likelihood of the human origin of the sewage component of the ditch infill.

Table 13.1
East annexe ditch, macroscopic plant remains

			Depth from top of column in cm					
			Roman sewage					*post-Roman*
			168–70	*148–50*	*118–20*	*98–100*	*68–70*	*48–50*
Imported culinary and medicinal plants								
Anethum graveolens (Dill)	Fruit	F			1		2	
Apium graveolens (Wild Celery)	Fruit			2	3	4	3	
Coriandrum sativum (Coriander)	Fruit	F	3	2	3	4	1	
Ficus carica (Fig)	Seed			6	3	11	2	
Papaver somniferum (Opium Poppy)	Seed	**F**		**1**			**1**	
Cultivated plants and weeds								
Agrostemma githago (Corncockle)	Seed	F	3	14	32	25	13	
Avena sp (Wild/Cultivated Oat)	Testa	F		r			r	
Brassica rapa ssp *sylvestris* (Wild Turnip)	Seed	F		1		1		
Bromus hordeaceus agg (Lop-grass)	Pericarp	F	f	f	f	f	f	
Cerastium fontanum (Common Mouse-ear Chickweed)	Seed			3	3		5	
Chenopodium album (Fat Hen)	Seed			2	1			
Chrysanthemum segetum (Corn Marigold)	Achene			1				
Fallopia convolvulus (Black Bindweed)	Nut	F		1				
Hordeum sp (Barley)	pericarp	F	r	r	o	o	r	
Cf *Lens culinaris* (Lentil)	Seed	F			r		r	
Linum usitatissimum (Flax, Linseed)	Seed	F		1			1	
Malva sylvestris (Common Mallow)	Pollen cluster						r	
Polygonum aviculare agg (Knotgrass)	Nut						1	
P. lapathifolium (Pale Persicaria)	Nut	F		1			1	
Cf *Raphanus* sp (Wild Cultivated Radish)	Seed	F				1	3	
Secale cereale (Rye)	Pericarp	F	r	r	r	r	r	
Sonchus asper (Spiny Sow-thistle)	Achene		1	1			1	1
Stellaria media (Chickweed)	Seed		5		1	1		
Triticum cf *dicoccum* (Emmer Wheat)	Pericarp	F	r	r	r	r	r	
T. aestivum/spelta (Bread/Spelt Wheat)	Pericarp	F		r	r	r		
T. dicoccum/spelta (Emmer/Spelt Wheat)	Glume base				61	80	1	
Triticum/Secale (Wheat/Rye)	Testa	F	a	a	a	a	a	
Umbelliferae (Umbellifer Family)	Fruit	F			2	1		

Table 13.1 (continued)

		Depth from top of column in cm						
		Roman sewage						*post-Roman*
			168–70	*148–50*	*118–20*	*98–100*	*68–70*	*48–50*
Cf *Vicia faba* (Horse Bean)	Seed	F			r	r	r	
Cf *Vicia* sp (Vetch, Tare)	Seed	F			r	r	r	
Heathland and bog								
Aulacomnium palustre (Moss)	Leafy stem				r	r		
Calluna vulgaris (Heather)	Leafy stem		*6	*29	*88	*50	*40	
Danthonia decumbens (Heathgrass)	Grain		1	5				
Erica tetralix (Cross-leaved Heath)	Leaf			5	9	9	4	
Erica tetralix (Cross-leaved Heath)	Seed						1	
Eriophorum vaginatum (Cotton-grass)	Leaf spindle			6	14	4	9	
Eriophorum sp (Cotton-grass)	Nut						1	
Juncus squarrosus (Heath Rush)	Seed		1	3			2	
Potentilla erecta (Common Tormentil)	Achene			4	1	1	3	
Pteridium aquilinum (Bracken)	Frond	F	r	o	f	o	o	
Pteridium aquilinum (Bracken)	Rhizome	F		r		r		
Sphagnum imbricatum (Bog moss)	leaf		r					
S. cf *palustre* (Bog Moss)	Leaf		r		r			
Sphagnum undiff (Bog Moss)	Leaf		o				r	
Vaccinium myrtillus (Bilberry)	seed				1		1	
Woodland, grassland and wet pasture								
Agrostis sp or spp (Bent-grass)	Grain		1	3	17	3		
Alnus glutinosa (Alder)	Fruit			1			1	
Betula pubescens (Birch)	Fruit			1			1	
Betula pubescens (Birch)	Catkin scale					1		
B. pubescens/pendula (Birch/Silver Birch)	Fruit						1	1
Cardamine flexuosa/hirsuta (Wood/Hairy Bitter-cress)	Seed						2	13
Calliergon cordifolium (Moss)	Leafy stem				r			
C. cuspidatum (Moss)	Leafy stem			r	r			
Ceratodon purpureus (Moss)	Leafy stem		o		r			
Cf *Conopodium majus* (Pignut)	Fruit					1		
Corylus avellana (Hazel)	Nut	F			1	1		
Deschampsia caespitosa (Tufted Hair-grass)	Grain			1	1	3	1	1

Table 13.1 (continued)

		Depth from top of column in cm						
		Roman sewage						*post-Roman*
			168–70	*148–50*	*118–20*	*98–100*	*68–70*	*48–50*
Eurhynchium praelongum (Moss)	Leafy stem		o	o	o	f		a
Fragaria vesca (Wild Strawberry)	Achene						19	1
Gnaphalium sylvaticum/uliginosum (Wood/ Marsh Cudweed)	Achene						6	
Gramineae (Grass)	grain		4	4	4	1	7	3
Holcus lanatus (Yorkshire-fog)	Grain		1					
Hylocomium splendens (Moss)	Leafy stem		o	o	r	f	o	o
Hypnum cupressiforme (Moss)	Leafy stem		o	o	r	f	r	o
Hypochaeris radicata (Cat's-ear)	Achene				1			
Isothecium myosuroides (Moss)	Leafy stem				r	r		
Juncus acutiflorus/articulatus (Sharp-flowered/ Jointed Rush)	Seed				2			
J. bufonius (Toad Rush)	Seed				2	1	5	
J. conglomeratus/effusus (Soft Rush)	seed		1		15	1	41	
Juncus sp (Rush)	stem/leaf	F			*r			
Labiatae (Mint Family)	nut				2	2		
Lathyrus pratensis (Meadow Vetchling)	leaf, stipule	F	1	4	9	2	2	
Linum catharticum (Purging Flax)	seed, capsule				1			
Luzula sp (Woodrush)	seed			1	1	2	3	
Neckera complanata (Moss)	leafy stem					r		
Phleum cf *pratense* (Timothy Grass)	grain						4	
Plagiomnium undulatum (Moss)	leafy stem				r			
Poa annua (Annual Meadow-grass)	grain						1	
P. cf *pratensis* (Smooth-stalked Meadow-grass)	grain						4	
P. cf *trivialis* (Rough-stalked Meadow-grass)	grain					1	6	4
Pohlia cf *nutans* (Moss)	leafy stem				r		r	
Polytrichum commune (Hair Moss)	leaf		r		r	o	r	r
Prunella vulgaris (Self-heal)	nut			3	3	2	2	
Pseudoscleropodium purum (Moss)	leafy stem		r		r	r		
Ranunculus sect *Ranunculus* (Buttercup)	achene			3				
Rhinanthus sp (Yellow-rattle)	seed			1				
Rhytidiadelphus squarrosus (Moss)	leafy stem		r	r	r	0		

Table 13.1 (continued)

		Depth from top of column in cm						
		Roman sewage						*Post-Roman*
			168–70	*148–50*	*118–20*	*98–100*	*68–70*	*48–50*
Rubus fruticosus agg (Blackberry)	fruit-stone				2			
R. idaeus (Raspberry)	fruit-stone		1	2	1		2	
Salix sp (Willow)	bud scale			1		1		
Stellaria graminea (Lesser Stitchwort)	seed						1	
Thuidium tamariscinum (Moss)	leafy stem						r	
Cf *Trifolium repens* (White Clover)	petal	F	4	6	7	6	5	
Urtica dioica (Stinging Nettle)	nut					1		2
Aquatic, marsh and fen								
Alopecurus cf *geniculatus* (Marsh Foxtail)	grain						1	
Bidens cernua (Nodding Bur-Marigold)	achene				2			
Callitriche stagnalis (Starwort)	fruit							>75
Carex cf *paniculata* (Panicled Sedge)	nut							>150
Carex sp or spp (Sedge)	nut		2	15	12	7	12	
Epilobium palustre (Marsh Willow-herb)	seed						1	1
Filipendula ulmaria (Meadow-sweet)	fruit			1				
Glyceria fluitans (Flote-grass)	grain			2				
Isolepis setacea (Bristle Scirpus)	nut				1			
Lemna cf *minor* (Duckweed)	seed							24
Lychnis flos-cuculi (Ragged Robin)	seed			1				7
Lycopus europaeus (Gypsy-wort)	nut			1			1	
Phalaris arundinacea (Reed-grass)	grain							1
Ranunculus sub g *Batrachium* (Water Crowfoot)	achene							24
R. flammula (Lesser Spearwort)	achene			1				
R. sceleratus (Celery-leaved Crowfoot)	achene							35
Rorippa palustris (Marsh Yellow-cress)	seed		1		1		3	
Viola palustris (Marsh Violet)	seed					1		
Miscellaneous								
Acrocarp undiff (Moss)	leafy stem				r			
Bryum sp (Moss)	leafy stem				r	r		
Cerastium sp (Chickweed)	seed					1		
Cirsium sp (Thistle)	achene		1	1				12
Galium sp (Bedstraw)	fruit				1			1

Table 13.1 (continued)

		Depth from top of column in cm						
		Roman sewage						*post-Roman*
			168–70	*148–50*	*118–20*	*98–100*	*68–70*	*48–50*
Rumex sp (Dock/Sorrel)	nut, perianth			1	1	3	2	7
Senecio sp (Groundsel/Ragwort)	achene						7	
Umbelli ferae (Umbellifer Family)	fruit			1		1	2	
Viola sp (Violet/Pansy)	seed						1	
Unidentified	seed		1		4			9

Four samples from the ditch were examined initially but when the deposit was found to be basically of sewage two further samples were processed, from 680mm to 700mm and from 1.18m to 1.2m; *c* 1% sodium hydroxide was used to disaggregate these two samples to avoid damage to the delicate food fragments. As already stated, in addition to the corn many other plant remains were identified; the native plans are grouped accordingly to their ecological preferences but they are not necessarily exclusive to those categories.

Crop plants: cereals and associated weeds

The cereal fragments consist of probably two species of wheat with barley, rye and oats. All were identified on small fragments only and criteria and photographs are provided elsewhere in this report and in Dickson, C (1987a).

Triticum cf *dicoccum* (emmer wheat) pericarp fragments are very tentatively identified from each level and the glume bases with more certainty. Emmer has been identified from three Roman sites of the Antonine period (Rough Castle, Castlecary and Lyne; and Jessen & Helbaek 1944). According to Percival (1921: 188) emmer has little frost resistance and it is notable that the only native Iron Age place in Scotland where it has been found in quantity is a west coastal site on the River Clyde (Dickson, forthcoming). Emmer is present at Roman sites in southern Britain but generally in smaller proportion than spelt wheat (Green, F J 1981: 133) where it continued in cultivation in the early Saxon period (Green, F J 1981: 136, fig 7.3) and in the early Christian period in Scotland (Jessen & Helbaek 1944).

Triticum spelta/aestivum sl (spelt/bread or club wheat) is tentatively identified as rare grain fragments from three levels. Spelt glume bases are also probably present.

Spelt wheat has been identified from three Antonine sites (Rough Castle, Castlecary and Lyne) but apparently not from native sites in Scotland. In southern Britain spelt is the commonest wheat found at sites of Iron Age and Roman date (Green, F J 1981: 136, fig 7.3). See Addendum B.

Grains of bread or club wheat have been recovered in small proportion at two Antonine Wall sites (Rough Castle and Castlecary; and Jessen & Helbaek 1944). Occasional grains have been found in native sites in Scotland from the Bronze Age onwards. In England club wheat has been recorded in some quantity from Verulamium (Helbaek 1953) from a second century context; it seems to have been more widely grown in the later Roman period.

Triticum/Secale (wheat/rye). These are ground-up bran fragments, which in fact make up the vast bulk of the cereal fragments, but they are so degraded that only the testa (similar in both wheat and rye) is left. However, as discussed below, associated glume fragments suggest that the bran is predominantly of hulled wheat; its identification and the form in which the wheat was eaten are later discussed.

Triticum dicoccum/spelta (emmer/pelt wheat). Glume bases from hulled wheats, probably from both emmer and spelt wheats were recovered in quantity from two samples. 98–100 yielded 80 and 118mm–20mm, 61 glume bases (it is probable that they were overlooked in other samples). It seems likely that these glumes, which do not thresh free easily as in modern wheats, were retained during processing of the grain; their fragmentary appearance also suggests that they were cooked and consumed with the wheat.

Hordeum sp (barley). The barley grain fragments are of two distinct types. Some are brown and appear to have been ground-up with the wheat but probably only represent a few grains in each sample; since the wheat fragments must represent some hundreds or even thousands of grains in each sample, these fragments represent only a small proportion and could well be residual barley from a previous crop or impurity in the seed corn. There are also a very few transparent fragments of barley grains which appear to have been processed differently to the wheat but in a similar way to pearl barley and are later described and discussed. Barley has been recorded from other forms on the Antonine Wall and from Birrens, Dumfriesshire (Jessen & Helbaek 1944). Tagg (1911: 356) found 'husks' of wheat and barley at Roman Newstead.

Secale cereale (rye). The rare fragments of rye from each sample suggest that it status was that of a weed in the wheat crop. Carbonised grains of rye have been recorded from several Roman sites, these include a considerable quantity from *Isca*/Caerleon,

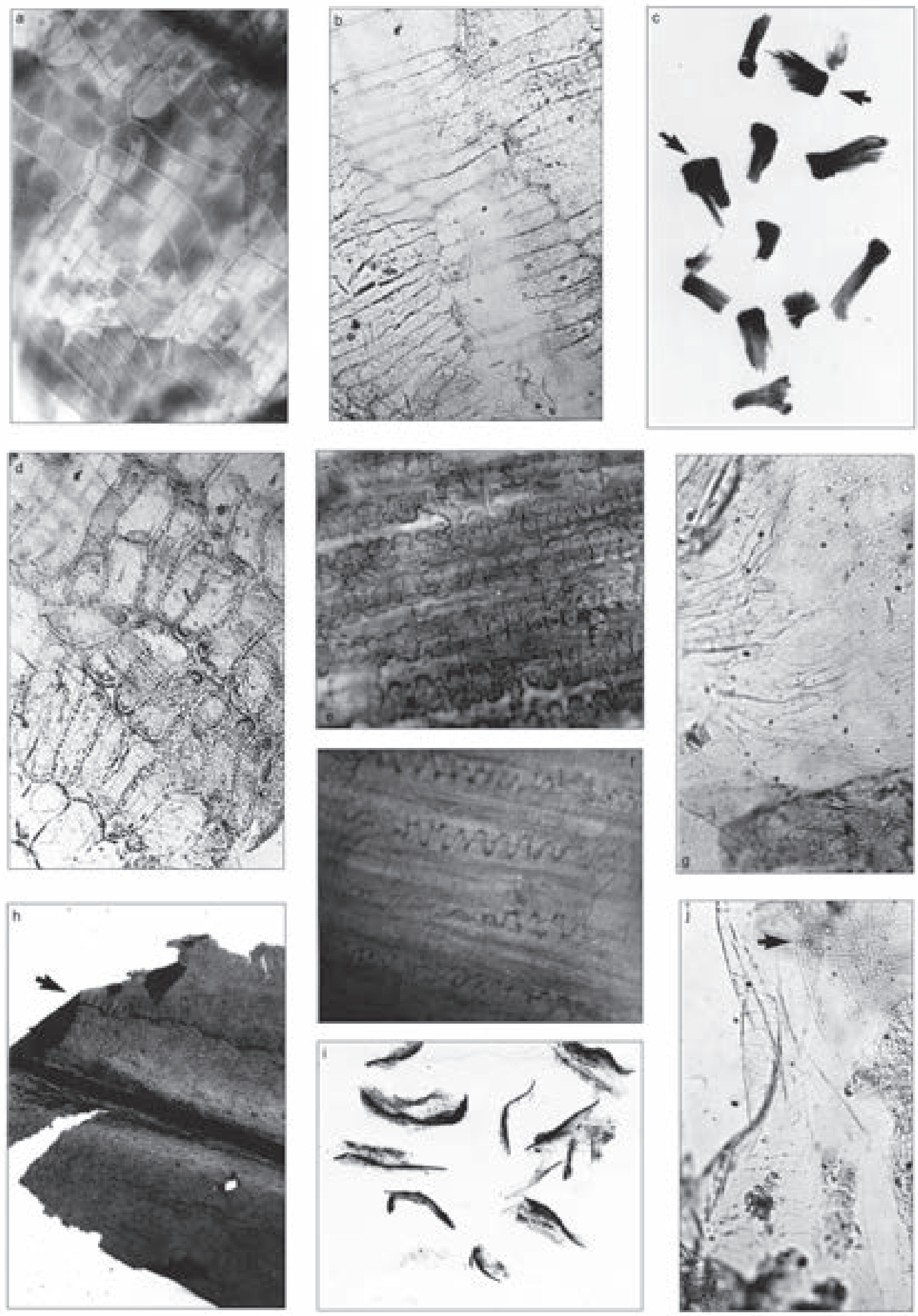


Illustration 13.1
Cereal bran.
Key: (a) *Triticum/Secale*, 2 testa layers, ×200; (b) *T. spelta/T. aestivum* sl, transverse cells, walls partly replaced with fungal hyphae, ×200; (c) *T.* cf *dicoccum*, glume bases and rachis segments (arrowed), ×3.5; (d) *Secale cereal*, transverse cells, ×200; (e) *T.* cf *dicoccum*, glume epidermal cell pattern, ×400; (f) *T.* cf *spelta*, glume epidermal cell pattern, ×400; (g) *Avena*, tube cells (the testa cells have disappeared), ×200; (h) *Hordeum*, testa with glume imprints (arrowed) each side of the hilum, ×20; (i) *Hordeum*, hilums with degraded testa, ×3; (j) *Hordeum*, perisperm and transverse cells (arrowed), ×200.

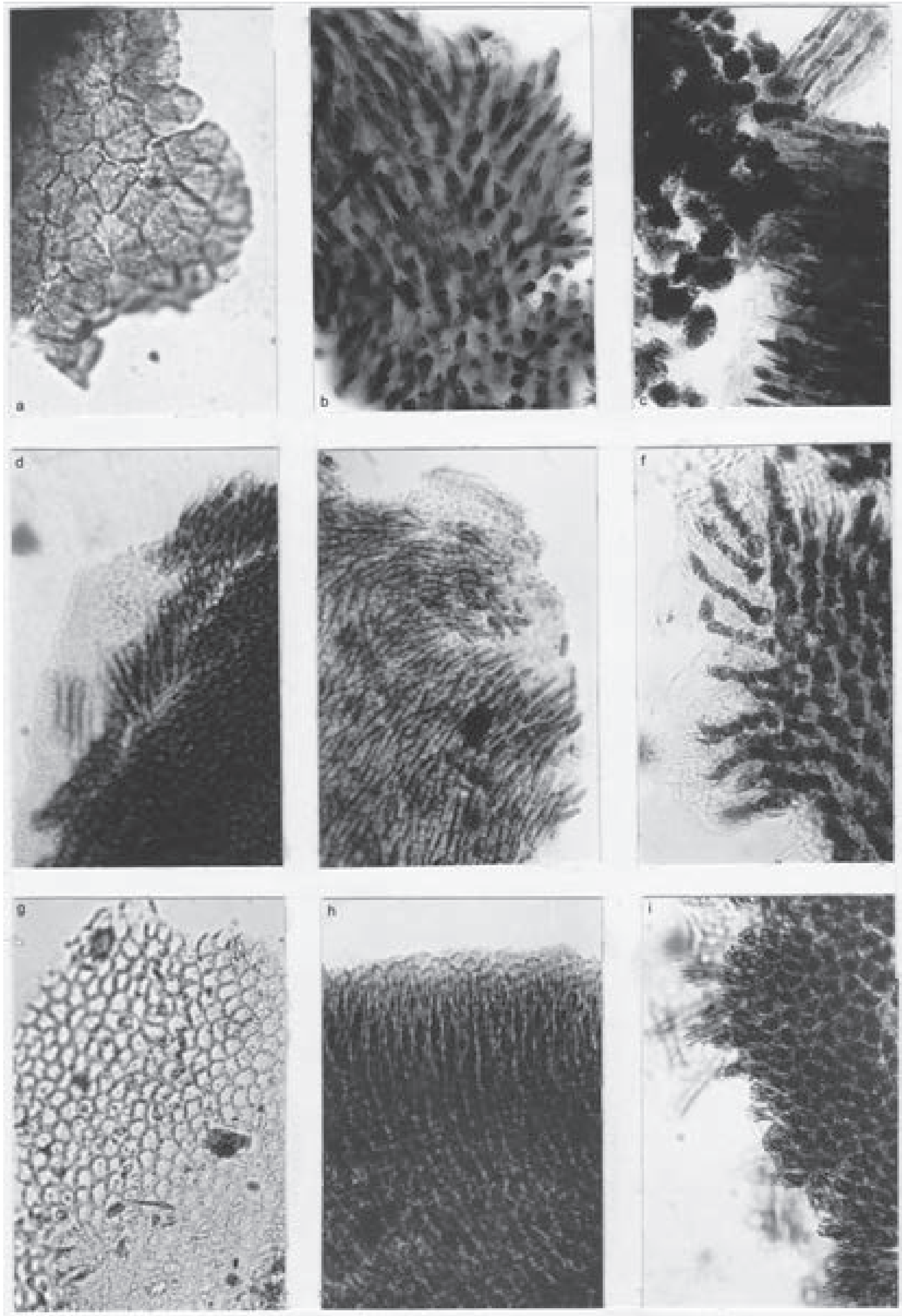


Illustration 13.2
Leguminosae, testa fragments.
Key: (a) Cf *Vicia faba*, cuticle, ×400; (b) Cf *V. faba*, palisade cells TS and oblique LS, ×200; (c) Cf *V. faba*, palisade cells LS and hypoderm cells, ×200; (d) Cf *Lens culinaris*, palisade cells and cuticle, ×400; (e) CF *L. culinaris*, palisade cells LS, ×400; (f) *V. faba*, reference testa, heated in water, showing dark brown lumina, ×200; (g) Cf *Vicia*, cuticle, ×400; (h) Cf *Vicia*, cuticle and palisade cells LS, ×400; (i) Cf *Vicia*, top of palisade cells, ×400.

Wales (Helbaek 1964) but as rare grain only from two Antonine Wall forts (Jessen & Helbaek 1944).

Avena sp (wild or cultivated oat) is probably under-represented since grain fragments often become transparent (microfiche). These rare fragments probably represent accidental inclusion of wild oats gathered with the wheat.

It seems probable then that the digested grain is mainly of emmer and spelt wheats, with a little barley. Bread wheat may be present but rye and oats are more likely to represent weeds. These rather tentative conclusions are strengthened by comparison with carbonised grain from other Antonine wall forts later in this report.

Almost all the fruits and seeds of cornfield weeds are damaged or in fragments as would be expected if they had been accidentally ground with the wheat. They include the grain of a wild grass, *Bromus hordeaceus* agg (lop-grass) which is still a moderately common cereal field contaminant.

Agrostemma githago (corn cockle), until recently a common cornfield weed, has seeds which can cause a susceptibility to leprosy (Godwin 1975: 146), and which deleteriously affect the physical properties of wheat flour (Clapham et al 1962: 288). Tagg (1911: 356) in a report on the Newstead plant remains found 'husks of wheat and barley in many of the pits mixed with corn cockle seeds'. *Bromus* and *Agrostemma* are present in some quantity and confined to the samples containing cereal remains.

Crop plants: pulses and linseed

The very small fragments of seeds of cf *lens culinaris* (lentil), cf *Vicia faba* (horse bean) and cf *Vicia* sp (vetch) are of particular interest: the taxa are tentatively identified because all are represented by fragments of only 1mm to 3mm diameter (microfiche). Legume seeds are uncommon in British archaeological sites and are generally carbonised.

Lentils are not native to Britain and the climate is not suited to their cultivation. They are widely cultivated in central, southern and eastern Europe but have been recorded from Roman London (Willcox 1977: 279) and *Isca*/Caerleon (Helbaek 1964). There is also a 19th-century record from a Roman villa at North Leigh, Oxfordshire which is quoted by Morrison (1959: 13–14); 'the floor is of plaster, and was covered in many places with wheat and lentils, black as if burnt; the form of the grain is, however, distinctly preserved'.

Vicia faba is perhaps best known in the form of the large pale-coloured broad bean of culinary use; these tiny fragments probably represent one of the smaller brown forms which are known as field, horse, tick or celtic beans. The species is not known in the wild and is sometimes grown for fodder. *V. faba* has been found at Early Iron Age and Roman sites (Godwin 1975: 181).

The seed fragments of cf *Vicia* sp most resemble those of *V. sativa* (common vetch), a well-known fodder plant with seeds that have been eaten in times of famine (Sturtevant. 1972). Some vetches are of course cornfield weeds and it is possible that they have been accidentally ground with the corn. *Vicia sativa* is one of eight species of *Vicia* and *Lathyrus* found in a burnt Roman grain store together with *V. faba* and *Lens culinaris* (Helbaek 1964).

The reason for the very small fragments of the pulses may be found in the preparation as described by Pliny; he states that lentils were first roasted then mixed with bran and lightly pounded (Pliny 18, 23). He also notes that bean meal (*Vicia faba*) was used to increase the weight of loaves of bread and also gives medicinal uses for bean meal (Pliny 18, 31; 22, 69). Beans and lentils were the most common vegetables of the Roman military diet (Davies 1971: 132), according to documentary evidence.

Seed fragments of *Linum usitatissimum* (flax, linseed) occurred at two levels of the sewage. Although present from Neolithic times onwards found on Roman sites (Godwin 1975: 167), it is usually unclear whether the crop was grown for fibre, food or both. However a seed fragment from a human coprolite from an Orkney broch (Dickson, C A, unpublished) shows that linseed was eaten by the Iron Age people in Scotland: there is also a single seed from a Caithness broch (Dickson, J H 1979a). The seeds have emollient, demulcent and pectoral properties and Pliny notes their use internally, and externally as a poultice (Pliny 20, 92). Helbaek states (1950) that the laxative powers can be removed by boiling the seeds and that they are a useful food containing 30 to 35% oil. Seed fragments were found in the stomach contents of three Iron Age bog corpses in Denmark (Helbaek 1950; Helbaek 1958) and were among the principal components in two of them.

Imported culinary and medicinal plants

The plant remains from the ditch are remarkable for the presence of fruits and seeds of species which are not part of the native flora of Britain. *Ficus carica* (fig), *Anethum graveolens* (dill), *Coriandrum sativum* (coriander) and *Papaver somniferum* (opium poppy) were all used by the early Mediterranean civilisations. Opium poppy is recorded from an Iron Age site at Fifield Bavant, Wilts (Helbaek 1952: 222) and all are known from Roman sites in England and, excepting the fig, from Wales also; these are listed in Godwin (1975: 247, 227, 223 and 129).

It is possible to grow figs in western Scotland but they only ripen on south facing walls in sheltered localities. A tree would take ten or more years to become established and produce a good crop, since Bearsden was only occupied for 16 years at most it seems highly improbable that the figs were locally grown. Coriander, dill, and opium poppy can all produce fruit in a single season even in western Scotland; if the initial seed were imported it is not inconceivable that subsequent crops could be grown in carefully tended patches and seeds would ripen in favourable seasons. See Addendum C.

Dried figs consist of over 50% sugar and presumably Pliny was considering them as an energy source when he recommended figs for increasing the strength of youth and for improving health and reducing wrinkles for the aged (Pliny 23, 63). Figs had many medicinal uses; they were used as a diuretic as well as a laxative, and also for difficult breathing being also beneficial to the throat and larynx. Figs were also applied with other substances externally to wounds and abscesses (Pliny 23, 63). Opium poppy seeds were sprinkled on Roman bread according to Pliny (Pliny 19, 53) and were also taken, lightly roasted; they were thought to induce sleep (Pliny 20, 76) although the ripe seeds do not contain opium. Coriander fruits are usually pounded to release the volatile oil from the resinous canals inside and it is of interest that only fragments of the fruit wall were found. The Romans used the fruit for flavouring but in addition pounded fruits had many medicinal uses for various skin conditions, wounds and internal parasites (Pliny 20, 82). In Britain coriander was once more commonly used medicinally than nowadays and has carminative and expectorant qualities as well as its use as a spice. Dill was used in the kitchen and as a medicinal herb by the Romans, and Pliny noted its carminative properties (Pliny 20,74). The fruits may be used as stimulant and stomachic, and dill water is still widely used to disperse wind in infants. The fruit tastes similar to that of caraway and is also used for flavouring.

Several other plants of the Umbellifer family (of which coriander and dill are members) with possible culinary uses were first found in Britain in Roman contexts (Godwin 1975: 222). Among them is included *Apium graveolens* (wild celery) fruits of which were present in the ditch. This plant, with a past Scottish distribution mainly restricted to a few damp coastal habitats in central Scotland, has suffered a reduction in its range in historic time and the Mull of Kintyre, its only present station in Scotland, is now the most northerly British locality (Perring & Walters 1976: 158). Its fossil distribution in Britain is confined to coastal peats and Roman sites (Godwin 1975: 223–4). In view of the fact that the plant is at the limit of its range in Scotland and is unlikely to have ever been commonly available it is considered that the fruits were imported. Leaves, leaf stalks and fruits can be used for flavouring in a similar way to those of *var dolce*, the cultivated celery. However its past uses have been mainly medical; the fruits are carminative, the roots and leaves were also used as a diuretic (the fruits are still so used), stimulant, tonic and for promoting restfulness and sleep. Marsh celery, referred to by Pliny among plants for the kitchen garden, may be wild celery. Celery seed is included in a recipe to alleviate headaches by Galen, the leading Roman authority on medicine (Davies 1970: 103).

The records for undetermined Umbelliferae are mainly for resinous canals, all that is left of the fruit; they include cumin (*Cuminum cyminum* L), another Mediterranean plant of former medicinal use. It is of interest that the Romans were aware of the properties of powered coriander and cumin to keep meat fresh during summer (Pliny 20, 82).

Native plants with culinary and medicinal uses

The two incomplete seeds of *Brassica rapa* ssp *sylvestris* (wild turnip) 1.0mm and 1.3mm in diameter, and four seeds of cf *Raphanus* sp (wild or cultivated radish) are of particular interest. Although both taxa could be present as cornfield weeds, it is noteworthy that no pod fragments were found; the tough pod segments of *Raphanus* spp are not usually separated by winnowing and sieving. Seed of wild turnip is mentioned by Gerard (1633) as a substitute for mustard seed though it is more bitter, and wild radish seed is considered an excellent substitute for mustard seed (Johnson 1862). Another name for wild turnip is bargeman's cabbage, still occasionally eaten as a green vegetable in early spring and leaves of wild radish are also edible. The cultivated turnip, B. *rapa* ssp *rapa*, has larger seeds, the Romans certainly knew it but it is not clear whether they introduced it into Britain. Roman soldiers often used radish seed as a substitute for olive oil (Davies 1971: 125) and the cultivated radish had many medical uses (Pliny 20, 13). *B. Rapa* is recorded from the Late Bronze Age site at Itford Hill, Sussex (Helbaek 1952: 137), the Bu broch in Orkney (Dickson, C 1987b: 137), the Roman site at Pevensey, Sussex (Salzman 1908: 135) and tentatively from the Roman sewer at york (Greig 1976: 25). It is the only species of *Brassica* represented from medieval layers in three Scottish towns (Fraser 1981; Fraser & Dickson 1982). *R. raphanistrum* (wild radish) has several Roman (Godwin 1975: 131) and medieval records (Fraser 1981; Fraser & Dickson 1982).

Two pollen clusters of *Malva sylvestris* (common mallow) were recovered from 680mm to 70mm, similar clusters were found in the pollen sievings from 700mm to 760mm. The exceptionally large spiky dimorphic grains (these are all of 180μm) of this insect pollinated plant must either have been growing on the ditch side or, as seems more likely since no fruits were found, to be part of the sewage. The passage of pollen through the gut is well attested through work on coprolites (eg Callen 1969). Pliny (20, 84) gives numerous medicinal uses for mallows especially for 'sylvestris' and 'Althaea', presumably *M. sylvestris* and *Althaea officinalis* (Marsh mallow). Pliny also states that any person taking daily half a cyathus (20 cc) of any of the mallows will be immune to all diseases. The Romans ate the nutlets and boiled the leaves; herbals still recommend the emollient properties of this mucilaginous plant. It is possible that the common mallow, a perennial plant of waste places, was deliberately cultivated at Bearsden. Both forms of the dimorphic pollen were found in other levels of the Roman sewage and a single grain in the Roman level of the middle W ditch but none in the post-Roman deposits. It is notable that previous archaeological records of Malvaceae are all from Roman sites (Godwin 1975: 200). In Germany, in a Roman cellar of second century date, Dr J Baas found an earthenware vessel filled with 30,000 fruits of *Malva sylvestris*. Dr Baas (in Körber-Grohne 1979) pointed out the great respect that both the Roman and Greek civilisations had for the medicinal virtues of the mallow. *M. sylvestris* is fairly common in the east of Scotland but rare and mainly coastal in the west of Scotland though perhaps formerly more common (Hennedy 1878: 28).

Heathland and bog

Plants of heaths and bogs, though present in small fragments, are represented by several species. *Eriophorum vaginatum* (cotton-grass) is confined to damp peaty places, often on deep peat, and must have been brought to the site as is the case with *Sphagnum imbricatum* (bog moss); remains of peat were found in the hypocaust system. The other plants are common on peaty soils though less exclusive in their requirements. Since none was found above the sewage layer it seems probable that all were brought to the fort. Some of the *Calluna* (heather) shoots are burnt which suggests the use of heather, possibly as thatch. *Pteridium* (bracken), here represented by frond fragments, is often associated with human use (Rymer 1976: 155), and has been found in quantity at Vindolanda where Seaward (1976) suggests it may have been used for animal bedding. The other species could well have been gathered with the heather, although the two seeds

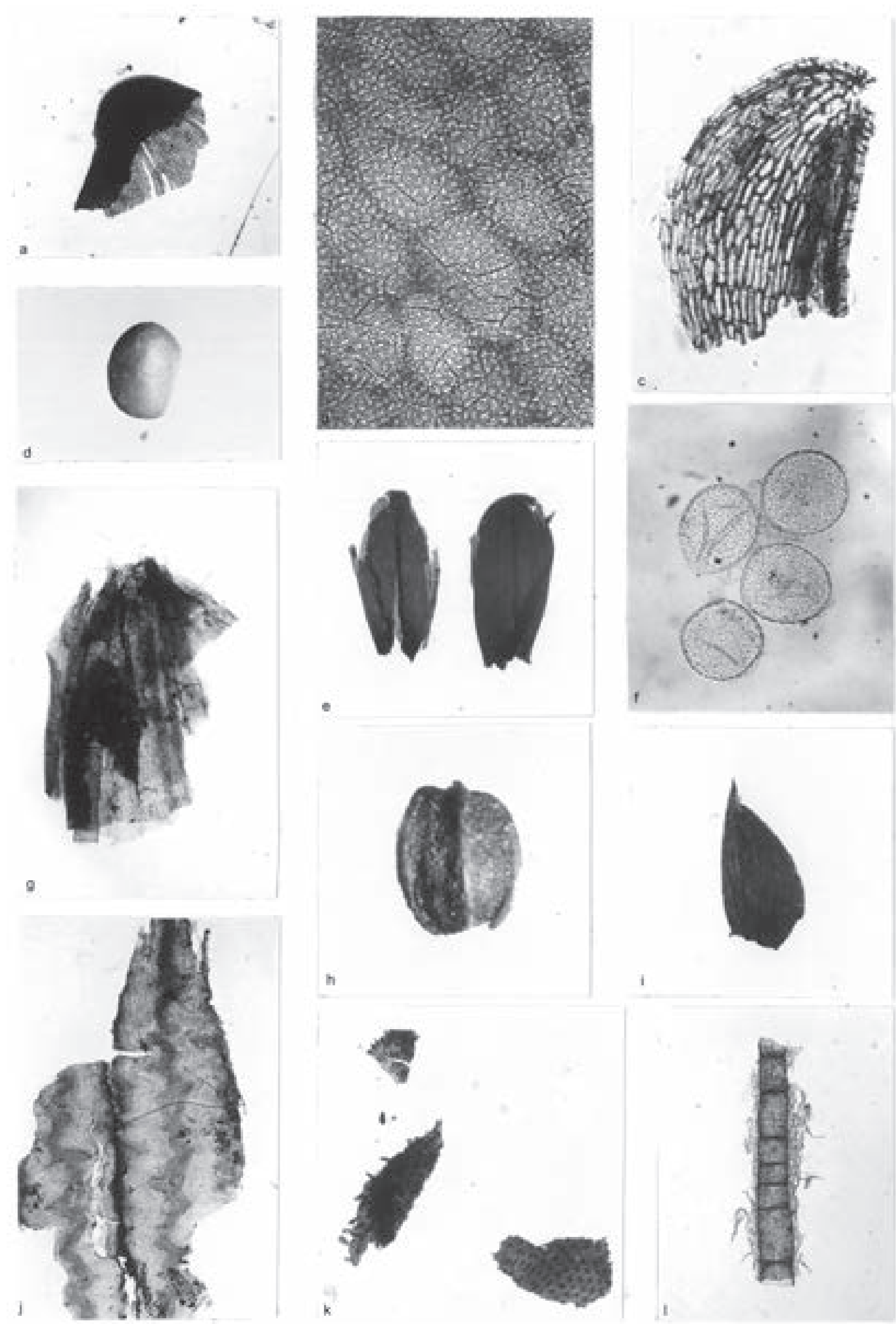


Illustration 13.3

Miscellaneous plan remains.

Key: (a) *Linum usitatissimum*, top of seed, ×20; (b) Cf *Raphanus* sp, top of testa palisade, ×200; (c) *Vaccinium myrtillus*, see, ×40; (d) *Ficus carica*, seed, ×10; (e) *Bromus hordeaceus* agg, 2 fruit, ×4.5; (f) *Malva sylvestris*, pollen, ×75; (g) *Anethum graveolens*, part of fruit with vittae, ×20; (h) *Apium graveolens*, fruit, ×20; (i) *Lathyrus pratensis*, stipule, ×4; (j) *Coriandrum sativum*, part of fruit, ×20; (k) *Agrostemma githago*, seed fragments, ×10; (l) Umbelliferae, *Cuminum* type, vitta, ×20.

of *Vaccinium myrtilus* (bilberry) are more likely to have come from fruit deliberately collected and eaten.

Woodland, grassland and wet pasture

Woodland plants are represented only in very small numbers. The very light wind-borne fruits of *Betula pubescens* (birch) could have come from nearby woodland; *Alnus* (alder) was also found. Nuts of *Corylus* (hazel), represented by small fragments and fruit of *Fragaria vesca* (wild strawberry), *Rubus fruticosus* agg (blackberry) and *R. idaeus* (raspberry) may have been gathered for food. *Linum catharticum* (purging flax, represented by two seeds, one with attached capsule valve, is a plant of dry grassland and heaths, perhaps its purgative properties were recognised by the Romans.

The number of grass grains found is surprisingly not very large; *Agrostis* spp (bent grass), *Deschampsia caespitosa* (tufted hair-grass), *Holcus lanatus* (yorkshire fog), *Poa* cf *pratensis* and *P.* cf *trivialis* (meadow grasses) are characteristic of low lying meadows and pastures sometimes cut for hay (Hubbard 1968, 28) although most of these species are not exclusive to this type of habitat. Fragments of leaves and leaf-like stipules of *Lathyrus pratensis* (meadow vetchling) and petals of cf *Trifolium repens* (white clover) are present in all samples, they may represent deliberate collection and are discussed on p 239.

Seeds of *Juncus* spp (rushes) are commonly found in persistent seeds banks; Salisbury (1961: 229) records about twenty seeds of *Juncus effusus* (soft rush) in each cubic inch of pasture soil. Other fruits and seeds found in the sewage levels and which remain dormant in soils include those of *Cirsium* and *Sonchus* sp (thistles) and *Rumex* spp (docks and sorrels) (Ødum 1978; Thompson & Grime 1979). It is possible that some of these plants may have grown around the ditch although this seems unlikely during the occupation.

Mosses which form large wefts are commonly represented; for example *Eurhynchium praelongum*, *Hylocomium spendens*, *Hypnum cupressiforme* and *Rhytidiadelphus squarrosus* are all common species which grow in damp woodland and grassland and are easily gathered in quantity. Large quantities of these and similar weft forming mosses have been found in medieval latrines; for example from Viking Dublin (Dickson, J H 1973: 233) and Bergen, Norway (Krzywinski 1979). From medieval Aberdeen eggs of the roundworm parasite *Trichuris* sp were found on leaves of *RhytidiadeIphus loreus*, another weft forming moss, by Miss M Fraser who concluded that this and other robust hypnoid mosses may have been used as toilet paper (Fraser 1981). No traces of the sponges usually associated with Roman latrines were found; sponge spicules of one or more species of marine sponges occurred in quantity in the Roman sewer at york (Buckland 1976a: 14): it seems plausible that these mosses which could be readily collected from the vicinity of the fort, should have been used instead. See Addendum D.

Aquatic, marsh and fen

Poorly preserved sedge nutlets, possibly referable to *Carex paniculata* (panicled sedge) were found in all samples. Other plants represented such as *Alopecurus* cf *geniculatus* (marsh foxtail), *Bidens cernua* (nodding bur-marigold), *Lycopus europaeus* (gypsy-wort), *Ranunculus flammula* (lesser spearwort) and *Rorippa palustris* (marsh yellow-cress) could have colonised the ditch sides during the occupation but this is unlikely because of the heavily polluted water. It is more probable that all these sparse remains represent plants which grew in the poorly drained marshy soils before the ditch was dug and their buried dormant seeds were washed in with clayey silt from the ditch sides.

Above the sewage levels, sample 480mm–500mm

No remains of cultivated plants and their associated weeds were found at this level, and plants of heath and bog are also strikingly absent.

Woodland, grassland and wet pasture

The only dry land plant commonly represented is the moss, *Eurhynchium praelongus*, a plant of shady places especially woodland, other mosses include *Hylocomium splendens* and *Hypnum cupressiforme* which could grow in grass and woodland. Occasional Gramineae (grass) fruits and a few seeds of *Cardamine flexuosa/hirsuta* (wood/hairy bittter-cress) were also found. The presence of *Sonchus asper* and *Cirsium* sp (thistles), rumex, sp (dock) and *Urtica dioica* (stinging nettle) suggests a weedy ditchside.

Aquatic, marsh and fen

Fruits and seeds of *Callitriche stagnalis* (starwort), *Lemna* cf *minor* (duckwood), batrachian *Ranunculus* (water crowfoot) and *R. sceleratus* (celery-leaved crowfoot), all plants which grow in shallow water or damp mud, are found in quantity. *Carex* cf *paniculata* (panicled sedge), represented by numerous nutlets, is usually a plant of base-rich soils; presumably the rich organic silty mud of the ditch formed a suitable habitat for it together with *Lychnis flos-cuculi* (ragged robin).

Closer sampling for pollen analysis (illus 13.1) reveals that the sewage layer extends upwards to 580mm. From 390mm to 500mm the more organic clay mud appears layered, showing that the ditch was undisturbed thus allowing the first stages of colonisation by aquatic and fen plants of the ditch bottom and sides. As described elsewhere, table 13.2 also shows that the process continued with trees and shrubs growing in and around the ditch.

13.2.2 Macroscopic plant remains from pollen samples

A pollen bearing sequence of deposits from all the ditches of a Roman occupation site is not usually available, therefore samples were examined for pollen wherever it seemed likely that pollen would be preserved. However the interpretation of such samples is problematical; pollen from the local ditch vegetation will be over-represented and therefore the regional pollen rain under-represented. At Bearsden this is likely to be further complicated by the pollen and spores adhering to plant remains deposited in the ditch by human activity, and those present in the sewage of the outer east annexe ditch.

To gain further knowledge of the local component of the ditches and the depression south of building 7, the sieved residues from the samples prepared for pollen analysis (each representing *c* 1cc of deposit) were examined. About 1cc was also taken from other levels where knowledge of the development of the local vegetation was needed for the interpretation of the pollen spectra. The results are set out in tables 13.1 and 13.2.

Outer East Annexe Ditch

ROMAN SEWAGE 580mm–1.80m

The small samples taken throughout the ditch confirm the homogeneity of the sewage layer. The large quantity of *Triticum/Secale* (wheat/rye) grain fragments consistently comprises about half of the organic fraction between 670mm and 1.67m. Leaves of *Calluna vulgaris* (heather), mostly burnt, are found in every sample from 550mm downwards. Also common throughout are very small fragments of charcoal, still sparsely present between 400mm and 590mm. *Erica cinerea* (bell-heather) is the only heathland plant not represented in the bulk samples. Present as small fragments in several samples are *Eriophorum vaginatum* (cotton-grass), *Pteridium aquilinum* (bracken) and *Sphagnum* spp (bog moss). Fern tracheids, which seem to be a particularly resistant part of the rachis and rhizone, are probably also those of bracken. Four non-aquatic grasses were identified; *Poa annua* (annual meadow-grass) is always associated with man-made habitats and well known for its resistance to trampling. *Bromus* sp (lop-grass or brome) is found only as grain fragments, together with *Agrostemma githago* (corn cockle) a cornfield weed and in this ditch found only where wheat/rye grain fragments are present. *Juncus* (rush) though present in nearly every sample as occasional seeds, as noted previously, may have been washed in with the silt.

Below about 590mm there is no certain evidence of plants actually growing in the ditch. This is to be expected due to the sewage polluting the water. The small size of the fragments of bracken, cotton-grass, heather, mosses and charcoal etc suggests that these are wind-borne fragments blown in from domestic use in the fort.

PLANT COLONISATION 280mm–580mm

From 550mm to 580mm rare seeds of *Cardamine pratensis* (lady's smock) and *Rorippa palustris* (marsh yellow-cress), both of which grow beside water, are found. Single grains of *Glyceria fluitans* (flote-grass) occur at 520mm, 530mm and 580mm and numerous grains of *Catabrosa aquatica* (water whorl-grass), now a rather rare species, were identified from 530mm and 550mm, both are plants of shallow water. The abundance of seeds of *Juncus conglomeratus/effusus* (soft rush) from 520mm upwards is most likely to represent the rushes growing on the muddy bottom of the ditch. Fruits of *Callitriche stagnalis* (starwort) from 530mm and *Ranunculus* subg *Batrachium* (water crowfoot) and *R. sceleratus* (celery-leaved crowfoot) from 500mm together with other ditch species from 480mm to 500mm listed in table 13.1 show the development of a varied flora in the shallow water and mud.

Rushes and a species of *Carex*, most probably *C. paniculata* (panicled sedge) were well established by 460mm. The tufted habit of *C. paniculata* would provide a habitat above the water level enabling an invasion of ferns, here represented by sporangia, to become established.

At the depth of 280mm to 340mm *Betula* cf *pubescens* (birch), *Corylus* (hazel) and *Salix* (willow) have invaded the ditch or its environs. It seems clear that after sewage from the annexe ceased to be deposited and the fort was abandoned the shallow water and mud were colonised by natural vegetation which soon led to the overgrowth of the ditch.

13.2.3 Outer east annexe ditch: pollen analyses

The interpretation of the larger plant remains shows that the Roman occupation is represented by the sewage and other infilling from about 580mm to 1.80m, the bottom of the ditch. It has also been shown that the deposits which overlie the sewage layer reflect the natural infilling of the ditch. Therefore a pollen series through this ditch should indicate the plant cover in the vicinity of the fort during and immediately after the occupation.

The striking feature of the six pollen analyses from 790mm to 1.8m of the sewage layer (illus 13.14) is their similarity. *Alnus* (alder) contributes *c* 25% of the total land pollen with Coryloid (mostly *Corylus* – hazel) under 20%; *Betula* (birch) ranges from 7 to 10%, *Quercus* (oak) 1–4%; *Pinus* (pine), *Ulmus* (elm), and *Salix* (willow) are also present. The presence in the ditch of charcoal and other remains of birch (fruit and catkin scale), and hazel (anther and nut fragments) show that the pollen represents local woodland as do alder (charcoal only) and willow (budscales) which would probably grow in damper areas such as around the Manse burn.

Gramineae (grasses), 26 to 31%, dominate the herbaceous pollen with about 8% *Calluna* (heather) pollen. *Plantago lanceolata* (ribwort plantain) 1–4%, is well known for its presence wherever man and animals modify the vegetation. There is a variety of other herbaceous pollen types, in small quantity, all suggesting open ground. There is very little pollen of annual weeds which would indicate arable fields. Rare cereal pollen of cf *Triticum* (wheat) was found in the sewage (microfiche) but this does not necessarily mean that cereals were grown nearby; the grains may well have been adhering to cereal grain pericarp or glume bases, as demonstrated by Robinson & Hubbard (1977: 198), which had passed through the gut. The occurrence of grains of *Malva sylvestris* (common mallow), present throughout the sewage and probably also digested has been discussed on p 232.

Some insect pollinated plants, with very local pollen dispersal, are limited to the sewage layer. They are *Lotus uliginosus* (pedunculatus) (large birdsfoot-trefoil) type. The small size of the pollen excludes *L. corniculatus* (microfiche), and on ecological grounds *L. uliginosus* is the most likely. *Trifolium repens* (white clover), flower petals were tentatively identified and they probably represent meadow hay, a possibility which is discussed on p 239.

Fern spores are present throughout the ditch and include those of *Pteridium* (bracken), frond fragments were also found in several samples. Spores of *Sphagnum* (bog moss) are similarly present in most samples and the leaves also occur sparsely throughout (table 13.1). Spores of Carboniferous age, derived

Table 13.2
East annexe ditch, macroscopic plant remains

			Depth from top of column in era *Plant remains mainly from domestic use/plant growth in ditch*																					
			Roman sewage														*Aquatic, marsh*						*Trees*	
			180	*167*	*147*	*120*	*96*	*89*	*79*	*76*	*73*	*70*	*67*	*64*	*61*	*58*	*55*	*53*	*52*	*50*	*46*	*40*	*34*	*28*
Cultivated plants and weeds																								
Agrostemma githago (Corn Cockle)	seed	F			+	+				+														
Bromus sp (Lop-grass or Brome)	pericarp	F		+	+	+				+	+		+											
Hordeum sp (Barley)	pericarp	F			+																			
Malva sylvestris (Common Mallow)	pollen cluster									+		+												
Triticum dicoccum/spelta (Emmer/Spelt Wheat)	glume base																							
Triticum/Secale (Wheat/Rye)	testa	F	+	++	++	++	++	++	++	++	++	++	++	+	+	+								
Heath land and bog																								
Calluna vulgaris (Heather)	leaf		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+					
Erica cinerea (Bell-heather)	seed												+											
E. tetralix (Cross-leaved Heath)	leaf									+														
Eriophorum vaginatum (Cotton-grass)	leaf/stem		+	+			+	+																
Pteridium aquilinum (Bracken)	frond	F		+	+					+	+	+				+								
Sphagnum cf *palustre* (Bog Moss)	leaf									+				+		+								
S. papillosum (Bog Moss)	leaf												+											
S. subg *Litophloea* (Bog Moss)	leaf						+	+	+															
Woodland, grassland and wet pasture																								
Cf *Agrostis* sp (Bent-grass)	grain															+								
Betula cf *pubescens* (Birch)	fruit, leaf	F																				+	+	+
B. pubescens/pendula (Birch/Silver Birch)	anther																						+	
Cardamine flexuosa/hirsuta (Wood/ Hairy Bitter-cress)	seed														+	+				+				
C. pratensis (Lady's Smock)	seed															+								
Corylus avellana (Hazel)	nut																							+
Eurhynchium praelongum (Moss)	leafy stem									+			+	+										
Filicales (Fern)	sporangium																						+	+
Cf Filicales (Fern)	tracheid		+	+			+									+								

Table 13.2 (continued)

			Depth from top of column in era *Plant remains mainly from domestic use/plant growth in ditch*																					
			Roman sewage														*aquatic, marsh*						*trees*	
			180	*167*	*147*	*120*	*96*	*89*	*79*	*76*	*73*	*70*	*67*	*64*	*61*	*58*	*55*	*53*	*52*	*50*	*46*	*40*	*34*	*28*
Cultivated plants and weeds																								
Galium sp (Bedstraw)	fruit																			+				
Gramineae (Grass)	grain			+							+			+	+	+								
Hylocomium splendens (Moss)	leafy stem												+			+								
Juncus bufonius (Toad Rush)	seed							+																
J. effusus/conglomeratus (Soft Rush)	seed		+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	++	++	+	++	++	+
Phleum cf *pratense* (Timothy Grass)	grain														+									
Poa annua (Annual Meadow-grass)	grain				+										+									
Polytrichum commune (Hair Moss)	leaf															+								
Potentilla sp (Cinquefoil/Tormentil)	achene												+											
Ranunculus sect *Ranunculus* (Buttercup)	achene						+																	
Rhytidiadelphus squarrosus (Moss)	leaf									+						+								
Rumex sp (Dock or Sorrel)	nut, perianth															+								
Salix sp (Willow)	wood																						+	+
cf *Trifolium repens* (White Clover)	petal	F			+																			
Aquatic, marsh and fen																								
Callitriche stagnalis (Starwort)	fruit																	+	+	+				
Carex sp (Sedge)	nut																		+		+	++	+	
Catabrosa aquatica (Water Whorl-grass)	grain																++	+						
Glyceria fluitans (Flote-grass)	grain							+								+		+	+					
Lychnis flos-cuculi (Ragged Robin)	seed																					+	+	
Ranunculus subg *Batrachium* (Water Crowfoot)	achene																				+			
R. sceleratus (Celery-leaved Crowfoot)	achene																			+		+		
Rorippa palustris (Marsh Yellow-cress)	seed															+	+							
Miscellaneous																								
Unidentified	seed											+												
Unidentified	charcoal <3mm		++	++	++	++	++	++	++	++	++	+	+	+	++	+	+		+	+				

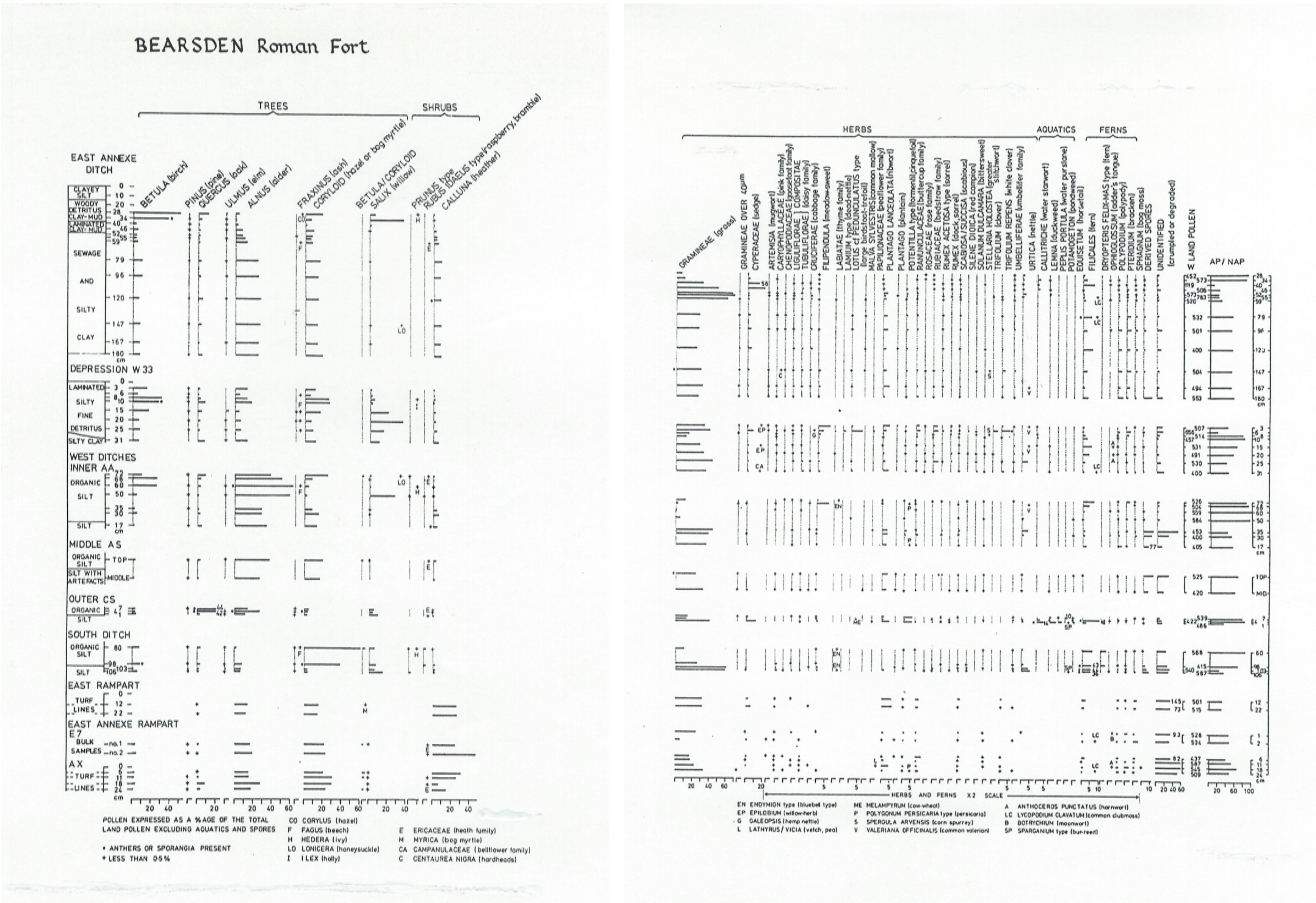


Illustration 13.4
Pollen diagram.

from the clay, appear throughout the ditch and are, appropriately, most common at 1.8m where the sample is largely of clay.

The samples from 590mm upwards, that is at the top of the sewage layer, reflect the development of the local vegetation, the nature of which has been reconstructed from the macroscopic remains listed in tables 13.1 and 13.2.

The spectacular increase in grass pollen from 400mm to 590mm coincides from 530mm to 590mm with the presence of aquatic grasses in the ditch (table 13.1) and fruit of non-aquatic grasses are also found in the sample from 480mm to 500mm (table 13.2).

Aquatic vegetation, probably in shallow water or mud, is shown by the pollen and seeds of *Lemna* (duckweed) and pollen and fruits of *Callitriche* (starwort) from 530mm to 380mm. A steep rise in Cyperaceae pollen between 400mm and 460mm coincides with abundant nutlets of *Carex* cf *paniculata* (panicled sedge). A rise of fern spores at 400mm suggests that the surface is drying out. Increases of herbaceous pollen between 460mm and 590mm, such as Caryophyllaceae, Compositae, Cruciferae, Ranunculaceae, Rubiaceae, *Rumex* spp and *Urtica* may all reflect plants growing in and around the ditch since fruits and seeds referable to these genera and families have been found at these levels.

Samples from the woody detritus mud at 280mm and 340mm show a rise in birch and willow pollen, their probable local over-representation, is attested by their larger plant remains; at 280mm the arboreal pollen rises to over 80% of the total land pollen. This has probably depressed the true values of the other pollen such as grasses and herbs and may only represent local tree growth over the deserted fort.

13.2.4 Origin of cultivated plants and the evidence for hay

The cereal fragments preserved in the outer east annexe ditch are those of the bran component of the grain, that is the indigestible grain wall. As already shown from the description of the plant remains from the outer east annexe ditch, the ditch infilling originates from a number of different sources. Although the overwhelmingly large contribution of the ground up fragments of wheat/rye grains shows the sewage to be of human origin, we must also consider possible evidence of horse droppings finding their way into the open sewer. The contents of four horse turds from a late second-century Roman well at Lancaster, England have been examined by Wilson (Wilson, D G 1979) together with 1500ml of possible stable litter found with them. Over a hundred plant species are represented from the five samples including large fragments of and whole uncarbonised cereal grains. These are predominantly of *Hordeum vulgare* (barley), 23 grains and many probable fragments, with *Avena sativa* (oats), five grains, *Secale cereals* (rye), three grains, *Triticum* sp, one grain and *T.* cf *spelta* (spelt), and nine glume bases. Leguminous plants are represented by petals, calyces, pods, bracts/stipules, tendrils and immature seeds. *Trifolium pratense* (red clover) and *Vicia* cf *sepium* (bush vetch) have been identified among the several taxa represented. Included in the species-rich stable litter are two fruits of *Apium graveolens* (wild celery), five fruits of *Coriandrum sativum* (coriander) and one achene of *Ficus carica* (fig). Many plants from arable fields, grassland, fens and heath are also represented in the litter. Some species from all these ecological groups are also present in the turds and all samples contain abundant monocotyledon leaf and stem fragments. Wilson (ibid) suggests that the horses ate plants from mature pastureland and were fed forage from a mixed unripe leguminous crop either as fresh or dried fodder; she also notes that 'Pollux (1, 183), in the second century, said that horses were fed on barley, spelt, oats, grass and hay', all of which are present in the Lancaster samples. We may assume then that the cereal and hay remains from Lancaster are probably typical of the food given to horses in the Roman cavalry.

Many of the plants listed are also present at Bearsden; could dispersed turds and stable litter be contributing to the plant remains from the annexe ditch? If turds are present in the sewage whole or partly chewed cereal grains would be present, but no whole grains and very few half grains of wheat, barley or oats have been found. Furthermore barley and oat grain fragments are only present in very small numbers; the vast majority of the cereal remains are of small fragments of ground wheat/rye grains. Similarly flowers, pods and immature seeds of legumes should be preserved but we have only occasional incomplete petals of cf *Trifolium repens* (white clover), broken leaves/stipules of *Lathyrus pratensis* (meadow vetchling) and pollen of *Lotus uliginosus* (*pedunculatus*) type (large birdsfoot-trefoil) representing leguminous plants, apart from the rare tiny cf *Vicia* spp (field beam, vetch) seed fragments which are considered to be digested remains. Although these plants could represent fodder from turds, the fragmentary nature of the remains suggests that they are wind blown fragments of meadow hay, presumably from hay used in the fort. If turds are absent or very rarely present then an abundance of stable litter would be equally unlikely. It is worthy of note that straw and plants used for animal bedding were particularly searched for; monocotyledon stems and bracken were present but only as small fragments.

It is appropriate now to consider the positive evidence for animal fodder. As already mentioned petals of white clover have been tentatively, and the pollen more certainly, identified. Petals were found in small quantity throughout the sewage layer and also in the Roman levels of the depression within the fort, south of building 7, and in two of the west ditches, notably confined to the occupational parts of the deposits. White clover is one of the most nutritious of pasture plants. *Lotus uliginosus* (large birdsfoot-trefoil) type pollen is present in the sewage levels and in the depression; *L. uliginosus* is grown for fodder in the USA. Because of insect pollination, little or no Leguminosae pollen is dispersed aerially and therefore the discovery of *Lotus* pollen in several samples indicates either immediately local growth or derivation from hay. When well grown, often in damp areas of meadow or pasture, they could be gathered in quantity together with grasses, represented in the ditches by pollen and occasional fruit and other plants such as *Filipendula* (meadowsweet), also insect pollinated, with pollen present in the ditch. Legumes and grasses would provide adequate food for grazing animals even if cereals were not available. Meadow or bog hay was, of course, one of the traditional sources of fodder before hay fields were deliberately seeded and managed.

The sewage from the outer east annexe ditch represents only the indigestible, mainly cellulose, part of the soldiers' diet. It is unlikely that either cheese and bacon, the staple foods together with corn, of the Roman military diet (Davies 1971: 125), or roots and green vegetables would leave visible traces in the sewage. However from studies of coprolites in America (Callen 1969) and preliminary studies in Scotland by the authors, it could be expected that from a predominantly meat diet, hair and bone fragments and from fish, scales and vertebrae would be preserved. Very small rare bone fragments only, some burnt, were recovered from 1.48m to 1.5m and unpublished levels and also between 200mm and 230mm (Roman levels) in the inner west ditch. The lack of animal remains together with positive biochemical evidence (Knights et al 1983) suggest that plant food may have formed the main part of the soldiers' meals. Although it seems highly likely that some of the food used for flavouring and possible medicinal use was imported from the Mediterranean region, the source of the wheat is less clear. Wheat is only rarely reported from native sources in Scotland during this period. As already stated emmer has only been found in quantity from one pre-Roman Iron Age site, on the Clyde estuary some 10km to the west of Bearsden, bread wheat finds are rare and spelt is so far unrecorded from Iron Age sites in Scotland. Wheat, including emmer and spelt, and other cereals have been grown experimentally at Bearsden for some years (Dr A M M Berrie, pers comm). All need artificial drainage of the predominantly heavy soils of the area. *Hordeum vulgare* (six-row barley) is by far the commonest crop grown throughout Scotland during the Iron Age. There is evidence of barley processing at a broch some 23km to the north of Bearsden (Boyd 1983) occupied during the first and second centuries.

If the grain was not all grown in western Scotland there are various possible sources. The south-west of Scotland has a milder climate and the drainage problems could be overcome by cultivating fertile and freely draining coastal land. The drier east side is also possible or the traditional cornlands of England.

However, as pointed out by Manning (1975a), the Romans preferred, when at all possible, to use local supplies of grain. Long journeys overland would be particularly consuming in time and manpower, and, as also stated by Manning, the grain would need to be distributed between the harvest and the winter. Part of the supplies to the northern forts, notably figs and spices, must have come by ship from the Mediterranean.

Harbours would presumably exist beyond Old Kilpatrick on the River Clyde to the west and at or near Bo'ness on the Forth to the east end of the Wall. It is probable that grain also came by ship. Mallow, possibly a prophylactic, and represented only by pollen, could have been brought and grown in the environs of the fort. Certainly mallow seems unlikely to have grown in quantity naturally and disappeared coincidentally with the end of the occupation as is suggested by the pollen evidence.

The question of the legume seeds is intriguing; although there are no records in Scotland of horse beans being grown by the native population, it is not so improbable since there is evidence of their use in England at this period (they are grown in Scotland for fodder at the present time). There are records of eleven amphorae of beans transported for the Roman troops in Europe. If the very tentative identification is correct and lentils are present they must have been imported and possibly the seed of the common vetch, equally tentatively identified, also. Many different legumes are grown in the Mediterranean region at the present time, though now mainly for fodder.

Fruit which was certainly gathered locally includes blackberry, raspberry, bilberry and wild strawberry, all of which still grow within a few kilometres of the fort.

13.2.5 Processing the crops

From comparison with other military sites we may conclude that emmer and spelt wheats and hulled barley were the cereals most commonly used by the Roman military, and these have been tentatively identified from Bearsden. These cereals would be turned into bread, porridge and soup (Davies 1971: 125) to provide the staple army foods. This knowledge raises the question of how and where the grain was processed and were the three cereals used for different purposes. By attempting archaic processing and then cooking the wheat and barley some answers to these questions may be tentatively given.

Wheat processing and cooking

How much of the processing would be carried out at the fort? Hillman (1981: 142) in his reconstruction of crop husbandry practices, states that 'in wet areas consumer settlements usually buy in glume wheat grain in the form of spikelets' as the grain of glume wheats is less likely to sprout if stored as spikelets rather than naked grain. The wheat spikelets would need to be parched to make them brittle enough to separate the grain from the persistent glumes, and spikelets have been found in Roman ovens (Hillman 1981: 154). It is notable that a kiln was found at the end of a granary at Balmuildy (Miller 1922: 27), the neighbouring fort to the east of Bearsden.

Once parched the grain is usually pounded or ground before cooking. Emmer and spelt are both hard grained wheats, but emmer grains are especially hard and flinty or semi-flinty and therefore more suitable for groats than for meal or flour. The bran layers of emmer are thinner than those of most other wheats producing smoother texture semi-liquid foods such as porridge.

The first century Romans made groats (allicia) from emmer (far) using wooden mortars (Pliny 18, 29). In Italy these groats were used to make porridge (*puls*), the staple food before bread wheat became widely available. Archaic methods of crop processing are still practised in eastern Turkey (Hillman 1981: 155; Hillman 1984: 135–40) where emmer wheat is preferred to macaroni wheat (*Triticum durum*) for bulgar (groats) because of its superior flavour and texture. Wooden mortars and mallets are favoured; to break up the spikelets a strongly curved narrow parabolic inside surface is more effective (Hillman 1984: 140) and a deep mortar prevents the spikelets escaping. However, an adjustable rotary quern, with the upper stone set high to give a clearance of two to three mm, is sometimes used to break up the spikelets and break the kernels into fragments.

By the second century hand querns had become part of the Roman army's equipment; quern stones found at the Antonine Wall forts are of the adjustable type with a perforated lower stone. The adjustable mechanism is described by Fenton (1978: 392–3) and Moritz (1958: 118–19).

Using emmer and spelt wheats grown in the south of England in 1985/86 both types of traditional processing were followed so far as was practical with small quantities of grain; this is summarised in illus 13.5. The grain was first parched at *c* 90°C (high temperatures could impair the leavening action). A wooden pestle and mortar were used. Traditionally, in Turkey, the spikelets are broken and the grain cracked in separate operations (Hillman 1984: 144–5) but it was easier to break up the glumes and the grain together by gentle pounding in this small scale processing. Loose querning proved impractical with the available well-worn rotary quern of garnetiferous schist and the Scottish practice (of grinding barley for meal with the husks still on) with the upper quern stone lowered was adopted (Fenton 1978: 392). It was found necessary to grind some of the corn twice in order to reduce all the grain to groats. This was also the experience of Moritz and Jones (1950) using a Romano-British quern to make flour from bread wheat. After pouring or grinding the four samples were winnowed ready for sieving.

In Turkey the sieves have a mesh of strands of scraped leather and 'the mesh dimensions are woven so that the holes are fractionally smaller than the smallest of the properly formed "prime" emmer grains' (Hillman 1984: 131). In Scotland a sheepskin stretched on a frame with holes pierced by a hot wire was traditionally used (Fenton 1978: 393); calfskin was similarly employed. Fortunately a domestic colander proved to have holes of a suitable size (3mm diameter) just to prevent the passage of whole grains of both emmer and spelt but to allow most of the groats to pass through. Arable weed seeds such as the rather large ones of corncockle (*Agrostemma*) also passed through as fragments, as appears to have been the case at Bearsden. In all four samples the resultant groats ranged from about 0.5mm to 3.0mm (4.0mm) × 0.5mm to 1.5mm (2.0mm) mm thick with a varying admixture of finer mealy particles. The four samples were passed, in turn, through a 0.5mm aperture sieve, which caught most of the groats with adherent bran, in order to estimate the finer mainly non-branny groats or meal in each sample. Gentle pounding in a mortar produced mainly groats from the emmer whereas about a tenth of the spelt was of meal-sized particles. Harder pounding would have produced more meal from each. After grinding through the quern about a sixth of the emmer was reduced to meal and a quarter of the spelt. The largely flinty groats of the ground emmer can be compared with the more mealy ones of the spelt (illus 13.5, e and f). A more efficient rotary quern would produce a more mealy product. The Roman army generally used stones of imported larva incised with radial grooves to regulate the passage of corn through the quern.

Another difference between emmer and spelt was that glume bases and rachis segments were particularly evident in the two sieved emmer samples but rather rare and generally broken and unrecognisable in those of spelt. It seems that spelt glumes are tougher as well as broader, some were found intact on top of the sieve, whereas glumes of emmer were usually broken and therefore more glume bases passed through the sieve. Similarly sieved spelt rachis segments were broken and uncommon whereas those of emmer were largely intact and plentiful.

The next step was to see if the different qualities of emmer and spelt grains led to differences in flavour and texture when cooked as porridge and bread. From the pounded groats a palatable porridge was produced after about 30 minutes simmering in water (comparable to the time needed to cook oatmeal porridge). The emmer porridge had a finer texture than that of spelt due to the thinner bran coats.

Many methods of breadmaking exist and the literature for traditional breadmaking is cited by Hillman (1985). The aim here was to discover the different baking qualities of emmer and spelt wheats not necessarily to produce a Roman type loaf. Several types of leavening were known to the Romans (Pliny 18, 12; 26), but for convenience dried yeast was used to make a leavened loaf from 100g each of the ground wheats adding salt and yeast, proving, and oven baking for 20 minutes at 220°C. The difference between the loaves can be seen on illus 13.5, i. The spelt loaf rose appreciably more than the emmer one and resembled a home baked loaf of strong wholemeal bread flour whereas the emmer bread was browner, heavier and rather sour tasting. A barley loaf, made from quern ground barley meal failed to rise at all due to the lack of gluten. Barley bread is traditionally made in Scotland as a flat thin bread (bannock) cooked on a hot griddle (girdle). Barley was normally given to soldiers as a punishment (Davies 1971: 140).

To compare the bran from the porridge and bread with that from the sewage, the starch etc was removed by heating with 5% hydrochloric or sulphuric acid for a few minutes (Dickson, C 1987a). Unfortunately it does not seem possible to distinguish visually the bran fragments obtained from the porridge from those from the bread by size or shape, both resemble the bran from the sewage. An example of ground bran of both emmer and spelt is shown for comparison with that from the sewage in illus 13.5, e, f and j. Microscopical examination of the cross cells of the bran pericarp showed considerable degradation in those of emmer and spelt following both cooking methods. Pounding or grinding, simmering or baking followed by digestion, excretion and many centuries in a water-logged deposit all take their roll until, in most cases, the diagnostic cross cells disappear and the fossil wheat bran becomes indistinguishable from that of rye. However, as the experimental processing has shown, it seems probable that emmer glume bases and rachis segments are more likely to be found with the bran than is the case with spelt. If well enough preserved they may be identifiable as is discussed on p 277.

It is of considerable interest that the fragment size of the fossil bran, up to 4mm by 3mm, is similar to that of the sieved emmer and spelt. We can assume from this that the Bearsden Romans probably sieved the broken grain only through a 3mm diameter aperture. Although the Romans were capable of drawing off various grades down to a fine white flour using a sieve of 0.2mm aperture (Moritz & Jones 1950; Moritz 1958: 180–1), this would entail several more grindings and sievings to remove the bran and such bran-free flour would leave no trace in the fossil record.

Although visually we cannot discern the cooking method or methods from the fossil bran (but see p 279), we may draw other conclusions from this limited small scale processing. Firstly, that emmer makes the best groats for porridge, especially if lightly pounded in a mortar, and secondly that spelt, ground in a quern, makes the better bread. This conclusion is strengthened by our rather limited knowledge of traditional grain cooking. Emmer has been the preferred wheat grain for porridge at least from ancient Rome up to the present day. Moritz (1958: 148), summarising classical sources, states that it was unusual to make bread from emmer groats. Spelt is said to be good for cakes and pastries (Percival 1921: 327) and is still used for bread making at one bakery in southern Germany and considered a delicacy (Jones, M in Hillman 1984). There is, of course, a considerable diversity in the products which can be made primarily from wheat (Hillman 1984; 1985); however few of them are made from ground or pounded hard wheats. It is not known whether emmer and spelt were always grown as single crops. Most carbonised grain from Roman military sites is found mixed. However an almost pure collection of spelt from a pit at the Roman military site of Welzheim, Germany, suggests that in some cases at least crops were grown and transported separately (there is evidence that the grain was processed but not grown there, Körber-Grohne et al 1983). See Addendum E.

Barley processing and cooking

As noted earlier in this paper the very occasional ground up barley fragments probably represent a residual weed in the wheat crop. However there are a few barley grain fragments which have an entirely different much degraded appearance as can be seen on Illus 13.5, i and j. Both types of barley remains and the probable processing which resulted in the degraded barley are described on microfiche. The degraded barley resembles pearl or pot barley which has been cooked for some three or four hours, and was probably used to thicken soup then as now. The use of pearl barley for broth and barley water was well known to both Greeks and Romans (Pliny 22, 66).

Evidence for food processing from utensils found at Antonine Wall forts

If we assume that emmer and spelt were processed separately how was this achieved? Many adjustable rotary querns exist but deep wooden mortars have so far not been recognised and deep stone ones are rare. It is quite possible that all the wheat was ground with the ubiquitous querns. The upper stones would need to be raised for emmer to produce largely meal-fee groats for porridge and lowered for spelt processing to give a more mealy product suitable for breadmaking.

'Remnants of three great mortars' were found at the Antonine fort at Bar Hill and are figured by Macdonald and Park (1906: 89, fig 32), presumably the same mortars described by Robertson et al (1975: 45) as 'made of local buff sandstone external diameter 1ft 1in' (32cm). The mortar fragments shown in the photograph strongly resemble pieces of 'knocking stones', traditionally used in Scotland for dehusking and pearling barley.

The high proportion of barley found at Roman forts suggests other uses besides pearl barley (which the visual evidence suggests formed only a small proportion of the cereal diet). Although at cavalry forts horses would have been fed barley and other cereals it is possible that celtic beer, the barley-based drink, was also made by the Romans. After malting the barley would be loose querned as described by Fenton (1978: 394) a process requiring an adjustable quern.

The shallow pottery mortaria, so commonly found on Roman sites, are not suitable for the pounding of grain for groats. They would be used to grind herbs and spices as is frequently instructed in the recipes of Apicius (Edwards 1984); the ground fragments of coriander from the sewage indicate such a use.

It is highly probable that perforated pottery vessels, found at two of the forts, were used as cheese presses.

13.3 DEPRESSION SOUTH OF BUILDING 7

13.3.1 Macroscopic plant remains

A seemingly natural depression within the fort, north of the Military Way, extends under the east rampart, therefore its formation must pre-date the building of the fort. The stratigraphy shows that it remained open during the Roman occupation.

A column, about 400mm long × 150mm × 100mm, was taken through the organic deposits and the underlying clay. The stratigraphy is as follows:

0–130mm	clayey silt with layers of detritus, birch bark and a little sand.
130mm–160mm	as above but not layered.
160mm–260mm	clayey silt with layers of detritus, leafy layer from 190mm to 220mm.
260mm–270mm	grey silty clay.
270mm–290mm	clayey silt with layers of leafy detritus.
290mm–400mm	grey silty clay with a layer of detritus at 310mm.
40mm–downwards	transition to pinkish clay.

Contiguous samples of approximately 1cc were examined throughout the organic silts and silty clay to detect any short lived changes in the vegetation during and after the Roman occupation. Larger samples were examined from 30mm to 80mm, 130mm to 160mm, 190mm to 220mm, 300mm to 330mm, 330mm to 350mm and 350mm to 370mm. Samples from adjacent levels containing similar remains have been grouped together (table 28). The organic sediments appear conformable with the top of the silty clay. Epidermal fragments of *Cyperaceae* (sedges) and other plants are found in the silty clay and throughout the organic layers.

Grey silty clay, 300mm–370mm

CULT IVATED PLANTS AND WEEDS

Rare bran fragments of *Triticum/Secale* (wheat/rye) and *Bromus* (lop-grass or brome) were found only in the grey silty clay beneath the organic infilling of the depression. The bran fragments are similar to those found in quantity in the outer east annexe ditch but it need not necessarily be assumed that those in the depression also result from sewage. The depression is not far from a granary and living quarters. Fragments of the hand ground corn would

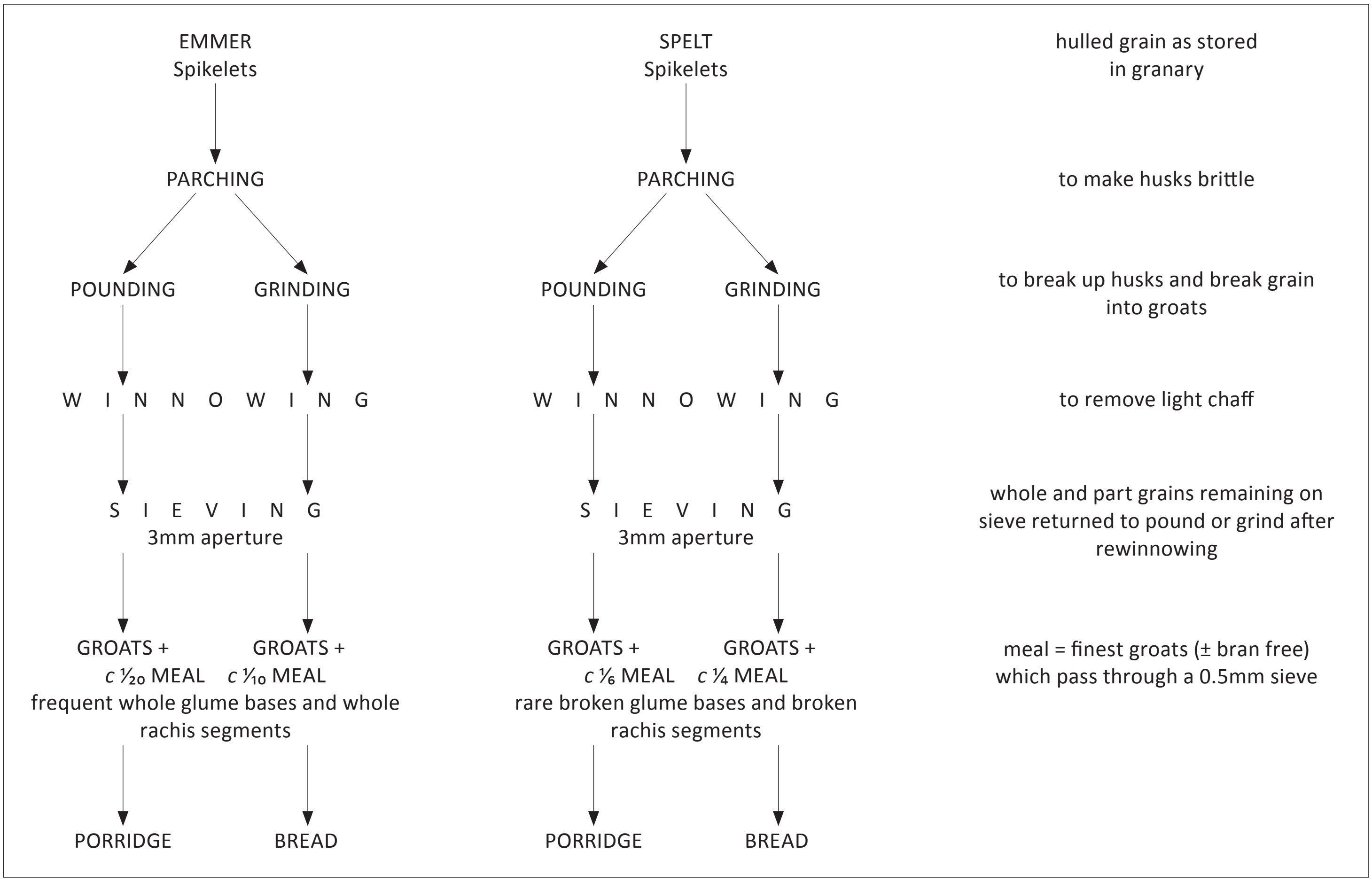


Illustration 13.5
Experimental grain processing of emmer and spelt wheats to compare with bran from Roman sewage.

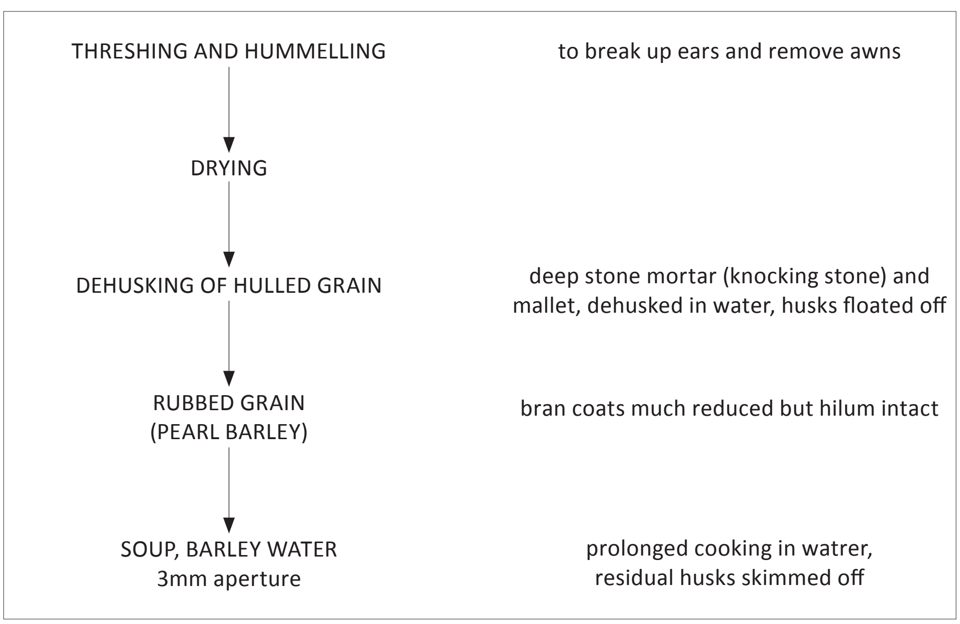


Illustration 13.6
Traditional Scottish processing of hulled six-row barley for pearl (pot) barley.

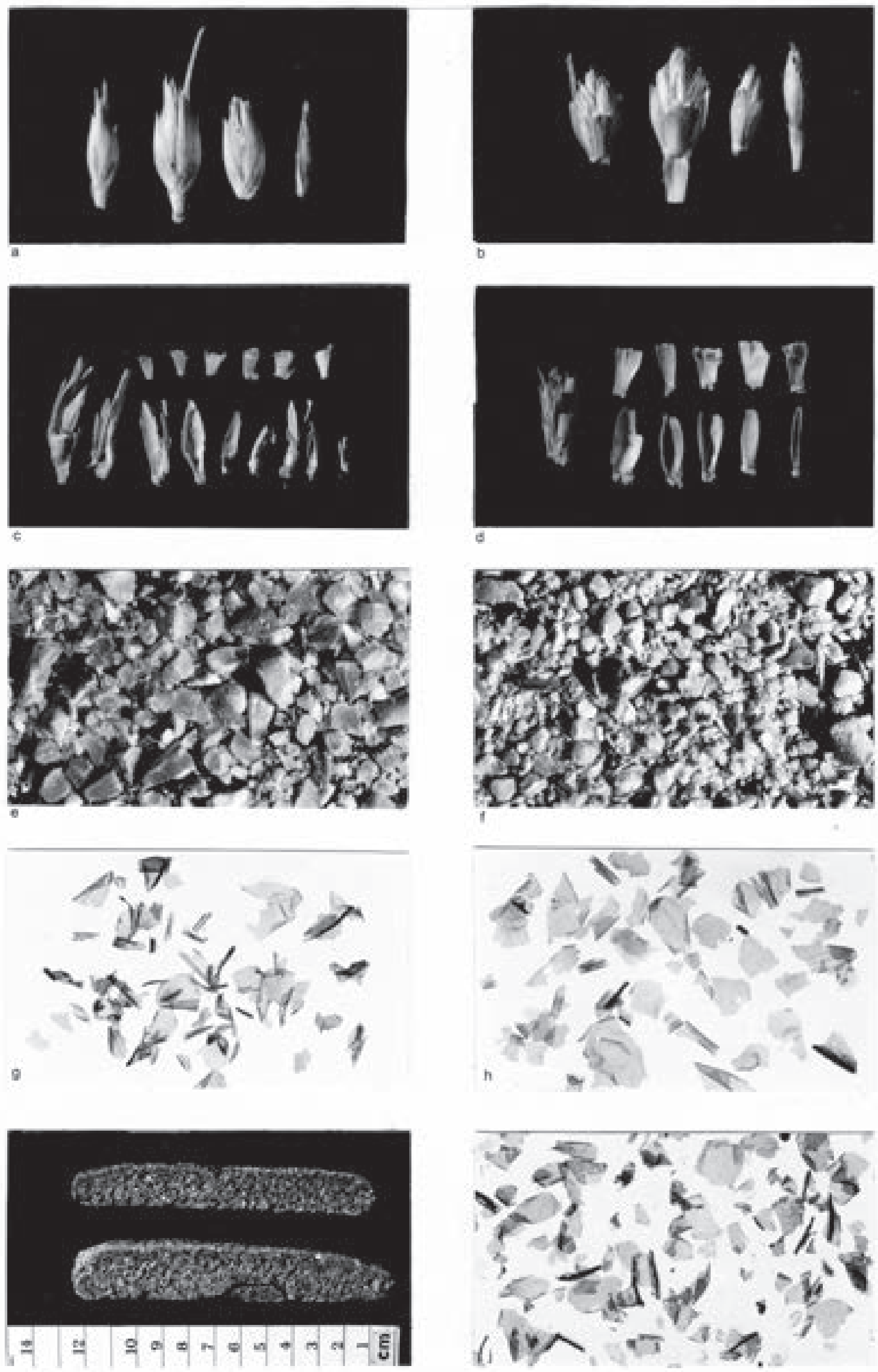


Illustration 13.7

Cereal processing.

Key: (a) *Triticum dicoccum*, spikelets, ×1.3; (b) *T. spelta*, spikelets, ×1.3; (c) *T. dicoccum*, glumes and rachis segments after grinding spikelets in rotary quern, ×1.3; (d) *T. spelta*, glumes and rachis segments after similar grinding, ×1.3; (e) *T. dicoccum*, resultant groats, passed through 3mm sieve, ×2; (f) *T. spelta*, resultant groats, passed through 3mm sieve, ×2; (g) *T. dicoccum*, bran from groats, ×2; (h) *T. spelta*, bran from groats, ×2; (i) Upper, *T, dicoccum* (emmer), bread; lower, *T. spelta* (spelt), bread; (j) Bran from sewage, ×2.

blow around the fort and become incorporated in the sediments of the depression.

HEATHLAND AND BOG

Also restricted to the silty clay are rare burnt fragments of *Calluna* (heather) and *Eriophorum vaginatum* (cotton-grass). Rare leaves of *Sphagnum* (bog moss) are also present. It seems probable that these sparse remains, also represented in the outer east annexe ditch, have blown in from use in the fort.

WOODLAND, GRASSLAND AND WET PASTURE

The sparse remains of cf *Trifolium repens* (white clover), petal fragments, and the mosses *Hylocomium splendens*, *Hypnum cupressiforme* and *Polytrichum commune* are also restricted to the clay, the possible use of similar plant fragments has also been discussed previously. Single fruits and seeds of *Epilobium* cf *obscurum* (dull-leaved willow-herb), *Rumex acetosella* (sheep's sorrel) and *Urtica dioica* (stinging nettle) are also confined to the silty clay. Perhaps these established themselves in organic mud thrown out of the depression during a cleaning operation. Their pollen in the succeeding layers suggests a continuance of suitable habitats.

The sparse remains in the silty clay include fragments of *Salix* sp (willow), and aquatic and fen plants. Well represented in the organic layers, these plants are discussed in the following paragraphs.

An intercalation of silty clay from 260mm to 270mm which had presumably slipped in from the side, also contained sparse plant debris.

Organic silt layers, 0–290mm

No remains of either cultivated plants and their associated weeds or heathland and bog plants were identified from these layers.

WOODLAND, GRASSLAND AND WET PASTURE

The base of the organic deposit from 280mm to 290mm yielded several leaf fragments of *Salix repens* (creeping willow) and two fruits of a *Salix* sp. From 190mm to 220mm a layer of leaves of *Salix repens* was also recovered and a 40mm long piece of willow wood at 140mm, most of the tiny wood fragments found throughout the profile could be those of willow. Willow bud scales and tiny epidermal fragments of *Salix* leaves were identified from 100mm to 180mm; it is possible that all these remains are of *Salix repens*, the basal cells of the hairs are similar to those of the creeping willow. It is unlikely that this quantity of willows remains had blown in from outside the fort; however if the underground creeping rhizomes were left in the ground when it was cleared for building, when conditions were favourable this low creeping willow could rapidly regenerate and recolonise the ground beside or in the depression. *S. repens*, a dwarf shrub, is characteristic of hollows and basins where drainage water collects especially on acid soils (Gimingham 1964: 266). It is notable that although *Calluna* and *Erica tetralix* can grow in similar situations their remains were not found above the silty clay.

Occasional fruits and rare leaf fragments of birch were recovered from the base of the organic deposits from 280mm to 290mm and from 100mm to 200mm, fragments of birch bark only a few mm in diameter are present in well defined layers in the top 160mm. *Rubus fruticosus* (blackberry), tentatively identified, and *Rubus idaeus* (raspberry) are present between 130mm and 220mm; they have been noted in both Roman and post-Roman contexts elsewhere in the fort.

Grains of non-aquatic grasses are only sparsely represented. Rare fragments of sedges are found throughout the organic sites. A few fragments of burnt rushes occur at 260mm and between 290mm and 350mm perhaps resulting from use in the fort. Seeds of rushes are common from 280mm upwards, which suggests that the sides of the depression or adjacent damp ground was soon colonised with vegetation.

The mosses are all shade tolerant species, and shady ditch sides, old cobble paving and nearby tree trunks could have provided suitable habitats.

AQUATIC, MARSH AND FEN

Fruits of *Calitriche stagnalis* (starwort) from 230mm to 260mm and seeds of *Lemna* cf *minor* (duckweed) from 130mm to 160mm and 230mm to 260mm indicate shallow water or damp mud as does *Glyceria fluitans* (flote-grass), some grains of the latter are eroded down to the transparent layer of the pericarp, grains of this aquatic grass were found from 10mm to 160mm. A single fruit of *Eleocharis palustris* (common spike-rush) was found between 190mm and 220mm.

MISCELLANEOUS

Charcoal, mostly fragments under 2mm diameter, is only occasionally found in the silty clay, becoming very rare from about 200mm upwards. Rare tiny fragments such as these might well have blown from fires some distance away.

The restriction of the plant fragments associated with Roman domestic use to the silty clay suggests that the depression was cleaned out during the Roman occupation. However, the succeeding organic silty infilling incorporates the remains of plants which could all have grown in and around the depression. Aquatic or semi-aquatic species persist throughout which suggests that drainage water, from the surrounding higher ground, prevented the depression drying out as plant detritus and silt accumulated. It may be that continued wetness prevented trees colonising the depression although rare birch fruits from 220mm upwards show that the tree was growing in the vicinity.

It seems reasonable to assume that the organic silts are post-occupation and the pollen should therefore reflect any changes in the vegetation around the fort after it was abandoned.

13.3.2 Pollen analysis

Pollen analyses were made throughout the organic silts which accumulated in the depression (illus 3.2.28). The analysis at 310mm is from a 10mm thick streak of organic silt within the bottom silty clay shown from the larger plant remains to contain plants used in the fort. As can be seen in the pollen diagram this single sample is very similar to those of the sewage layer of the outer east annexe ditch, apart from the *Salix* (10% of total pollen), most probably that of *S. repens* (creeping willow), represented in the larger plant remains. The presence of the insect pollinated

Table 13.3
Macroscopic plant remains in the depression within the fort

			Depth from top of column in cm										
			Roman			*post-Roman*							
			C	*C*	*C+D*	*D*	*C*	*D*	*D*	*D*	*D*	*D*	*D*
			35–7	*32–5*	*29–32*	*27–9*	*26–7*	*22–6*	*18–22*	*16–18*	*12–16*	*9–12*	*1–9*
Cultivated plants and weeds													
Bromus sp (Lop-grass or Brome)	pericarp	F	+										
Triticum/*Secale* (Wheat/Rye)	testa	F	+	+	+								
Heathland and bog													
Calluna vulgaris (Heather)	leaf		+	+	+								
Erica tetralix (Cross-leaved Heath)	leaf			+									
Eriophorum vaginatum (Cotton-grass)	leaf/stem				+								
Sphagnum subg Inophloea (Bog Moss)	leaf				+								
Sphagnum subg Litophloea (Bog Moss)	leaf		+	+	+								
Sphagnum undiff (Bog Moss)	leaf						+						
Woodland, grassland and wet pasture													
Agrostis sp (Bent-grass)	grain				+								
Amblystegium serpens (Moss)	leafy stem					+							
Antitrichia curtipendula (Moss)	leafy stem								+				
Betula pubescens (Birch)	fruit					+			+				
B. pubescens/pendula (Birch/Silver Birch)	bark								+		+	+	+
B. pubescens/pendula (Birch/Silver Birch)	fruit								+	+	+	+	
B. pubescens/pendula (Birch/Silver Birch)	leaf					+					+		
Calliergon cordifolium (Moss)	leaf					+							
C. cuspidatum (Moss)	leafy stem					+		+					
Cardamine flexuosa/hirsuta (Wood/Hairy Bitter-cress)	seed							+					
Deschampsia caespitosa (Tufted Hair-grass)	grain				+								
Dryopteris felix-mas type (Fern)	sporangium + spore			+									
Eurhynchium praelongum (Moss)	leafy stem				+	++		+	+	+			+

Table 13.3 (continued)

			Depth from top of column in cm										
			Roman			*post-Roman*							
			C	*C*	*C+D*	*D*	*C*	*D*	*D*	*D*	*D*	*D*	*D*
			35–7	*32–5*	*29–32*	*27–9*	*26–7*	*22–6*	*18–22*	*16–18*	*12–16*	*9–12*	*1–9*
Gramineae (Grass)	grain			+	+		+	+	+				
Holcus lanatus (Yorkshire-fog)	grain			+									
Homalothecium sericeum (Moss)	leafy stem				+	+			+		+		
Hylocomium splendens (Moss)	leafy stem			+									
Hypnum cupressiforme (Moss)	leafy stem		+										
Juncus acutiflorus/articulatus (Sharp-flowered/ Jointed Rush)	seed		+	+	+	+	+	++	++	+	+		+
J. bufonius (Toad Rush)	seed					+							+
J. conglomeratus/effusus (Soft Rush)	seed		+	+	+	+	+	+ +	++	++	++	+	++
Juncus sp (Rush)	leaf/stem	F		+	+								
Neckera complanata (Moss)	leafy stem		+	+		+			+				
Phleum cf *pratense* (Timothy Grass)	grain							+					
Poa pratensis (Smooth-stalked Meadow-grass)	grain							+					
Polytrichum commune (Hair Moss)	leaf			+									
Ranunculus sp (Buttercup)	achene			+									
Rubus cf *fruticosus* agg (Blackberry)	fruit-stone	F							+				
R. idaeus (Raspberry)	fruit-stone								+		+		
Rumex acetosella agg (Sheep's Sorrel)	nut			+									
Rumex sp (Dock)	nut, perianth								+				
Salix repens (Creeping Willow)	leaf					++			+ +				
Salix sp (Willow)	budscale				+				+		+	+	
Salix sp (Willow)	fruit					+							
Salix sp (Willow)	leaf e-pidermis	F			+					+	+	+	+
Salix sp (Willow)	wood										+		
Stachys sylvatica (Hedge Woundwort)	nut								+		+		

Table 13.3 (continued)

			Depth from top of column in cm										
			Roman			*post-Roman*							
			C	*C*	*C+D*	*D*	*C*	*D*	*D*	*D*	*D*	*D*	*D*
			35–7	*32–5*	*29–32*	*27–9*	*26–7*	*22–6*	*18–22*	*16–18*	*12–16*	*9–12*	*1–9*
Thuidium tamariscinum (Moss)	leafy stem			+	+	+			+				
Cf *Trifolium repens* (White Clover)	petal			+									
Urtica dioica (Stinging Nettle)	nut				+								
Viola sp (Violet)	seed												+
Aquatic, marsh and fen													
Callitriche stagnalis (Starwort)	fruit				+			+					
Carex spp (Sedges)	nut			+	+								
Cyperaceae (Sedge Family)	epidermis	F		+	+	+	+	+	+	+	+	+	+
Cyperaceae (Sedge Family)	nut, glumes		+										
Eleocharis palustris (Common Spike-rush)	nut								+				
Epilobium cf *obscurum* (Dull-leaved Willowherb)	seed			+									
Galium cf *palustre* (Lesser Marsh-bedstraw)	fruit			+				+					
Glyceria fluitans (Flote-grass)	grain										+	+	+
Lemna cf *minor* (Duckweed)	seed							+			+		
Miscellaneous													
Unidentified	bark		+	+									
Unidentified	seed							+					
Unidentified	wood		+	+	+	+		+	+		+		+
Unidentified	Charcoal < 3mm		+	+	+	+	+	+	+	+	+	+	+

Lotus uliginosus (pedunculatus) type and *Trifolium repens* (white clover) suggest that these plants were present inside the fort. *L. uliginosus*, a plant of damp grassland or marshy ground is most unlikely to have been growing on cobbled paths or in the depression. It seems more likely that they represent fodder or hay. A tentative identification of petal fragments of white clover has been made in the silty clay, 330mm–350mm. This pollen assemblage is consistent with the evidence from the larger plant remains found in the silty clay above and below the organic band, that the organic streak remained from an earlier infilling deposited within the Roman occupation before the depression was cleared out.

No larger plant remains from Roman use were found above 300mm and at 250mm the relatively high Rubiaceae, probably *Galium* (bedstraw), and *Urtica* (nettle) pollen values may mark the abandonment of the fort although fruits of *Galium* cf *palustre* (lesser marsh bedstraw) and *Urtica dioica* (stinging nettle) were also present between 300mm and 330mm. The tree pollen values from 150mm downwards are depressed by a proportion of local *Salix* (willow) pollen. *Betula* (birch) also has large plant remains present throughout and its pollen may be over-represented especially towards the top where anthers were found at 100mm. Part of the grass pollen may also be very local, fruits of *Glyceria fluitans* (flote-grass) are present in the top 160mm. It is of interest that *Ulmus* (elm) present as less than 0.5% in all other samples from the fort attains 3% of total land pollen at 150mm. Small aquatic or semi-aquatic plants are present. There is *Lemna* (duckweed) in the lower part and *Callitriche* (starwort) in the upper part of the profile.Fern spores are consistently present but spores of *Sphagnum* (bog moss) are rare (150mm and 200mm) and *Sphagnum* moss leaves are notably only present in the silty clay. *Anthoceros punctatus* (hornwort), a thallose liverwort, with single spores at 150mm and 200mm, indicates patches of bare ground. The top two samples at 30mm and especially at 60mm have particularly high values of insect pollinated plants represented which have pollen not normally dispersed far from the parent plant. In fact they comprise over 30% of the total pollen at 60mm. They include *Filipendula* (meadowsweet), Labiatae including *Lamium* (dead-nettle), *Lotus uliginosus* (*pedunculatus*) type (large birdsfood-trefoil). *Silene dioica* (red campion), *Trifolium repens* (white clover) and *Trifolium* sp (clover or trefoil). These plants grow in grassland and wet places; the legumes and meadow-sweet in particular are among plants collected for meadow hay. Although such high values would seem to indicate plants growing in or near the depression it is notable that no larger plant remains were found of these taxa. The *Plantago lanceolata* (ribwort plantain), an indicator of human disturbance, pollen values are comparable to those recorded during the occupation. All these factors suggest that the two samples point to human interference with the vegetation; for instance a wisp of meadow hay blown into the depression could account for this pollen. If we accept the evidence that traces of occupation ceased above 300mm, this represents post-Roman farming. With the exception of these two samples, the pollen from the depression shows reasonable agreement with that of the sewage layer of the east annexe ditch. We do not know what period of time is represented by this depression but if the layers are annual it may be less than half a century. It seems that the surrounding woodland did not greatly alter during that period.

13.4 INNER WEST DITCH

13.4.1 Macroscopic plant remains

Large stones in the top of the grey silts prevented a complete column from being taken through the middle of the ditch infilling; instead a column 1.160m × 100mm × 100mm was taken from the side and 290mm of the basal silt was duplicated from the middle of the ditch beneath the stones. 0m is at approximately the same depth in both columns which are measured from the base upwards.

Column from side of ditch:

1.16m–850mm	khaki clayey silt becoming more organic downwards
850mm–420mm	dark grey-brown woody silty detritus with streaks of carbon from 550mm to 430mm, gradual transition downwards to the next layer
420mm–300mm	grey and khaki mottled silts with sand, stones, small charcoal, wood and silvery bark fragments
300mm–130mm	light grey to khaki clayey silt with occasional streaks of carbon and wood fragments, stone between 270mm and 180mm
130mm–0mm	dark grey streaky clayey silt with fragments of silvery bark

Duplicate of base of column from middle of ditch:

290mm–120mm	mottled yellow and grey clayey silt
120mm–70mm	blue-grey clayey silt with small stones
70mm–0mm	blue-grey clayey silt with coarse sand and stones

Samples 30mm thick, each of *c* 150cc were taken from 170mm upwards from the main column, similar samples but of *c* 27cc were taken from 0 to 170mm throughout the duplicate column unless otherwise stated. Table 29 records the main plant bearing part of the silts from the two columns. Where plant remains are very sparse or very similar the results from adjoining levels have been combined or detailed below. Wood and charcoal are shown in table 29, small unidentifiable charcoal fragments under 3mm were found throughout.

Sparse plant remains from the base of the duplicate column are as follows:

170mm–140mm	*Triticum*/*Secale* (wheat/rye) bran fragments and *Juncus effusus* (soft rush) seeds, occasional; *Calluna* (heather) leaves, rare; coal, occasional; charcoal, rare

140mm–110mm	*Triticum/Secale* bran fragments, rare
110mm–70mm	no plant remains seen
70mm–40mm	coal and other Carboniferous – plant fragments, rare
40mm–0mm	unidentified stems

Coal and Carboniferous megaspores are also present in the silts of the occupation levels shown in table 13.4. The presence of coal (all of fragments under 10mm) in silts with and without fort debris suggests that it is derived from the underlying Carboniferous clays rather than from use in the fort.

Middle of ditch, 17–23, 230mm–290mm, Roman occupation

A piece of a Roman leather shoe was found at approximately this level.

CULTIVATED PLANTS AND WEEDS

Some bran fragments of *Triticum/Secale* (wheat/rye) and a few glume bases of *T. dicoccum/spelta* (emmer/spelt) are present. A single carbonised wheat grain, the only one to be found at Bearsden, was recovered from 0.23 to 0.29m; it is 'puffed' and therefore not further identifiable. *Hordeum* (barley) and *Bromus* sp (lop-grass or brome) are present as occasional bran fragments. *Linum usitatissimum* (flax, linseed) is represented by part of a single seed (170mm–230mm); the cell pattern and characteristic beak are well preserved. Although the cereal and weed fragments are similar to those from the outer east annexe ditch they do not necessarily originate from sewage. Barrack-blocks and one of the fort's granaries are sited just the other side of the rampart, moreover a drain from the fort empties into the ditch. It seems more probable that these and other plant fragments from use in the fort were blown or washed into the ditch.

It is notable that four fragments of bone, one of them burnt and none larger than 2mm across, were found between 200mm and 230mm; as stated earlier fragments were also noted in the outer east annexe ditch.

HEATHLAND AND BOG

Calluna (heather) contributes leafy stems, some burnt, and *Pteridium* (bracken), frond fragments. These small fragments could have been blown or washed into the ditch from use in the fort. As has been postulated for the east annexe ditch the other plants from heath and bog habitats could have been gathered with the heather.

WOODLAND, GRASSLAND AND WET PASTURE

Wild plants which may have been gathered for food are represented by single fruitstones of *Rubus fruticosus* agg (blackberry) and *R. idaeus* (raspberry). The grass grains are all of species found in the outer east annexe ditch; together with wild legumes, represented by fragments of *Lathyrus pratensis* (meadow vetchling) and of *Trifolium repens* (white clover) they may have been gathered for fodder as is discussed on p 239. Abundant seeds of *Juncus effusus* (soft rush) may represent dormant seeds, the rare burnt fragments of rush stems/leaves in these and subsequent levels probably result from use in the fort. A clump of moss at 270mm consists mainly of *Hylocomium splendens* with other weft-forming robust hypnoid mosses easily gathered in quantity, they are mostly the same species as those found in the outer east annexe ditch.

AQUATIC, MARSH AND FEN

Fruits and seeds of sedges and other semi-aquatic plants are present in such small numbers that it is doubtful whether they were growing in the ditch during the occupation. Persistent seed banks or collection with hay from damp places could account for their presence.

Side of ditch, 20mm–300mm, Roman occupation

The lower sample from 20mm to 130mm contains seeds of *Juncus* spp especially *J. effusus* (soft rush) and grains of *Glyceria fluitans* (flote-grass). From 130mm to 300mm fruits of *Isolepis setacea* (bristle scirpus), a plant of damp places, and abundant *Juncus* seeds were noted. Many of the *Glyceria* grains and *Juncus* seeds are corroded perhaps due to fluctuating water levels in the ditch. At least 12 different mosses, many of them robust species, from woodland and both wet and dry grassland are present as small fragments. Flowering plants from similar habitats are generally not represented at this level. This diverse assemblage of mosses would seem to have been deliberately collected, perhaps the rushes were too.

300mm–400mm, Roman occupation

CULTIVATED PLANTS AND WEEDS

Rare bran fragments of *Triticum/Secale* (wheat/rye) and *Bromus* sp (lopgrass or brome) are confined to between 300mm and 400mm.

HEATHLAND AND BOG

Eriophorum vaginatum (cotton-grass), as noted previously, a plant of damp peaty places only, shows deliberate collection. Leafy stems of *Calluna* (heather), some of them burnt, and associated heath and bog plants were recognised; also a few frond fragments of *Pteridium* (bracken). All are less common than in the middle of the ditch and diminish upwards.

WOODLAND, GRASSLAND AND WET PASTURE

Grasses of low lying meadow and pasture are present but in no great numbers; rush seeds are still abundant. A single seed of *Plantago lanceolata* (ribwort plantain) is of interest. *Urtica dioica* (stinging nettle), present in all samples, is a plant which rapidly invades habitation sites. Ten different mosses are virtually all the same species found in the lower samples and in the middle of the ditch suggesting a continued domestic use.

AQUATIC, MARSH AND FEN

Aquatic and semi-aquatic plants are present in quantity; cf *Nymphaea alba* (water-lily) and *Potamogeton natans* (broad-leaved pondweed) all need permanent standing water. *Callitriche stagnalis* (starwort), *Glyceria fluitans* (flote-grass), *Ranunculus* subg *Batrachium* (water crowfoot) and *Rorippa palustris* (marsh yellow-cress) grow in water or damp mud. *Lychnis flos-cuculi* (ragged robin) and probably *Carex* spp (sedges) would grow in marshy ground.

MISCELLANEOUS

Carduus spp (thistles) and most species of *Cirsium* are characteristic of waste places and disturbed ground; *Sonchus asper* (spiny sow-thistle) and *Rumex obtusifolius* (broad-leaved dock) can grow in similar habitats.

The evidence shown here, together with that of the charcoal, is consistent with the destruction of the fort with a few wind-blown fragments from domestic use in the fort, rapid plant growth in the ditch, and the invasion of weeds and nettles around it.

470mm–500mm, Post Roman

It is notable that neither cultivated plants nor plants of heathland and bog are present.

WOODLAND, GRASSLAND AND WET PASTURE

It is striking that very few species are represented. *Alnus* (alder) fruits and *Salix* (willow) buds are notable; alder and willow pollen dominate the pollen spectrum at this level. Seeds of *Juncus effusus* (soft rush) are still abundant.

AQUATIC, MARSH AND FEN

The aquatic plants have disappeared; *Lychnis flos-cuculi* (ragged robin) and *Potentilla palustris* (marsh cinquefoil) together with the rushes show that the overgrown ditch is still marshy.

Conclusions

The two sequences of samples suggest that during the occupation the organic infilling derived mainly from use within the fort, probably either via a drain emptying into the ditch or from wind-blown fragments. These plant remains seem to have occupied the basal silt in the middle of the ditch and a few centimetres at the side of the ditch infilling suggesting that the ditch was cleared out shortly before the fort was abandoned. The plants from domestic use are also represented in the outer east annexe ditch.

The sequence of deposits is interrupted by the large stones in the middle of the ditch, presumably from the destruction of the fort, but the sequence at the side of the ditch seems continuous. However, the silts below 400mm probably accumulated rapidly as a result of disturbance at the end of the occupation and may represent only a brief period of deposition. Rapid growth of water and marsh plants is shown by their presence in the same samples as fragments from domestic use between 300mm and 400mm; at the same time nettles and rank weeds colonised the ditch sides. The sample from 470mm to 500mm shows that subsequent overgrowth by marsh plants and trees or shrubs is marked by a striking reduction in the number of dry land plants. It is tempting to conclude that many of these, including the mosses, derive from domestic use in the fort.

13.4.2 Pollen analyses

The larger plant remains have shown that levels below about 400mm reflect the end of the Roman occupation and the beginning of aquatic plant growth. The sample from 170mm is from the duplicate column, the pollen from both it and the samples from 300mm and 350mm is very similar to that from the sewage levels of the outer east annexe ditch with *Alnus* (alder) and *Corylus* (hazel) as the main tree pollen. *Gramineae* (grass) pollen is probably attributable in part to *Glyceria fluitans* (flote-grass) fruits of which are also present. Rare cf *Triticum* (wheat) pollen is present at 250mm, presumably having adhered to wheat bran. *Calluna* (heather) and *Plantago lanceolata* (ribwort plantain) are present in small amounts. *Urtica dioica* (stinging nettle), represented by both pollen and nutlets from 300mm upwards must have grown nearby. About half the pollen is derived from trees including hazel. The high values for derived spores coincide with carboniferous megaspores and coal, the spores are also presumed to be of Carboniferous age.

The samples from 500mm upwards show initial overgrowth by *Alnus* (alder) and *Salix* (willow), their local origin is confirmed by larger plant remains with Betula (birch) replacing *Salix* (willow) from 600mm upwards and *Filipendula* (meadow-sweet) and ferns notable in the upper two samples.

13.5 MIDDLE WEST DITCH

13.5.1 Macroscopic plant remains

Due to the instability of the section it was only possible to take bulk samples from the silts as indicated. The woody detritus layer was not sampled since it is clearly post-Roman. The stratigraphy of the section is as follows:

Topsoil *c* 800mm thick
Brown soil *c* 500m thick
Clayey silt *c* 360mm thick
Woody detritus *c* 900mm thick
Grey-brown silt *c* 120mm–240mm thick, 'top silt'
Grey silt (with artefacts) *c* 440mm thick, 'middle silt'
Silt below artefacts (not sampled)

Middle silt with artefacts, Roman occupation

CULTIVATED PLANTS AND WEEDS

Triticum/Secale (wheat/rye) and *Bromus* sp (brome or lop-grass) are present in small amount and confined to the silt containing the artefacts, as shown in table 13.5.

HEATHLAND AND BOG

Rare fragments of these plants, associated with use in the fort, are also only found in this silt.

WOODLAND, GRASSLAND AND WET PASTURE

The flowering plants and mosses are all of species also recovered from the inner west ditch. Similar conclusions can be drawn as to the origin of these and the other plant remains from this silt of undoubtedly Roman age: namely that most fragments probably originate from use in the fort. The plant fragments are possibly wind-blown and/or the ditches were linked and the contents of drains from the fort flowed from the inner to the middle ditch.

Table 13.4
Inner west ditch, macroscopic plant remains

			Depth in cm from base upwards							
			Middle of ditch		*Side of ditch*					
			Roman		*Roman*					*post-Roman*
			23–17	*29–23*	*13–2*	*30–13*	*34–30*	*37–34*	*40–37*	*50–47*
Cultivated plants and weeds										
Agrostemma githago (Corn Cockle)	seed	F		1						
Bromus sp (Lop-grass or Brome)	pericarp	F	o	o			r			
Cerastium fontanum (Common Mouse-ear Chickweed)	seed		1				9	5	2	
Galeopsis tetrahit agg (Common Hemp-nettle)	nut						1	1	1	
Hordeum sp (Barley)	pericarp	F	o	o						
Linum usitatissimum (Cultivated Flax)	seed	F	1							
Polygonum aviculare agg (Knotgrass)	nut								1	
R. persicaria (Persicaria)	nut			1						
Rumex obtusifolius (Broad-leaved Dock)	nut, perianth						8			
Sonchus asper (Spiny Sow-thistle)	achene						1	3	3	
Stellaria media (Chickweed)	seed						5		5	
Triticum dicoccum/spelta (Emmer/Spelt Wheat)	glume	F	6	5			r			
Triticum/Secale (Wheat/Rye)	testa	F	f	f			r			
Triticum sp (Wheat)	gram			1*						
Heathland and bog										
Aulacomnium palustre (Moss)	leafy stem		r	f		o	r			
Calluna vulgaris (Heather)	flower		1	6			3	2		
Calluna vulgaris (Heather)	leafy stem		41*	15			13*	6*	1	
Calluna vulgaris (Heather)	seed						3	1	1	
Danthonia decumbens (Heath-grass)	grain			1						
Dicranum cf *bonjeani* (Moss)	leafy stem		r							
Erica tetralix (Cross-leaved Heath)	leaf		6				2			
Erica tetralix (Cross-leaved Heath)	seed			3			1			

Table 13.4 (continued)

			Depth in cm from base upwards							
			Middle of ditch		*Side of ditch*					
			Roman		*Roman*					*post-Roman*
			23–17	*29–3*	*13–2*	*30–13*	*34–30*	*37–34*	*40–37*	*50–47*
Eriophorum vaginatum (Cotton-grass)	leaf spindle		3	2			3	2		
Juncus squarrosus (Heath Rush)	seed		0	r	r	r	o	o	o	
Polytrichum sect *Juniperina* (Hair Moss)	leafy stem		r							
Potentilla erecta (Common Tormentil)	achene		6	1			1	1	1	
Pteridium aquilinum (Bracken)	frond	F			r	o	r			
Sphagnum sect *Acutifolia* (Bog Moss)	leaf		r							
S. subg *Litophloea* (Bog Moss)	leaf		r	r						
S. palustre (Bog Moss)	leaf						r			
Woodland, grassland and wet pasture										
Agrostis sp (Bent-grass)	grain		13	14			1	2	3	
Alnus glutinosa (Alder)	fruit									3
Calliergon cordifolium (Moss)	leafy stem					r				
C. cuspidatum (Moss)	leafy stem						r	r		
Campanula rotundifolia (Harebell)	seed		1							
Cardamine flexuosa/hirsuta (Wood/Hairy Bitter-cress)	seed						9	2	8	
Ceratodon purpureus (Moss)	leafy stem		r	r		o	r	r	o	
cf *Conopodium majus* (Pignut)	fruit									1
Deschampsia caespitosa (Tufted Hair-grass)	grain		1	2			10	3	9	
Dicranella cf *heteromalla* (Moss)	leafy stem		r				r			
Dryopteris felix-mas type (Fern)	sporangium								1	
Eurhynchium praelongum (Moss)	leafy stem		r	r		r	f	a	f	
Eurhynchium sp (Moss)	leafy stem		0	0		0	r			
Gnaphalium sylvaticum/uliginosuim (Wood/Marsh Cudweed)	fruit			2			2			
Gramineae (Grass)	grain		12	9		1	4	18	10	
Holcus lanatus (Yorkshire-fog)	grain		2	1						

Table 13.4 (continued)

			Depth in cm from base upwards							
			middle of ditch		side of ditch					
			Roman		Roman					post-Roman
			23–17	29–23	13–2	30–13	34–30	37–34	40–37	50–47
Hylocomium splendens (Moss)	leafy stem		o	a		o	o	r	r	
Hypericum cf *humifusum* (Trailing St John's Wort)	seed							1		
Hypnum cupressiforme (Moss)	leafy stem		r	o		o	o	r	r	
Juncus articulatus (Jointed Rush)	seed		1		r	a	f	f	f	
J. bufonius (Toad Rush)	seed		o	r	r	a	f	f		
J. effusus (Soft Rush)	seed		a	a	a	a	a	f	a	a
Juncus sp (Rush)	stem/leaf	F		r*			r*	r*		
Juncus sp or spp	seed		f			f	o	o	o	
Lathyrus pratensis (Meadow Vetchling)	leaf/stipule	F	6	1				1		
Luzula sp (Wood Rush)	seed		2	2		1	2	3		
Mnium hornum (Moss)	leafy stem			r		r		r	r	
Myosotis sylvatica (Wood Forget-me-not)	nut			1					1	
Neckera complanata (Moss)	leafy stem					r				
Plantago lanceolata (Ribwort Plantain)	seed						1			
Pleurozium schreberi (Moss)	leafy stem		r	r						
Poa annua (Annual Meadow-grass)	grain		1	1						
P. cf *pratensis* (Smooth-stalked Meadow-grass)	grain		2					1	1	
P. cf *trivialis* (Rough-stalked Meadow-grass)	grain		1				1			
Polygala sp (Milkwort)	seed	F		1			1	1		
Polytrichum commune (Hair Moss)	leafy stem		r	o		r	r	r	o	
Pseudoscleropodium purum (Moss)	leafy stem			o						
Ranunculus acris (Meadow Buttercup)	achene		4							
R. repens (Creeping Buttercup)	achene		1				3	2		
Rhytidiadelphus squarrosus (Moss)	leafy stem			o			r			

Table 13.4 (continued)

			Depth in cm from base upwards							
			Middle of ditch		*Side of ditch*					
			Roman		*Roman*					*post-Roman*
			23–17	*29–3*	*13–2*	*30–13*	*34–30*	*37–34*	*40–37*	*50–47*
Rubus fruticosus agg (Blackberry)	fruit-stone		1							
R. idaeus (Raspberry)	fruit-stone			1						1
Rumex acetosa (Sorrel)	nut, perianth						1	5	1	
Sagina procurabens (Procumbent Pearlwort)	seed						1	1		
Salix sp (Willow)	bud scale						3			10
Salix sp (Willow)	leaf	F					o			
Stachys palustris/sylvatica (Marsh/Hedge Woundwort)	nut				1					
Thuidium tamariscinum (Moss)	leafy stem			o						
Thuidium sp (Moss)	leafy stem					r				
cf *Trifolium repens* (White Clover)	petal	F	7	3			2			
Urtica dioica (Stinging Nettle)	nut						11	14	4	
Aquatic marsh and fen										
Callitriche stagnalis (Starwort)	fruit			2			2	1		
Caltha palustris (Marsh Marigold)	seed		1							
Carex nigra (Common Sedge)	nut, utricle			2						
C. cf *paniculata* (Panicled Sedge)	nut, utricle		4						1	
C. cf *riparia* (Great Pond Sedge)	nut						2	2		
Carex spp (Sedge)	nut		13	12			14	14	6	12
Eleocharis palustris (Common Spike-rush)	nut									1
Epilobium cf *obscurum* (Dull-leaved Willow-herb)	seed		1				3	6	3	
E. palustre (Marsh Willow-herb)	seed						2		3	
Glyceria fluitans (Flote-grass)	grain				75		21	15	4	1
Isolepis setacea (Bristle Scirpus)	nut					7				
Lychnis flos-cuculi (Ragged Robin)	seed						27	39	4	94

Table 13.4 (continued)

		Depth in cm from base upwards							
		Middle of ditch		*Side of ditch*					
		Roman		*Roman*					*post-Roman*
		23–17	*29–23*	*13–2*	*30–13*	*34–30*	*37–34*	*40–37*	*50–47*
Lythrum portula (Water Purslane)	seed	2							
Montia fontana (Blinks)	seed					5	5		
cf *Nymphaea alba* (White Water-lily)	seed F					1			
Potamogeton natans (Broad-leaved Pondweed)	fruit-stone							131	
Potentilla palustris (Marsh Cinquefoil)	achene								11
Ranunculus subg *Batrachium* (Water Crowfoot)	achene					168	156	65	
R. flammula (Lesser Spearwort)	achene		1						1
Rorippa palustris (Marsh Yellow-cress)	seed					6	5	2	
Viola palustris (Marsh Violet)	seed					1			10
Miscellaneous									
Acrocarp undiff (Moss)	leafy stem		o		r				
Bryophyta (Moss)	capsule		r		r	r	r		
Bryophyta (Moss)	leafy stem					o			o
Bryum sp (Moss)	leafy stem				r				
Carduus sp (Thistle)	achene					1			
cf *Cirsium* sp (Thistle)	achene					2	2	7	5
Epilobium sp (Willow-herb)	seed	1				3	6	4	
Galium sp (Bedstraw)	fruit					1	1		1
Pohlia sp (Moss)	leafy stem	o	r		r				
Potentilla sp (Cinquefoil)	achene		1						4
Rumex sp (Dock/Sorrel)	nut	1				3		1	
Senecio sylvaticus/vulgaris (Wood Groundsel/Groundsel)	achene					4	3	8	
Unidentified	charcoal <3mm	r	r	r	r	r	r	r	r
Carboniferous,	megaspore		1		2	1	1		
Carboniferous	coal	r	r			r			

Top silt, post-Roman

Neither cultivated plants nor those from heathland or bog were found.

WOODLAND, GRASSLAND AND WET PASTURE

The plants represented are similar to those from the middle silt.

AQUATIC, MARSH AND FEN

The beginning of aquatic plant growth in the ditch is shown, *Potamogeton natans* (broad-leaved pondweed) indicates standing water; the same taxa are present in the inner ditch between 300mm and 400mm.

13.5.2 Pollen analysis

The larger plant fragments (table 13.5) show the middle and top of the silt to be Roman and immediately post-Roman respectively. The pollen spectra from both samples are very similar to those from the lower three samples from the inner west ditch.

Conclusions

These two samples indicate similar conditions to those of the inner ditch. The middle silt, with Roman artefacts, contains similar plant remains from use in the fort to those from 170mm to 290mm from the middle of the inner west ditch: the top silt though lacking most of these plants has elements of the aquatic flora similar to that from 300mm to 400mm from the side column of the inner ditch.

The silts in the middle ditch obviously accumulated very rapidly which may account for the smaller quantity of plant remains. The unsampled woody detritus above these silts suggests that the deposits were sealed in by later tree overgrowth in a similar way to those of the inner west ditch.

13.6 OUTER WEST DITCH

13.6.1 Macroscopic plant remains

A column 600mm × 100mm × 180mm was taken through the organic deposits. It proved impossible to sample the underlying silts due to the imminent collapse of the section. The stratigraphy of the column measured from the base upwards is as follows:

600mm–100mm	unsampled woody detritus
100mm–30mm	coarse detritus with leaves and *Salix* (willow) wood
30mm–0mm	coarse detritus consisting mainly of the moss *Fontinalis antipyretica*, slightly silty at the base.

The material is very rich in plant remains and only *c* 30cc each of samples 30mm and 30mm–60m was examined. The samples at 70mm and 100mm are from pollen washings each of *c* 1cc, the results are set out in table 31.

0–30mm, post-Roman

WOODLAND, GRASSLAND AND WET PASTURE

Local growth of *Juncus effusus* (soft rush) is evinced by capsules and abundant seeds; with shade tolerant ferns and grass, and *Myosotis sylvatica* (wood forget-me-not), a plant of damp woods.

AQUATIC, MARSH AND FERN

Potamogeton berchtoldii (small pondweed) indicates standing water, marshy areas at the ditchside would provide habitats for *Eleocharis palustris* (common spike-rush), *Epilobium* cf *obscurum* and *E. palustre* (dull-leaved and marsh willow-herbs), *Lythrum* (*Peplis*) *portula* (water purslane) and *Potentilla palustris* (marsh cinquefoil). The most abundant plant remains are of a moss, *Fontinalis* antipyretica, which grows on rocks, exposed roots and tree boles submerged or subject to submergence; it often grows in moving water.

30mm–100mm, post-Roman

WOODLAND, GRASSLAND AND WET PASTURE

The shade tolerant herbaceous plants are still present and local tree growth is shown by anthers of *Corylus* (hazel) and *Quercus* Cog); with fruits of *Alnus* (alder), *Betula pubescens* (birch) and *Quercus* (oak) together with leaves of *Quercus* and *Salix* (willow). Most of the mosses such as *Antitrichia curtipendula*, *Homalothecium sericeum*, *Isothecium myosuroides* var *myosuroides*, *Thuidium tamariscinum* and *Zygodon* cf *viridissimus* grow on trees and rocks and *Ulota* spp on trees near water.

AQUATIC, MARSH AND FEN

The same plants of wet places continue to flourish, open water is still indicated by pollen of *Potamogeton* (pondweed) at 100mm.

Conclusions

Plants used in the fort are absent but the base of the column adjoining the top of the unsampled silt shown in the section is probably immediately post-Roman. The presence of *Urtica* (stinging nettle) pollen at 10mm and 40mm, a plant characteristic of abandoned habitation sites, contributes to this view. The ditch flora shows rather different conditions to those of the other two west ditches. The aquatic moss *Fontinalis*, 0–30mm, could indicate moving water from percolating drainage water from higher ground at the north end of the ditch. Open water conditions continued for at least the period while 100mm of deposit accumulated: a link with the south ditch which the Roman levels show was cut into lower ground then as now would account for the water movement and relatively slow silting up of the ditch. The coarse nature of the debris suggests that the basal 0.1m soon accumulated, perhaps 50mm in as little as 40 to 50 years, the time it would take an oak grown from seed to produce fruit, or if from a coppiced shoot only 20 to 25 years (Jones, E W 1959).

13.6.2 Pollen analysis

The obtainable samples have been shown to be post-Roman. The lowest at 10mm has a similar pollen spectrum to those from the inner and middle ditches; *Plantago lanceolata* (ribwort plantain)

Table 13.5
Middle west ditch, macroscopic plant remains

			Roman	*post-Roman*
			Middle top silts	
Cultivated plants and weeds				
Bromus sp (Brome or Lop-grass)	pericarp	F	r	
Sonchus asper (Spiny Sow-thistle)	achene			2
Stellaria media (Chickweed)	seed		2	
Triticum/*Secale* (Wheat/Rye)	testa	F	o	
Heathland and bog				
Calluna vulgaris (Heather)	leafy stem		1	
Juncus squarrosus (Heath Rush)	seed		1	
Polytrichum sect *Juniperina* (Hair Moss)	leaf		r	
Pteridium aquilinum (Bracken)	frond	F	r	
Sphagnum subg *Inophloea* (Bog Moss)	leaf		r	
Sphagnum subg *Litophloea* (Bog Moss)	leaf		r	
Woodland, grassland and wet pasture				
Agrostis sp (Bent-grass)	grain		1	2
Betula pubescens/*pendula* (Birch/Silver Birch)	fruit			1
Cardamine flexuosa/*hirsuta* (Wood/Hairy Bittercress)	seed		1	
Ceratodon purpureus (Moss)	leafy stem		o	r
Gramineae (Grass)	anther		3	1
Gramineae (Grass)	grain		3	10
Hylocomium splendens (Moss)	leafy stem		r	r
Hypnum cupressiforme (Moss)	leafy stem		o	
Juncus acutiflorus/*articulatus* (Sharp-flowered/Jointed Rush)	seed		r	r
J. *conglomeratus*/*effusus* (Soft Rush)	seed		r	
Juncus sp (Rush)	stem/leaf		r*	
Luzula sp (Woodrush)	seed			2
Mnium hornum (Moss)	leaf		r	r
Poa annua (Annual Meadow-grass)	grain		2	2
Ranunculus repens (Creeping Buttercup)	achene			1
Rumex acetosa (Sorrel)	anther, perianth			1, 2
cf *Trifolium repens* (White Clover)	petal	F	3	
Urtica dioica (Stinging Nettle)	nut		4	6

Table 13.5 (continued)

			Roman	*post-Roman*
			Middle top silts	
Aquatic, marsh and fen				
Carex spp (Sedge)	nut		4	2
Epilobium cf *obscurum* (Dull-leaved Willow Herb)	seed			2
Potamogeton natans (Broad-leaved Pondweed)	fruit-stone			5
Ranunculus subg *Batrachium* (Water Crowfoot)	achene			3
Rorippa palustris (Marsh Yellow-cress)	seed			3
Miscellaneous				
Bryum sp (Moss)	leafy stem		r	r
cf *Cirsium* sp (Thistle)	achene		9	
Pohlia sp (Moss)	leafy stem		o	
Potentilla sp (Cinquefoil or Tormentil)	achene		1	1
Rumex sp (Dock)	perianth		4	
Unidentified	seed		1	1

at about 5% of the total land pollen and a small amount of *Urtica dioica* (stinging nettle) pollen would seem to indicate the end of the occupation as is the case in the inner ditch. The moderate grass values are in part attributable to the aquatic grass *Glyceria aquatica*, and Cyperacese pollen is probably that of *Eleocharis palustris* (common spike-rush). Pollen from aquatic and marsh plants corresponds to larger plant remains; *Potentilla* is probably attributable to *P. palustris* (marsh cinquefoil), more certainly *Callitriche* (starwort), *Lemna* (duckweed) and *Lythrum* (*Peplis*) *portula* (water purslane) are present as both pollen and fruits or seeds.

At 40mm and 70mm values of over 40% of *Quercus* (oak) are shown to be of local origin from abundant larger plant fragments, anthers of *Alnus* (alder) and *Corylus* (hazel) are also present. The high values of *Quercus* in particular may mask changes in the other pollen; authors' unpublished analyses from 100mm to 150mm show the *Quercus* pollen values to have remained high. Pollen of aquatic plants is still present.

13.7 SOUTH DITCH

13.7.1 Macroscopic plant remains

A column 1.100m × 170mm × 100mm was taken through the organic deposits down to the top of the natural clay, stratigraphy is as follows:

0–1m	silty woody detritus mud with leaf fragments
1m–1.100m	clayey silt with wood fragments and *Salix* (willow) twigs
1.100m–	downwards silt and natural clay, unsampled

Bulk samples of *c* 75cc were taken from 100mm to 105mm and 1.05m to 1.1m, a further 60cc was later sampled from 1.050m to 1.100cm to search particularly for pericarp fragments but none were found; the samples were disaggregated in water before sieving. The result from these and two pollen washings each of *c* 1cc from 800mm and 980mm are listed in table 32.

1m–1.05m, 1.05–1.1m, post-Roman

WOODLAND, GRASSLAND AND WET PASTURE

There is little difference between the assemblages recovered from the two samples. There is no definite evidence of plant use from the fort though *Urtica dioica* (stinging nettle), with pollen and fruits present, once again suggests recent habitation. *Salix* (willow) remains suggest early colonisation by these shrubs or trees. The presence of edible fruits of *Fragaria vesca* (wild strawberry), *Rubus fruticosus* (blackberry), *R. idaeus* (raspberry) and *Sorbus aucuparia* (rowan) are of interest, they could represent use in the fort. *Rubus* pollen was only found at 980mm and 800mm perhaps from bushes growing from discarded fruit. The presence of ferns with spores present in all samples and sporangia, abundant from 1m to 1.05m and at 900mm, suggests shady habitats as do the seeds of *Silene dioica* (red campion).

Table 13.6
Outer west ditch, macroscopic plant remains

			Depth from base of column in cm			
			post-Roman			
			0–3	*3–6*	*7*	*10*
Woodland, grassland and wet pasture						
Alnus glutinosa (Alder)	anther			1		
Alnus glutinosa (Alder)	fruit		1	22		2
Amblystegium riparium (Moss)	leafy stem			r		
Antitrichia curtipendula (Moss)	leafy stem					r
Betula pubescens (Birch)	fruit			8		4
B. pubescens/pendula (Birch/Silver Birch)	fruit			7		
Corylus avellana (Hazel)	anther			1		
Deschampsia caespitosa (Tufted Hair-grass)	grain		3	2		
Dryopteris felix-mas type (Fern)	sporangium		1	3		
Eurhynchium praelongum (Moss)	leafy stem			r		
Eurhynchium sp (Moss)	leafy stem			r		
Filicales (Fern)	frond	F	r	r		
Filicales (Fern)	sporangium				4	4
Gramineae (Grass)	grain		2	5	1	
Homalothecium sericeum (Moss)	leafy stem			r		
Hypnum cupressiforme (Moss)	leafy stem		r	r		r
Isothecium myosuroides var *myosuroides* (Moss)	leafy stem			r	r	0
Juncus effusus (Soft Rush)	capsule, seed		f, a	r, a	r, f	0
Lathyrus pratensis (Meadow Vetchling)	leaf	F		r		
Myosotis sylvatica (Wood Forget-me-not)	nut		11	12		
Neckera complanata (Moss)	leafy stem					1
Prunella vulgaris (Self-heal)	nut			1		
Quercus sp (Oak)	acorn, cupule			3, 2		
Quercus sp (Oak)	anther			1		2
Quercus sp (Oak)	leaf	F		o		
Salix sp (Willow)	leaf	F		r		
Salix sp (Willow)	wood	F			r	
Thuidium tamariscinum (Moss)	leafy stem			o		
Ulota sp (Moss)	leafy stem			r		r
Zygodon cf *Viridissimus* (Moss)	leafy stem			r		

Table 13.6 (continued)

			Depth from base of column in cm			
			post-Roman			
			0–3	*3–6*	*7*	*10*
Aquatic, marsh and fen						
Callitriche stagnalis (Starwort)	anther		12			
Callitriche stagnalis (Starwort)	fruit		7	8		1
Cardamine cf *amara* (Large Bitter-cress)	seed			1		
Carex sp (Sedge)	nut			1	1	
Eleocharis palustris (Common Spiker-rush)	nut		16	8	1	
Epilobium cf *obscurum* (Dull-leaved Willow-herb)	seed		2			
E. palustre (Marsh Willow-herb)	seed		6	2	1	
Fontinalis antipyretica (Moss)	capsule			1		
Fontinalis antipyretica (Moss)	leafy stem		a			
Galium cf *palustre* (Lesser Marsh Bedstraw)	fruit		2	1		
Glyceria fluitans (Flote-grass)	grain		1			
Lemna cf *minor* (Duckweed)	seed		2	1		
Lythrum portula (Water Purslane)	seed		77	27	2	2
Phalaris arundinacea (Reed-grass)	grain			1		
Potamogeton berchtoldii (Small Pondweed)	fruit-stone		5			
Potentilla palustris (Marsh Cinquefoil)	achene		48	54	1	1
Sparganium cf *minimum* (Small Bur-reed)	fruit-stone			1		
Miscellaneous						
Bryum sp (Moss)	leafy stem			r		

AQUATIC, MARSH AND FEN

The presence of *Glyceria fluitans* (flote-grass) implies stagnant or slow-flowing water.

800mm, 980mm

The overgrowth of trees by 980mm is suggested by anthers of *Betula* (birch) and *Corylus* (hazel), the latter on a pollen slide. The mosses are a shade tolerant assemblage found in woodland, shady banks and tree trunks, with base-rich soil implied.

13.7.2 Pollen analysis

Samples from 1.06m and 1.03m show similar results to those from the base of the outer west ditch; local overgrowth by shrubs and small trees is suggested by pollen of *Salix* (willow) and *Prunus* type. The aquatic grass contributes to the high grass pollen count. By 800mm *Corylus* (hazel) has dominated the pollen spectrum and its local over-representation has eclipsed most of the pollen from outside the ditch.

Conclusions

The absence of cultivated plants and those of heathland and bog suggests that the ditch was cleaned out by the Romans, the basal samples may be immediately post-Roman and if so the remains of edible fruits could be refuse from deliberate collection. The pollen evidence shows that the willow scrub was soon invaded by hazel and the ditch deposits sealed in by resulting woodland overgrowth.

Table 13.7
South ditch, macroscopic plant remains

			Depth from base of column in cm			
			post-Roman			
			105–110	*100–105*	*98*	*80*
Woodland, grassland and wet pasture						
Betula pubescens/pendula (Birch/Silver Birch)	anther				1	
Cardamine flexuosa/hirsuta (Wood/Hairy Bitter-cress)	seed		1	1		
Eurhynchium striatum (Moss)	leafy stem					r
E. cf *swartzii* (Moss)	leafy stem				r	
Filicales (Fern)	sporangium		r	a	a	
Fragaria vesca (Wild Strawberry)	achene		10	1		
Galeopsis tetrahit agg (Common Hemp-nettle)	nut			2		
Gramineae (Grass)	grain		1			
Homalothecium sericeum (Moss)	leafy stem			r		r
Isothecium myosuroides (Moss)	leafy stem					r
Juncus effusus (Soft Rush)	seed		o	r		
Mnium hornum (Moss)	leaf					r
Neckera complanata (Moss)	leafy stem					r
Ranunculus sect *Ranunculus* (Buttercup)	achene		1			
R. repens (Creeping Buttercup)	achene			3		
Rubus fruticosus agg (Blackberry)	fruit-stone		2		1	
R. idaeus (Raspberry)	fruit-stone		2	1		
Salix sp (Willow)	budscale		2	1		
Salix sp (Willow)	leaf	F		r		
Salix sp (Willow)	wood		r			
Silene dioica (Red Campion)	seed		21	11		
Solanum dulcamara (Bittersweet)	seed		1			
Sorbus aucuparia (Rowan)	seed		1			
Urtica dioica (Stinging Nettle)	nut		2	2		
Aquatic, marsh and fen						
Callitriche stagnalis (Starwort)	fruit		3			1
Glyceria fluitans (Flote-grass)	grain		30	10	1	
Miscellaneous						
Unidentified	fruit		1			

13.8 RAMPART TURVES

13.8.1 East annexe rampart

A small bulk sample consists of grey clayey si1t, with sand and small stones with a thin dark turf line *c* 5mm thick. The sample (NK77EI) is penetrated by roots of cf *Corylus* (hazel) possibly from a tree colonising the slighted rampart.

Another column, 300mm × l50mm × 100mm, was taken through a section of the east annexe rampart. It consists of grey clayey silt with sand and small stones with four thin dark turf lines each *c* 5mm thick and approximately 60mm apart; occasional roots have penetrated throughout the column. The four turf lines were pollen analysed and bulk samples 100mm thick × 50mm × 100mm were taken through the turf lines, first examined untreated and then disaggregated with 2% sodium hydroxide before sieving for larger plant remains. 1cc samples were also taken from below the turf lines at 210mm and 270mm to detect any differences in the flora before the preserved turf had formed (NK78Ax).

13.8.2 East fort rampart

A small bulk sample from the rampart between the fort and the annexe to the east of building 12 and just below the present ground level consists of grey, clayey silt with sand and stones, with a thin dark turf line. The sample (NK77By) is penetrated by roots of cf *Salix* (willow), decayed wood of cf *Salix* was also found. Pollen was too sparse to count.

A column 450mm × 150mm × 100m was taken through a section of the turf rampart east of building 8, 910mm below

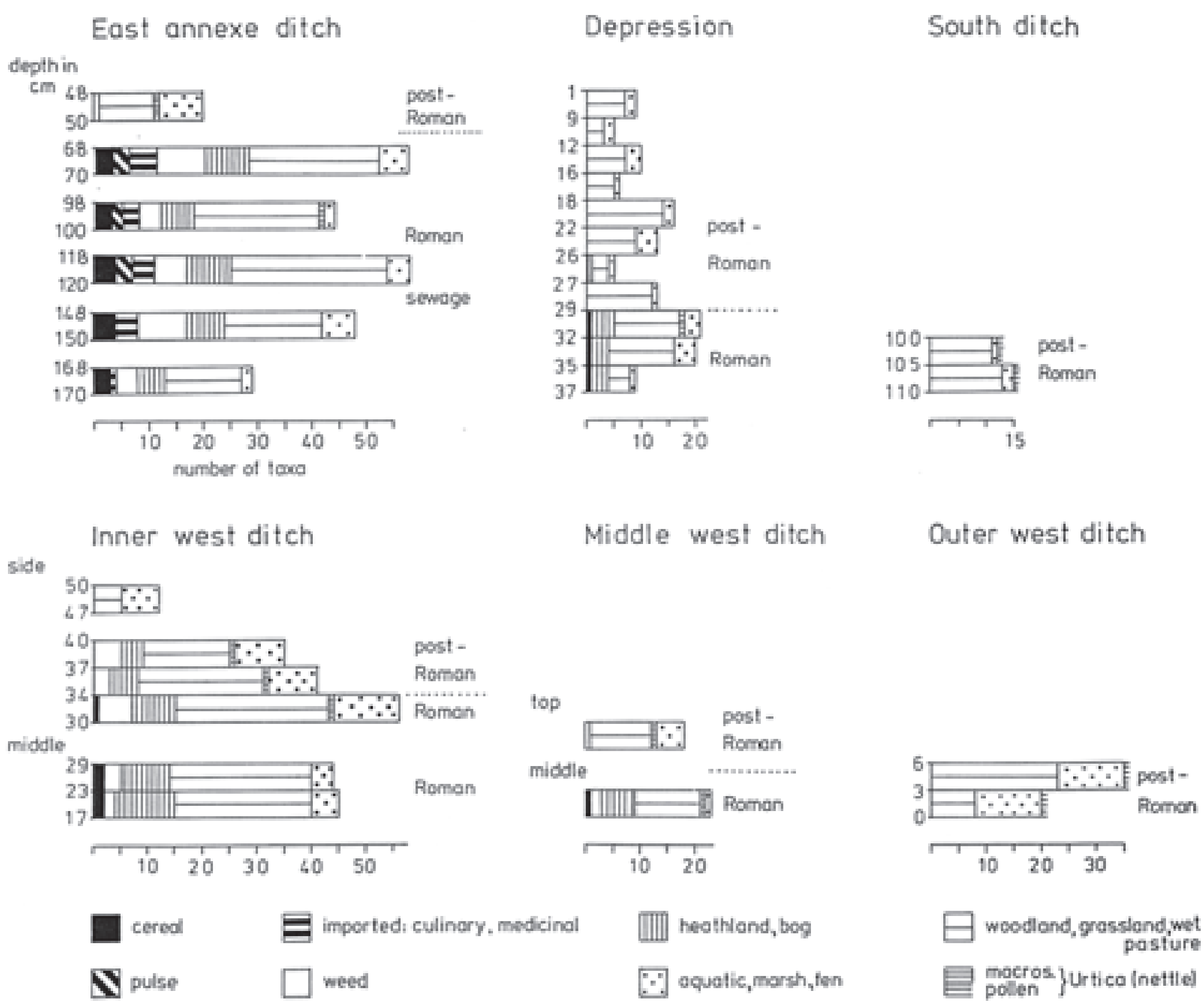


Illustration 13.8

Macroscopic plant remains: summary diagram. These bar diagrams show clearly that macroscopic plant remains of cereals, pulses and culinary or medicinal plants characterise the Roman sewage and cereals distinguish the Roman levels in other deposits. Plants of heath and bog, found throughout the occupation levels, cease at or soon after the fort's destruction which is immediately followed by a growth of nettles recorded in all deposits.

Table 13.8
Turf ramparts, macroscopic plan remains

		East rampart							*East annexe rampart*							
		NK778Y	*NK78DS*				*NK78DR*		*NK77EI*		*NK78AX*					
			T		*T*		*T*	*T*	*T*	*T*	*T*	*T*	*T*		*T*	
			12	*15*	*22*	*25*	*36*	*42*	*1*	*2*	*6*	*11*	*18*	*21*	*24*	*27*
Calluna vulgaris (Heather)	leaf								*	*						
Chenopodium cf *album* (Fat Hen)	seed								+							
Corylus (Hazel)	charcoal	*														
Erica tetralix (Cross-leaved Heath)	leaf								*	*						
Juncus bufonius (Toad Rush)	seed								+		+		+	+	+	+
J. *conglomeratus/effusus* (Soft Rush)	seed						+	+	++	+	+	+	++	++	++	++
Quercus (Oak)	charcoal	*			*				*			*	*		*	
Salix (Willow)	bud scale				+											
Bryophyta (Moss)	stem		*		*				*	*	*				*	
Unidentified herbaceous plant fragments	carbonised		*		*	*	*	*			*		*	*	*	*
Unidentified, < 3mm	charcoal	*	*	*	*	*			*	*	*				*	

Depth measured in cm from tops of columns, except NK77BY and NK77EI which are from bulk samples
T, turf line; ++, >100 seeds per cc; *, carbonised

the present ground surface. It consists of grey silt with sand and stones; only two turf lines are clearly visible at 120mm and 220mm. The sample is slightly penetrated by roots. Samples were taken as for NK78Ax with 1cc samples below the turf lines at 150mm and 250mm (NK78DS).

A duplicate column from the same location was extensively penetrated by roots, the least affected turf lines at 360mm and 420mm were examined for larger plant remains (NK78DR).

13.8.3 Macroscopic plant remains

Plant remains, shown in table 13.8, are mainly sparse in all samples. The presence of rare leaves of burnt *Calluna* (heather) and *Erica tetralix* (cross-leaved heath) in two samples suggests heathy grassland. *Chenopodium* cf *album* (fat hen), represented by a single seed, is a plant of waste places and cultivated land. *Juncus conglomeratus/effusus* (soft rush), with particularly abundant seeds in three of the turves, are both characteristic of wet pastures. *Corylus* (hazel) and *Quercus* (oak) are both represented as charcoal, none of the fragments being larger than 10mm diameter. The small samples taken from the soil beneath the turf lines, shown in table 13.8, contain less burnt material but have otherwise similar plant remains.

13.8.4 Pollen analysis

It is of particular interest to have countable pollen preserved from rampart turves since these are similar to surface pollen samples reflecting the vegetation at the time the fort was built. However, between 30% and 145% of the pollen was too crumpled or deteriorated to identify and the results are accordingly more tentative than for the other samples. Heather and alder pollen are both recognisable when poorly preserved, grass pollen is markedly less so. The pollen from the seven turf lines which were analysed is predominantly of *Alnus* (alder), *Corylus* (hazel), *Calluna* (heather) and *Gramineae* (grasses). *Plantago lanceolata* (ribwort plantain) provides up to 7% of the total pollen; this plant is resistant to trampling and grazing and is one of the most consistent components of pasture. Other herbaceous pollen such as that of *Ranunculaceae* (buttercup family) is only present in small amounts; there are virtually no plants of arable land. Boggy areas are indicated by the occurrence of *Sphagnum* (bog moss) in all samples.

The low values for herbaceous pollen suggest that the grassland was well grazed, the rushes and mosses indicate damp areas. Comparison with recent surface samples from established pasture (p 268) show a good measure of agreement with these samples. Further interpretation of the pollen in the terms of the landscape it represents is attempted on pp 268–9.

13.9 WOOD, CHARCOAL AND OTHER BURNT PLANT REMAINS

Charcoal was recovered from most of the samples, often as tiny unidentifiable fragments under 3mm in diameter. The width of the transverse face was seldom greater than 15mm but by comparing the diameter of the annual rings with templates of known diameter, the approximate minimum diameter of the original branch or trunk was estimated for some of the charcoal. This does not allow for asymmetric growth and only when most of the transverse face is preserved, as with most of the wattle, is it certain.

13.9.1 Outer east annexe ditch

The charcoal is all of small fragments of alder, birch, hazel and oak and is restricted to the Roman sewage levels (table 13.2). It is assumed, from the presence of pollen, that all the trees grew locally. The conifer is not pine but could be juniper (*Juniperus*) which used to grow locally (Hennedy 1878). The hazel wood from between 620mm and 65omm is about 30mm in diameter; it lies a few cm below the top (at *c* 580mm) of the sewage and could, with other hazel fragments a few cm lower, represent wattle from the slighted rampart. The birch and willow wood from the post-Roman levels result from ditch overgrowth.

13.9.2 Inner west ditch

The wood and charcoal is all of Roman age (table 13.4), the charcoal is of fragments of 5mm diameter or less; the only measurable wood is the willow, originally *c* 300mm including bark and the hazel, of 15mm diameter, both from between 300mm and 400mm, the end of the occupation; they may therefore have come from the slighted rampart.

13.9.3 Middle west ditch

Wood was retrieved from the same Roman silt as nails and arrowheads. Of this wood (table 13.5) four pieces of oak appear to be shaped.

13.9.4 Ramparts

The charcoal from the rampart turves is of hazel and oak, wood commonly used in the fort. From immediately outside the west rampart small fragments of oak charcoal were found. From the slighted east rampart a quantity of burnt roundwood, mainly of willow but with some alder and hazel with one piece of gean, was recovered. The roundwood is mainly 7mm–16mm in diameter, three–eleven years old and broken into fragments 20mm–143mm long; some still retains bark and is clay covered. It seems probable that it represents a timber breast-work of wattles on top of the rampart.

13.9.5 Charcoal associated with buildings in the northern part of the fort

The evidence for building materials is from post-holes, drain fills, gulleys and areas of burning between buildings as shown in illus 13.8.

Alder over 50mm diameter, together with birch roundwood, 16mm diameter and hazel roundwood, 8mm diameter, was recovered from the gulley north of building 1. Alder and sparse rush leaves/stems were found in the gulley between buildings 1 and 2. South-east of building 2, ash cut from wood originally over 80mm in diameter was found with alder, hazel, oak and willow. Alder fragments were found in two post-holes in the north-west of building 2.

South of the officer's quarters of building 3, a daub-filled gulley yielded a fragment of oak with roundwood of alder, 18 and 25mm diameter, hazel, 15 and 22mm diameter and willow, the most common, 10–15mm diameter. Some roundwood has retained its bark and adherent clay; the pieces are between 15 and 28mm long and from three to seven years old. The gulley also produced fragments of burnt rushes, partly in small bundles, in a clay matrix; it is assumed that the rushes were used to reinforce the daub instead of straw. This is the most complete evidence for wattle and daub produced in the fort. From the south end of building 3 was found a piece of ash, squarish in section, about 18mm × 22mm, which could have been part of a structure; alder, a piece of willow roundwood 12mm in diameter and daub were also recorded.

Charcoal, thought to be from a barrack wall, included two fragments of oak planks or boards, both were sawn tangentially. One piece has two flat, smooth, parallel sides and is now 65mm wide, 19mm thick and 50mm long; the third straight side has been accurately cut at right angles to the parallel sides. The second piece, also 19mm thick with parallel sides is now 149mm wide and 65mm long. A small piece of possibly worked alder, a piece of ash resembling an irregularly angled peg and a fragment of hazel roundwood, of 10mm diameter were also recovered.

From a gulley west of building 3 alder of 50mm diameter was identified. The area between the building 3 and north granary yielded birch fragments. Outside the east wall of the granary a gulley contained alder charcoal, and the tumble of the north wall produced alder and birch charcoal. In the gulley outside the granary a layer of burnt rushes up to 12mm thick was identified; these rushes originated either from the granary or the adjacent barrack-block to the north. The rushes are of *Juncus effusus* (soft rush), identified on occasional fruiting heads. Four nutlets of *Carex ovalis* (oval sedge) and one of *C. pulicaris* (flea-sedge) were found among the rushes and were presumably gathered with them. There is no clay admixture and it seems probable that this represents rush thatch.

From the worked wood charcoal associated directly with buildings 1 to 4, alder, oak and ash seem to have been used as structural timber and oak planks or boards were associated with one of the barracks. Alder, birch, hazel and willow occur as roundwood and range from 8 to 22mm diameter; presumably they were used as wattle. Clay daub was commonly found around the fort, but the only good evidence to suggest that it was reinforced with rushes is from building 3. Rushes may have provided roofing for the granary or barracks. It is the most likely roofing material to have been used at Bearsden since the presence of seeds in both ditch and turf samples shows that suitable rushes grew nearby. There is no evidence to suggest cereal growing in the vicinity and so straw may not have been readily available.

13.9.6 Charcoal associated with buildings in the southern part of the fort

The charcoal in the south area is less clearly linked to particular buildings and is mainly from features and pits together with burnt deposits overlying them as shown in illus 13.8.

From the west side of the south granary charcoal of alder and oak from mature wood was recovered together with a fragment of burnt hazel nut shell and an uncarbonised seed fragment of *Euphorbia helioscopia* (sun spurge).

The contents of three post-holes were examined; one of these, F49, contained charcoal of alder, hazel, including roundwood, and birch. It seems likely that this includes wattle from the fort's destruction. From F55 a shaped piece of alder and from Fl a fragment of alder were identified.

In the area of building 16 a scoop, F4l, produced alder including a shaped piece. In a pit, F36, was found a roughly squared piece of ash, 35mm × 35mm, which must originally have been split into quarters, the radius of the wood was originally at least 38mm. Willow roundwood, 10mm in diameter, was also present. Charcoal from within and overlying other pits was of alder including roundwood of 12mm–6mm diameter, hazel, mainly roundwood of 7mm–20mm diameter and willow roundwood 6mm–14mm diameter. Burnt daub was present in most samples. It seems probable that these represent one or more structures built of ash and alder timbers with wattle of alder, hazel and willow roundwood covered with daub. Charcoal fragments from other pits, features and drain fills in this area add little to the overall picture with the exception of charcoal of silver fir.

Abies Alba (Silver Fir)

Fragments of silver fir charcoal were found in the fill of the drain running east–west immediately south of the south wall of the forehall to the headquarters building. They are probably all from one piece now 53mm long, 22mm wide along the tangential axis and 8mm deep along the radial axis. The growth rings are more or less straight indicating, assuming regular growth, wood of at least 200mm minimum diameter. Smaller fragments were found in a small patch of burnt clay (daub?) overlying the cobbles beside the drain; all the wood is slightly degraded.

This find is of considerable interest as silver fir is not native to Britain. At Silchester, Reid (1901, 253) reported Roman wells lined with barrel staves which he interpreted as the re-use of casks used for transporting wine from the Pyrenees. Williams (1978: 48–50) identified silver fir wood from a staved bucket found in a fourth century Roman well in york. He suggested that the bucket or its constituent staves were purposely brought from the continent. Barrels made of fir wood have been found in Roman sites in northern Germany brought from Bavaria or the Danube basin. Fir wood was chosen because the wood lacks resin canals. However, silver fir wood was also used for writing tablets and has been recorded, thus used, from Roman Carlisle (Donaldson & Rackham 1984). The Romans appear to have made writing tablets from rather thin slices of wood, up to 3mm thick, at Vindolanda, so perhaps these rather thicker fragments are more likely to have derived from a container.

13.9.7 *Bath-house*

The bath-house and hypocaust system contained charcoal and other burnt material. Post-hole 1 in the changing room contained small fragments of birch, hazel, oak and willow, these probably include charcoal which fell in during demolition. From the north-west corner small fragments of alder charcoal were identified. In the cold room a post-hole in the north wall contained alder and birch derived from wood of about 60mm and over 140mm diameter respectively. A post-hole in the west wall had alder, birch and willow fragments and a drain contained fragments of alder and oak. The hazel and willow fragments could be from roundwood, the oak and birch are from mature wood.

Picea (Spruce)

A fragment of spruce wood was found in the cold room in the bath-house. It is roughly oblong and measures 75mm long × 83mm wide and a maximum of 9mm thick. The two sides are roughly parallel becoming thinner at the edges, the opposite ends have been roughly broken. The wood has been cut along the radii and is irregular in thickness; one of the faces is slightly convex. Much of the surface is covered in hard silt which cannot be readily brushed away. All exposed surfaces are dark brown, the inside is very pale arid fresh looking. The surface was viewed with oblique light; no scratches such as would be made by a stylus were seen. Two stylus tablets of spruce or larch (*Larix*) wood were found at Vindolanda but their centres were hollowed out to hold wax (Bowman & Thomas 1983: 29–31). Spruce is not native to Britain and presumably the wood once formed part of an imported artefact.

A drain in the warm room contained alder with a fragment of a non-British conifer, possibly of silver fir. Fragments of alder, hazel and oak charcoal were also found in drains running from the bath-house. These are the only contexts which derive certainly from structures; on this slight evidence it appears that alder may have been the main building timber.

The charcoal found in the hot room flue and stoke-hole, the hot dry room stoke-hole, the stoke-pit and between the stoke-pit drain and rampart was of alder, birch, oak and cf rowan (one fragment). Alder from the hot room flue was from wood originally between 40mm and 200mm in diameter and oak from wood of between 80mm and 200mm diameter; unburnt willow roundwood of 7mm diameter was also present. The drain running south from the stoke-hole yielded rare fragments of heather and occasional burrs from bark. A small amount of burnt peat was also found in the hot room flue, also unidentified bark with burrs. Burnt turf was present in the stoke-pit. Seemingly a variety of fuels was used in the hypocaust system, at least for the last fires.

In the hot dry room, sieved from 100cc of light brown clay from the drain-fill, unburnt hazel nut fragments were found; they consisted of over 80 fragments representing perhaps half a dozen hazel nuts. The only other plant material was a single rush seed.

The upper 80mm of a column of stony silty clay from the warm room yielded three achenes of *Fragaria vesca* (strawberry), one of *Potentilla palustris* (marsh cinquefoil) and a seed of *Sagina* sp (pearlwort), all unburnt. These could represent part of the original flora washed in with the clay but the *Fragaria* and *Potentilla* are unlikely to have grown together. It is tempting to interpret these finds as evidence of the Romans enjoying local fruit and nuts while relaxing in the hot dry and warm rooms of the bath-house.

13.9.8 *Latrine*

Ten samples from the rubble fill, flagged floor, sponge channel and drain inside the latrine, together with four from outside it, contained burnt plant remains. Charcoal is present in most samples, one fragment is from wood 50mm in diameter, another from wood originally of 240mm or more in diameter and these presumably represent structural timbers. Roundwood composed of alder, 6mm, 7mm and 30mm diameter, hazel, of 4mm–14mm diameter and willow 4mm–12mm diameter, are probably the remains of wattle. There is also a piece of hazel roundwood of 25mm diameter and 35mm long which appears to have been cut vertically. Fragments of birch, hazel and oak were also found. Small fragments of mainly clay-covered burnt rushes, of 2mm to 3mm across and up to 5mm in length could represent rush-tempered daub.

Samples from a 200mm depth of sandy, clayey silt from the drain running diagonally under the paving of the latrine were examined for possible signs of sewage; they contained numerous rush seeds. It is just possible that the seed derived from rush thatch, although rush seeds were also common in the clay subsoils of the fort. A similar sample from the lower fill of a drain beneath the floor yielded a few burnt heather stems with two fragments of burrs from bark, similar to material from the drain running south from the stoke-hole.

13.9.9 *Conclusion*

The finds of wood, charcoal and associated burnt plant remains from all contexts are summarised in table 13.9. Alder, hazel, oak and willow were commonly used, ash and birch less so and single finds of gean and rowan are tentatively identified. Alder in particular with some oak and ash were used as structural timbers; oak planks or boards were used in one of the barracks. Although no post-hole had been disturbed by the removal of its content, the evidence for posts is equivocal. Of seven post-holes containing charcoal, four have more than one type the others are of alder. The wattles of the timber buildings were mainly of hazel and willow with some alder. Rushes seem to have been used to temper clay daub and probably for roofing thatch although evidence for this only remains for either the north granary or one of the barracks. Fuel used in the hypocaust was mainly of timbers with a little evidence for the use of peat and turf.

At Falkirk, on the eastern part of the Wall, a hypocausted Antonine building produced large charred timbers (Dickson, C 1981: 258). Shaped pieces of ash were found with timber of alder and birch also indicated; oak timber seems to have been less commonly used.

Alder, ash, birch and elm have been used as structural timbers at other forts in Britain (Hanson 1978: 299, table 2) although oak was the preferred timber because of its durability.

Pollen evidence from Bearsden and turf analyses from other forts on the Antonine Wall suggests that alder and hazel were relatively plentiful but oak and birch sparse; ash and willow pollen are probably under-represented. It seems most probable that local wood was used in the forts along the Antonine Wall and the shortage of oak timber resulted in the extensive use of alder and to a lesser extent ash timber. Alder, ash, birch and willow are not durable timbers and would only last a few years in contact with the damp ground. The two exotic woods, silver fir and spruce are believed to have derived from artefacts.

13.10 INTERPRETATION OF POLLEN ANALYSES

The interpretation of the pollen analyses in terms of the vegetation they represent is complicated by several factors:

1. differential preservation, especially in silts and aerated samples such as rampart turves;
2. different pollen sources:
   (a) rampart turves: pollen is local and regional in origin;
   (b) ditches during the occupation: pollen is local and regional, assuming the ditches are regularly cleared of plant growth or conditions preclude plant colonisation;
   (c) ditches after the occupation: over-representation of local pollen, eg aquatic grasses, marsh plants, tree and shrub overgrowth.

Differential preservation of pollen and spores is well known and the literature is summarised by Birks and Birks (1980: 187–8) with a table showing the order of susceptibility to corrosion. Perhaps the experimental work by Havinga (1971) into pollen preservation in river clay soils is the most relevant here. Spores such as *Polypodium* (polypody) and pollen of Compositae of the dandelion type are highly resistant to corrosion, other relevant pollen types in descending order of resistance are *Quercus* (oak), *Betula* (birch), *Salix* (willow), *Ulmus* (elm), *Alnus* (alder), *Corylus* (hazel) and *Myrica* (bog myrtle). At Bearsden the unidentified pollen, particularly abundant in the rampart turves is probably mainly of Graminese, Coryloid and *Betula*, these being particularly difficult to identify when crumpled and deteriorated.

The interpretation of the tree pollen component is further complicated by the nature of the woodland; for instance one tree in an open position may disperse more pollen into the surrounding area than a dense stand of trees. Willow is insect pollinated therefore its pollen dispersal is not as effective as that of wind pollinated trees. The many factors affecting pollen dispersal and deposition are summarised by Birks and Birks (1980: 179–83). The distance of the woodland from the sampled area is important; Tinsley and Smith (1974) have shown a very rapid decline in arboreal pollen within 100m of a woodland edge bounding onto heather moorland.

Caseldine (1981) has taken surface pollen samples at 10m intervals along transects across a small raised bog and through birch woodland into pasture and similarly through the woodland into tall grass. In the birch woodland the pollen is predominantly of birch, 50 to 90% of the total pollen, but in a distance of 50m into pasture birch has dropped to only 5 to 15% of total pollen. There is an interesting distinction between samples in tall grassland and those in pasture. There is less difference than might be expected between the range of variation of grass pollen; about 30 to 76% in pasture and 40 to 66% in tall grassland. However, the contribution of *Corylus* (hazel) pollen ranges from 3 to 20% in pasture but is less than 5% in tall grassland and even lower in the other plant communities. Other values which are higher in pasture are *Alnus* (alder), 2 to 14%, *Calluna* (heather), + to 12%, the tree and shrub pollen range from 15 to 50% of the total pollen. Caseldine states that hazel and alder pollen are derived from hedgerow and regional sources. It would appear that the regional pollen rain is more widely represented in the pasture where local pollen is less abundant due to grazing.

The pollen spectra from the Roman deposits of the outer east annexe ditch and those from the rampart turves are rather similar to these twelve pasture samples in relative values of alder, hazel, heather and grass pollen and in the proportion of tree and shrub to that of herb pollen. The similarity between the high proportion of birch pollen in the top two samples from the outer east annexe ditch and that from the birch woodland is also noteworthy. In addition to the variable contribution of local pollen the variation between the different proportions of pollen in Caseldine's (1981) surface samples is shown to be closely related to the distance from the main source of pollen. One of the differences between the rampart turf analyses and those from the outer east annexe ditch lies in the higher proportion of Coryloid pollen in the turves and the generally lower values of alder. This could represent a difference in exploitation of the woodland before and during the life of the fort or merely different distances from the pollen sources.

Can we then deduce the plant cover of the cleared area represented? We may assume the pollen in the turves and occupation levels of the ditches is coming from a wide area around the fort with a limited local component. The turf analyses with grass values from 6 to 33% and heather from 7 to 47% suggest irregularly grazed areas with local patches of heather. Established pasture with wet areas is indicated from the macroscopic plants and the other pollen evidence. Well-cleared established grassland would be essential to cut the large quantities of turves needed for the rampart walls. By analogy to the recent surface samples already discussed the tree and shrub proportion varying between 27 and 64% of the identifiable land pollen of the turves suggests that there is considerable clearance of local woodland. However individual trees, copses or even large areas of woodland probably remained around the fort. Similar conditions seem to have existed during the life of the fort as the samples from the outer east annexe ditch and inner and middle west ditches show. The post-occupation ditch overgrowth is so clearly dominated by local trees and shrubs, from evidence of anthers and larger plant remains, that subsequent changes in the tree cover outside the fort would not be apparent.

13.11 THE WOODLAND AROUND BEARSDEN

Although there is a lack of well radiocarbon dated, pollen-analysed cores for central Scotland, covering the period when natural undisturbed woodland was gradually cleared by prehistoric man, nevertheless we can deduce with some confidence the composition of the original 'wild wood' in the area. From data collected by Birks (1977) in central Scotland and pollen analyses from the Loch Lomond basin (Dickson, J H et al 1978), it seems that the forest was predominantly of oak with birch, alder and willows on wetter soils and ash and elm on richer soils; pine is thought to have been very local, not forming, extensive forests.

At Mugdock, 5km to the north of the Bearsden fort, on similar glacial drift, there is a managed remnant of semi-natural woodland. This once coppiced wood supports oak, alder, ash, birch, bird-cherry, blackthorn and gean, with hazel at the margins. The removal of such woodland for pasture would, with light grazing pressure, give rise to heather and bracken; heavier grazing combined with burning would result in grassland. Uncleared wet areas would retain alder and willow carr and accompanying marsh and fen plants. Depending on the intensity of grazing and burning, seedlings of birch and willow, oak and hazel would, from fossil pollen evidence, soon be established (nowadays animals prevent hazel becoming established from seed). Hazel can also regenerate from underground stools each producing 20 or more poles. The deliberate removal of trees at or just above ground level, known as coppicing, is one of the bases for managing woodland; hazel is one of the fastest growing coppice trees, cropping of poles can continue indefinitely and hazel can even flower and fruit on a five-year coppicing cycle (Rackham 1980: 208). Most other deciduous trees will also coppice; some, but not hazel, can also be pollarded (Rackham 1976: 34), an advantage if animals such as cattle and deer, which browse on tender young coppice shoots, are present. Both coppiced and pollarded poles grow faster and straighter than most seedlings. Some fast growing willows grow up to six feet in a season. Traditionally coppice has been cut principally for hurdles, fencing and wattle.

It must be stated that we have little direct evidence of coppicing or other form of woodmanship in Scotland before slight evidence from the medieval period (see Addendum F). We know little of Roman woodland management in Britain. The art of coppicing was certainly known to the Romans and Rackham (1976: 51) considers that a permanent coppice system would be needed to maintain all the Roman industry and the building of forts and villas. Hazel coppicing is suggested from pollen evidence from about 250 BC onwards in Shropshire, England (Turner 1965: 351).

Is there any evidence of woodland management from the pollen, wood and charcoal from Bearsden? Certainly substantial clearing and thinning of the woodland before the fort was built is implied from the pollen evidence with oak no longer the dominant tree. Hazel values are relatively high, especially in the turf analyses. High alder values are as would be expected; alder-willow carr is still found in undrained areas to the north of the fort; willows do not distribute pollen over a wide area so their small pollen contribution is unremarkable.

Most of the wood and charcoal from Bearsden is of alder, hazel and willow; oak is less frequently present and birch even less common. It is not possible to say whether any grew from coppiced shoots, no long straight lengths have been preserved. However much of the wood is of small diameter (illus 13.8) and was probably used as wattle, it therefore would of necessity be in straightish lengths and could be the product of woodland management.

13.12 THE PLANT COMMUNITIES

From knowledge of present day plant communities it is possible to reconstruct some of the main types of vegetation which existed in the vicinity of Bearsden during and immediately after the occupation. It can be assumed that those species which grew just after the fort was abandoned did so from dormant seed or from seed dispersed from nearby.

Some 180 taxa of flowering plants, ferns and mosses are represented as pollen, spores, seeds and other vegetative remains. Many of these plants have specific requirements and have been grouped in the communities in which they are most commonly found in the area at the present time but they are not necessarily exclusive to these groups.

Weeds of cultivated and waste ground

Those plants which are represented as seed fragments thought to have been brought in with the wheat are excluded.

Chenopodium album (fat hen), *Poa annua* (annual meadow-grass), *Polygonum aviculare* agg (Knotgrass), *Rumex obtusifolius* (broad-leaved dock), *Sonchus asper* (spiny sow-thistle), *Spergula arvensis* (corn spurrey), *Stellaria media* (chickweed) and *Urtica dioica* (stinging nettle).

Heath and mire plants

Calluna vulgaris (heather), *Danthonia decumbens* (heath grass), *Erica cinerea* (bell heather), *E. tetralix* (cross-leaved heath), *Eriophorum vaginatum* (cotton-grass), *Juncus squarrosus* (heath rush), *Potentilla erecta* (common tormentil), *Salix repens* (creeping willow), *Vaccinium myrtillus* (bilberry) and the mosses *Hylocomium splendens* and *Polytrichum* sect *Juniperifolia*. Wet areas, often peat forming: *Aulacomnium palustre* (moss), *Sphagnum imbricatum*, S. *papillosum* (bog mosses).

Deciduous woodland

Trees and shrubs: *Betula pubescens* (birch), *Corylus avellana* (hazel), *Fraxinus excelsior* (ash), *Prunus* cf *avium* (gean), *Quercus* sp (oak), *Sorbus aucuparia* (rowan), *Ilex aquifolium* (holly). Climbing plants: *Hedera helix* (ivy), *Lonicera periclymenum* (honeysuckle). In open woodland: cf *Conopodium majus* (pig nut), *Fragaria vesca* (wild strawberry), *Hyacinthoides* (*Endymion*) *non-scriptus* (type) (bluebell), *Rubus fruticosus* agg (blackberry), *R. ideaus* (raspberry), *Silene dioica* (red campion), *Solanum dulcamara* (bittersweet), *Stellaria holostea* (greater stitchwort); ferns: *Dryopteris* felix-mas (type), *Pteridium aquilinum* (bracken); mosses: *Eurhynchium striatum*, *Mnium hornum*, *Thuidium tamariscinum*, other mosses and a fern commonly found in shady places include *Eurhynchium praelongum*, *Homalothecium* *sericeum*, *Isothecium myosuroides*, *Neckera complanata* and *Polypodium vulgare* agg (polypody).

Wet woodland

Trees and shrubs: *Alnus glutinosa* (alder), *Salix* spp (willows), sallows, which are not readily distinguishable on pollen or wood anatomy from willows, are included, herbs: *Myosotis sylvatica* (wood forget-me-not), and many of the fen and marsh plants listed subsequently, mosses: *Calliergon cordifolium*, *C. cuspidatum*, *Sphagnum palustre* and the epiphytic *Ulota* sp which grows in humid places.

Grassland

Agrostis app (bent-grasses), *Campanula rotundifolia* (harebell), *Holcus lanatus* (yorkshire fog), *Hypochaeris radicata* (cat's ear), *Lathyrus pratensis* (meadow vetchling), *Linum catharticum* (purging flax), *Plantago lanceolata* (ribwort plantain), *Poa* (cf) *pratensis* (smooth-stalked meadow-grass), *P.* cf *trivialis* (roughstalked meadow-grass), *Prunella vulgaris* (self-heal), *Ranunculus acris* (meadow buttercup), *R. repens* (creeping buttercup), *Rumex acetosa* (sorrel), *Stellaria graminea* (lesser stitchwort), *Trifolium repens* (white clover) and the mosses *Rhytidiadelphus squarrosus*, *Pseudoscleropodium purum*. Two other mosses, *Ceratodon purpureus* and *Hypnum cupressiforme*, perhaps occurred in such a habitat. Wet places in grassland and open woods; *Jincus acutiflorus/articulatus* (sharp flowered/ jointed rush), wet pasture and damp wood. *Juncus effusus/ conglomeratus* (soft rush).

Fen and marsh

Where the summer water table is usually below the surface but liable to winter flooding: *Caltha palustris* (marsh marigold), *Carex nigra* (common sedge), *C.* cf *paniculata* (panicled sedge), *Deschampsia caespitosa* (tufted hair-grass), *Eleocharis palustris* (common spike-rush), *Epilobium* cf *obscurum* (dull-leaved willow-herb). *E. palustre* (marsh willow-herb), *Filipendula ulmaria* (meadow-sweet), *Glyceria fluitans* (flote-grass), *Lotus uliginosus* (*pedunculatus*) (type) (large birdsfoot-trefoil), *Lychnis floscuculi* (ragged robin), *Lycopus europaeus* (gypsywort), *Phalaris arundinacea* (reed-grass), *Potentilla palustris* (marsh cinquefoil), *Ranunculus flammula* (lesser spearwort), *Valeriana officinalis* (common valerian), *Viola palustris* (marsh violet).

Semi-aquatic

Exposed mud with water standing in winter such as the muddy margins of ditches: *Alopecurus* cf *geniculatus* (marsh fox-tail), *Bidens cernuus* (nodding bur-marigold), *Catabrosa aquatica* (water whorl-grass), *Isolepis setacea* (bristle sedge), *Juncus bufonius* (toad rush), *Lythrum* (*Peplis*) *portula* (water purslane), *Ranunculus sceleratus* (celery-leaved crowfoot), *Rorippa palustris* (marsh yellow-cress).

Aquatic

Floating leaved and submerged vegetation often grading into reedswamp: *Lemna* cf *minor* (duckweed), *Nymphaea alba* (white water-lily), *Potamogeton berchtoldii* (small pondweed), *P. natans* (broad-leaved pondweed), *Sparganium* cf *minimum* (small bur-reed). Shallow water or damp mud: *Callitriche stagnalis* (starwort), *Ranunculus* subg *Batrachium* (water crowfoot).

The picture of the landscape we can derive from these plant communities is one of mixed woodland, at least partly cleared or thinned with shrubs, herbaceous plants and mosses in light shade. Low lying areas supported wet woodland and fen and marsh plants. Grassland developed on heavily grazed and burnt areas with bracken and heath where the pressure from man and animals was less, and rushes in damper grassland. Weeds grew in waste ground around habitations. Pools and streams supported floating water plants fringed with aquatic grasses, reeds and rushes; muddy margins had low-growing vegetation. Bog mosses and cotton grass must have derived from peat bogs. This diversity of habitats can be matched in areas a few kilometres to the north of Bearsden at the present time; most of the plants represented still grow in the county, a few have reduced their ranges due to drainage and cultivation but still grow in the west of Scotland.

The local environment envisaged at Bearsden would provide most, if not all, of the building materials needed for the fort in the form of wood and rushes for building, wood and peat for fires, bracken and heather for bedding and marsh hay for fodder. Local fruit in season would supplement cereals and pulses, together with herbs and fruit for medicine and flavouring, all possibly imported although medicinal plants such as mallows may have been cultivated at Bearsden.

13.13 COMPARISON WITH OTHER SITES

13.13.1 Pollen analyses

Pollen analyses of sites in the north-east of England, mainly from south of Hadrian's Wall, have shown substantial clearances both before and during the Roman occupation (Turner 1979). Most of the sites have been radiocarbon dated and Turner says 'that the native British populations of the two centuries before and early first century after Christ cleared woodland, maintained pasture and grew crops on a totally different scale from that of their predecessors in both the uplands and lowlands, and that the cleared land remained in use throughout the Roman occupation'.

At Vindolanda on Hadrian's Wall, from the civilian settlement dated from 100 to 125, the base of a marshy hollow produced small amounts of tree pollen and evidence of pasture and arable farming (Davies & Turner 1979). Fellend Moss, sampled less than 0.2km south of the Wall, is 9.3km west of Vindolanda; the pollen profile through the bog shows that much of the forest was cleared and the land used partly for growing crops at or just before the time of the Roman occupation (Davies & Turner 1979). However, in the north-west of England extensive clearance dates from after the Roman withdrawal and starts about 400 (Turner 1965: 353).

Unfortunately there are very few radiocarbon dated pollen analysed sites of Iron Age or Roman date in central Scotland. At

Bloak Moss, Ayrshire, 32km south-west of Bearsden, extensive clearance does not begin until about 450, although there are small temporary clearances of Bronze Age date (Turner 1965: 348–9; Turner 1975). At Flanders Moss, Stirlingshire, 26km north-east of Bearsden, extensive clearance began at about AD 200 (Turner 1965: 352). From the southern basin of Loch Lomond, 22km north-west of Bearsden, high grass and ribwort plantain values begin at about the same time (Dickson, J H et al 1978). These three areas, however, are considerable distances from the Antonine Wall and would not reflect local clearances along the Wall. See Addendum G.

There are turf analyses from Roman forts in Scotland and north-east England; unfortunately for none of the following turf analyses are numbers of pollen grains given. From Northumberland, at Benwell on Hadrian's Wall (Simpson & Richmond 1941) mainly hazel and alder with small amounts of herbaceous pollen were recorded. To the north of the Wall at Risingham and High Rochester (Richmond 1936: 196), birch was common with small amounts of hazel and alder and abundant grass pollen; Chew Green (Richmond 1937: 149) produced abundant heaths, a little grass and scarce hazel pollen. These forts therefore indicate extensive pre-Roman forest clearance both on and to the north of the Wall with varying amounts of light woodland, heath and grassland.

In Scotland at Fendoch, Perthshire, rampart turf produced 'a very small percentage of pollen about equally grass-spores and hazel-alder pollen' (Raistrick 1939: 154). This evidence from Roman forts has been summarised by Hanson and Macinnes (1980: 96–102). At Birrens, Dumfriesshire, an analysis by Beck in Wilson (1975) from the early Antonine well shows evidence for woodland and high values for grass and heather, the latter especially may be associated with abundant larger plant remains, there are no definite indications of agricultural activity.

Pollen analyses by Boyd (1984), however, have added substantially to our knowledge of the local vegetation from before the Roman presence up to the time of the construction of the Antonine Wall. Boyd analysed four turves from the Antonine fort at Bar Hill and one from the Agricolan fort (about 80–90) at Mollins, both 15km to the east of Bearsden. All the turves contained abundant well-preserved pollen and up to ten samples were analysed through each turf showing striking changes in the proportions of various pollen types during the time taken for about a 100mm thickness of turf to accumulate. The main changes are interpreted by Boyd as representing initially pre-Roman open woodland, regenerating from earlier probable, but unrecorded, forest clearance. By 80–90 a period of increased pastoral activity was accompanied by possible deliberate clearance of *Quercus* in the vicinity of Mollins. By about 142, when the Bar Hill turves were cut, there was an open landscape with a mosaic of *Calluna* – and grass – dominated rough grazing. The pollen profiles from the uppermost parts of the Bar Hill turves show steadily decreasing values for *Alnus* and *Coryloid* pollen, constantly low values for *Betula* and *Quercus* and rising values for *Calluna* and *Gramineae*. These proportions are essentially similar to these from the Bearsden turves. There are also other indications of an open pastoral landscape in the western part of the Antonine Wall from Wilderness West, 5km east of Bearsden (Newell 1983: 243) and from Croy Hill about 18km to the east (Robinson forthcoming). There is very little evidence of arable farming at any of these sites.

From the turf evidence then, it seems that in the Bar Hill area at least closed woodland was largely removed by native peoples and pasture established well before the Agricolan campaign. This clearance continued up to the establishment of the Antonine forts as is recorded between Bearsden and Croy Hill and there was little change in this open pastoral landscape during the early period of occupation as evinced from Bearsden.

13.13.2 Macroscopic plant remains

As shown in table 35 of selected Roman military sites, those in Britain and Welzheim in Germany have produced much useful information on the soldiers' diet. It is notable that only at sites which have remained waterlogged have the full range of cereals, pulses, culinary/medicinal plants and fruits and nuts been preserved. Useful plants from thirty two deposits from Roman military and non-military sites from Germany have been tabulated by Krber-Grohne et al (1983: table 7), together with a supplement of seeds from green vegetables and other less commonly found plants.

Avena spp (oats) contribute only a small proportion of cereal grains. Species have only occasionally been listed; one such is from an Antonine Wall site where Jessen and Helback (1944) identified *A. sativa* (common oats) and *A. strigosa* gp (black oats) which comprised about half a small sample of grain. *Hordeum vulgare* (six-row barley) forms a varying proportion of the grain. It is rarely possible to determine whether this was used as food, beer or animal feed. From the Lancaster evidence it appears that a variety of grain was fed to horses. *Secale* (rye) is absent or present in only small amounts in Scotland whereas in one sample from york, and probably also from Caerleon, it forms a substantial proportion of the grain. *Triticum aestivum* sl. (bread or club wheat) is sometimes present but only in small amounts. The glume wheats seem to have been the most important grains consumed and *T. spelta* (spelt) appears to be more common than *T. dicoccum* (emmer). Most of the indeterminate wheat from Scotland is probably of these two glume wheats.

Pulses rarely feature in the fossil record and *Lens* esculenta (lentil) and *Vicia faba* (horse bean) have only rarely been found in the British military sites. However, together with *Pisum sativum* (pea), they occur in thousands at the German military hospital at Neuss (Knorzer 1970; Krber-Grohne et al 1983).

Plants of culinary/medicinal use are *Anethum graveolens* (dill), *Apium graveolens* (celery) and *Coriandrum sativum* (coriander), these are the most commonly found spice plants in Britain and Germany. *Linum usitatissimum* (Linseed, flax) and *Papaver somniferum* (opium poppy), sometimes categorised as oil plants, have been less frequently preserved.

In Britain and Germany *Ficus carica* (fig) is the most commonly imported fruit but *Vitis vinifera* (grape) is present in northern Britain, presumably as dried fruit, for instance at york 2 (not tabulated). Remains of wild fruit are often found in some abundance, in particular those of *Fragaria vesca* (strawberry), *Rubus fruticosus* agg (blackberry) and *R. idaeus* (raspberry). Sloes and cherries have been recorded from Britain (Davies 1971: 132) and the range of fruit is greater in the more southerly German sites (Korber-Grohne et al 1983).

Nuts of *Corylus avellana* (hazel) have been found and *Juglans regia* (walnut) has been recorded from another Antonine Wall fort (Macdonald & Park 1906: 129), the latter presumably not grown locally; walnuts have also been found in Germany.

Although we have as yet only a little evidence from Britain, the similarity in food plants between forts in Scotland, north-east and north-west England, south Wales and Germany is clear, embracing the furthest north-west corner of the Roman empire to the south-east of Germany in this limited survey. Overall the implication is that many of these plant foods were standard supplies and it can be no coincidence that, with the exception of seasonal fruit, all can be kept for many months with little or no deterioration.

It must not be forgotten that animal products were readily eaten when available. The presence of bones of both domestic and wild animals and wild fowl together with molluscan shells from forts in Britain and Germany is tabulated by Davies (1971: 127–30). Davies also reviews the evidence from archaeological and literary sources for plant foods and alcoholic beverages and considers 'the basic diet, then, in peace-time will have consisted of corn, bacon, cheese, and probably vegetables to eat and sour wine to drink' (Davis 1971: 125). Although bacon and cheese would leave no discernible record, perforated vessels thought to have been used for cheese making have been found at various military sites; one from the Antonine Wall is illustrated by Robertson et al (1975: 161, fig 54, 21).

At the present time it seems unlikely that any of these plant foods were provided by the native populations in Scotland, excepting perhaps some of the cereals. However in Scotland we lack in general native water-logged sites where such evidence might have survived.

Work in progress shows that imported plant foods were certainly eaten in colonia in northern England, for instance in Carlisle (Donaldson & Rackham 1984) and york (Hall et al 1980: 143–4). Towns in southern England were, of course, importing a wide range of foods even before the conquest.

13.14 SUMMARY OF THE PLANT REMAINS

The outer east annexe ditch filled with sewage during the occupation of the fort and was sealed in by subsequent plant growth. The study of plant remains from the sewage has revealed that wheat formed a major part of the soldiers' diet. Two species of primitive wheat were ground, sieved and cooked. Experimental processing and cooking, supported by literary evidence, indicate that emmer wheat could have been used for porridge, whereas spelt wheat was probably made into bread. Barley appears to have been used, in small quantity only, as pearl barley probably for thickening broth. Figs, and the spices coriander, celery and dill, with the oily seeds of linseed and opium poppy together with pulses were consumed. Some or all were imported from the Mediterranean region. The flowering parts of common mallow appear to have been eaten, possibly as a prophylactic. Local fruit and nuts formed part of the diet. Mosses were used, perhaps for toilet purposes.

Comparisons with other military sites in Britain and one in south-east Germany indicate that the Roman military diet was remarkably uniform and that cereals, pulses, figs, spices and oil seeds must have been standard supplies.

A depression within the fort remained open during the occupation, probably for drainage. There is slight evidence for hay in this and two of the ditches although all except the outer east annexe ditch appear to have been regularly cleaned out.

The pollen analyses from the rampart turves indicate that there was established pasture before the fort was built and ditch analyses show little change in the open vegetation during the occupation. All the excavated ditches give evidence of the vegetation that developed after the fort was abandoned resulting in its eventual overgrowth by trees.

A variety of local woods were used for timber and wattle buildings, some at least were thatched with rushes. A wattle breastwork topped the ramparts. Rare finds of silver fir and spruce woods suggest their importation as artefacts.

From the identification of the pollen and other plant remains it has been possible to reconstruct the types of vegetation in the vicinity of the fort. Woodland was light and mainly secondary having been exploited before and during the Roman presence; it was possibly restricted to copses and streamsides. Turf was cut from well-grazed pasture with damp rushy areas and drier heathy ones. Bracken and heather were gathered and peat bogs exploited for fuel. Grassland, marshes and fen would have provided meadow hay. Standing water in winter and permanent open water would have been common on the poorly drained predominantly clay soils. Apart from staple plant foods the local countryside provided much of the Bearsden garrison's needs.

13.15 FUTURE WORK

Now that a variety of Roman sites has been examined for evidence of the Roman diet and impact on the vegetation it is perhaps appropriate to consider future lines of research. Although there are undoubtedly defensive waterlogged ditches which have not been excavated at other Roman sites, it seems, from the evidence at Bearsden, that these are more likely to record only small amounts of wind borne plant material from the Roman fort and perhaps evidence of destruction debris, along with the local vegetation. Sewage is potentially the most valuable source of dietary evidence; however digested seed fragments seem to be present in very small numbers apart from cereal grain fragments. Infillings of pits and wells may give evidence of food and also of agricultural practices along with rubbish from other sources. Interpretation of pollen from rampart turves may be hampered by poor preservation, but pollen and larger plant remains will give the local vegetation in some detail. However in order to assess the impact of the Romans and indeed the native settlers on the vegetation, what is needed are highly detailed, closely sampled and well radiocarbon dated pollen analyses. The sites should be sources of regionally derived pollen rain,

Table 13.9
Selected useful plants from other Roman military sites in Britain and Germany

	SCOTLAND				*WALES*	*ENGLAND*			*GERMANY*
	Bearsden	*Castlecary*	*Lyne*	*Rough Castle*	*Caerleon*	*Lancaster*	*York 1*	*York 2*	*Welzheim*
Cereals	Numbers as a percentage of cereals								
Avena (wild/cultivated oats)	+	8	0.6	0.2	+	+	3.6– 5.6		0.2
Hordeum vulgare (six-row barley)	+	7.3	91.2	54.1	+	+	23.2– 25.0	1	1
Secale (rye)	+	–	–	–	? ++	+	9.4– 17.8		(+)
Triticum aestivum s.l. (bread/club wheat)	?	1.1	–	2.1	? +			1	(+)
T. dicoccum (emmer)	cf+	6.6	3.2	3.5		cf +	–		17
T. spelta (spelt)	cf+	10.8	2.6	5.6	++	cf +	54.8–61.0		78
Triticum spp (indeterminate wheat)	+	66	3.2	34.3		+	–		
Pulses	Non cereals as absolute numbers								
Lens esculenta (lentil)	cf+				C.40				?1/2
Vicia faba (horse bean)	cf+				3				1
Culinary/medicinal									
Anethum graveolens (dill)	3								7
Apium graveolens (wild celery)	12					4		cf 1	16
Coriandrum sativum (coriander)	5					5			23
Linum usitatissimum (flax)	2								56
Papaver somniferum (opium poppy)	2							cf 28	18
Fruit									
Ficus carica (fig)	22					1	3		55
Fragaria vesca (strawberry)	20							146	>268
Rubus fruticosus agg (blackberry)	2							147+	>2755
R. idaeus (raspberry)	6							>82	
Nut									
Corylus avellana (hazel)	2								57

* Cereals includes *Panicum miliaceum* (millet) 4% and *Triticum monococcum* (einkorn) 1%; (+) present in second-century pit.
x; variation between differenct counts, total 2,500 grains. +; present; ++; many.

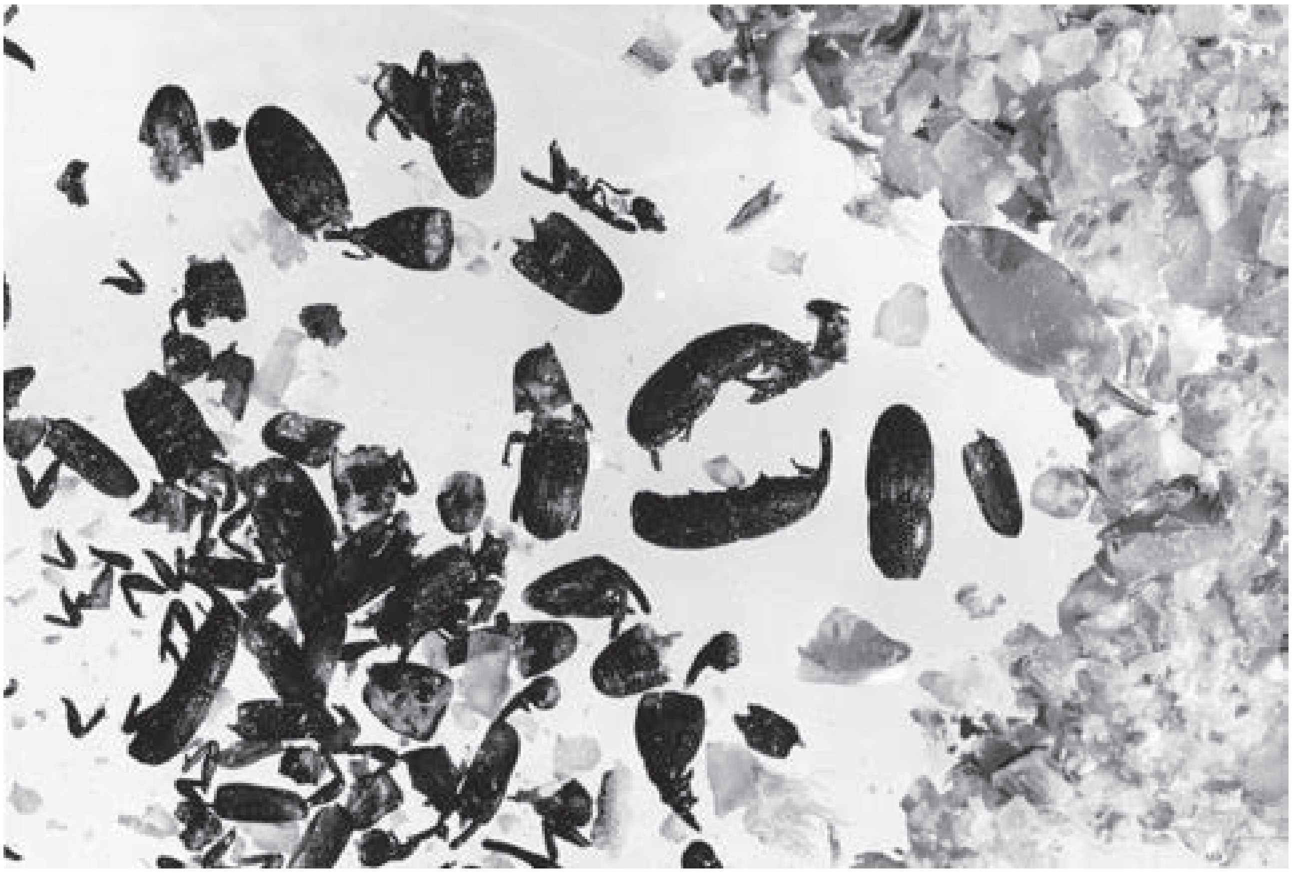


Illustration 13.9
Sitophilus granarius and emmer wheat groats after grinding in a rotary quern (see p 241). Photo: T N Tait.

preferably from lake basins close to Roman remains. It would then be possible to gauge farming practices and woodland management before, during and after the Roman occupation. See Addendum G.

APPENDIX 1: NOTES ON THE IDENTIFICATIONS

Pollen identification

Standard conventions are used. The name followed by type indicates that one fossil type is present, three or more taxa are possible but further identification does not seem possible. The name is of the genus or species most likely to occur on ecological or phytogeographical grounds.

Gramineae and Cerealia

The presence of grass pollen of at least 32µm diameter with pore annulus 8µm or more was noted using the method of Andersen (1979) taking the mean of the largest diameter and also that at right angles to it. Many of the larger and less well-preserved grains are folded and could not be measured, therefore it was not attempted to estimate frequencies.

According to Andersen (1979) large grains with a mean pollen size larger than 40µm together with a pore annulus diameter larger than 10µm are confined to species of *Avena* (oats including wild oats) and *Triticum* (wheat). The large grains of *Secale* (rye) are distinguished from those of other cereals by their asymmetrically placed pores and oblong shape. Andersen (table 3) gives means of eight collections of *Secale* as 40.1µm, annulus 8.9µm. None of the fossil grains is of the *Secale* shape and dimensions.

Large cereal grains (mean diameter 50.5µm, mean annulus 13.3µm) were found in the sewage levels of the east annexe ditch from 790mm downwards and from 550mm, just above the top of the sewage. Grains of *Avena* (oats) have a mean pollen size up to 44µm, mean annulus to 12µm; the means for *Triticum* spp (excluding *T. monococcum*) range from 42 to 50µm, annulus 11 to 14µm (Andersen 1979: table 3). It seems probable that most, if not all, these grains are of *Triticum*. Most of the grains are more or less folded and their surfaces are poorly preserved; if, as seems likely, they were adhering to the cereal pericarp and glumes and have been cooked and consumed their rather poor preservation is not surprising! From the inner west ditch grains have a mean diameter of 41.8µm, mean annulus 10.8µm; these are notably smaller grains, within the size range of *Avena* and *Triticum*, but are probably the latter since they are accompanied by wheat/rye grain fragments. Their smaller size suggests they have not been cooked and eaten.

Andersen defined a second group of grass pollen, mean pollen size 32–45μm, mean annulus diameter 8–10μm (Andersen 1979: 82). The measurements given below are from his figs 6 and 7 and table 3. Those species unlikely on phytogeographical grounds to be present at Bearsden have been excluded. Occasional grains, referable to the above group, were found in many of the samples from both occupation and post-occupation levels. Two size ranges appear to be present. Those with diameters 34–40μm, annulus 9–12μm resemble grains of *Elymus* (*Agropyron*) *repens* (couch grass); 30–45μm, means 37.3– 38.3, annulus 7.2–12.0μm, means 8.6–9.1μm, three collections measured. Couch grass is a common weed of cultivated ground and waste places and its presence in both Roman and post-Roman levels would be unexceptional. The second group, diameters 31–36μm, annulus 7–10μm can be matched within the size range of *Glyceria fluitans* (flote-grass); 28–41μm, means 31.6–35.9μm, annulus 7.2–12.0μm, means 8.9–10.6μm, six collections measured (pollen of *G. plicata* (sweet grass) falls within the same size range). Six of the 15 levels from which pollen samples were taken also contain fruit of flote-grass. Pollen of *Hordeum vulgare* (six-row barley), 32–43μm, means 36.3–39.1μm, annulus 6.0–10.8μm, means 8.0–8.6μm, three collections measured, is not thought to be represented. The annulus is generally smaller than that of the grains resembling *Elymus repens*, and the grain diameter generally larger than those of the *Glyceria* type. Due to the overlapping ranges in grain and annulus diameters with the species described here it does not seem possible to make definitive determinations especially on the small number of measureable grains. However, this data does suggest the presence of two wild grasses and absence of barley pollen.

Leguminosae

Lotus of *uliginosus* (*pedunculatus*) type pollen is distinguished from that of *L. corniculatus* on size. Birks gives size-frequency distribution curves for *Lotus* spp, the mean for *L. corniculatus* is about 19μm, that for *L. uliginosus* is 13μm, grains from Bearsden measured between 10 and 14μm (Birks 1973: 232).

Table 13.10
Measurements of cereal and large grass pollen

	Depth in mm				
	Roman	*Post-Roman*	*Number*	*Grain diam (μm)*	*Annulus diam*
Cf *Triticum* (wheat)					
East annexe ditch	790mm downwards	550	(12)	43–55 (50.5)	11–16 (13.3)
Inner west ditch	250		(8)	40–46 (41.8)	10–11 (10.8)
Cf *Agropyron repens* (couch grass)					
East annexe ditch	590, 610, 960, 1200	520,550	(15)	35–41 (37.2)	9–12 (10.0)
Depression		60, 80, 100	(10)	35–42 (38.0)	9–12 (10.5)
Outer west ditch		10, 40, 70	(13)	36–40 (38.6)	10–12 (10.5)
South ditch		980, 1060	(6)	34–40 (36.6)	9–11 (10.1)
East annexe rampart	180		(1)	38 (38.0)	9 (9.0)
Cf *Glyceria*					
East annexe ditch	610	550G	(5)	33–36 (34.2)	7–10 (8.4)
Depression		60G, 100G, 150G, 200, 250			
			(14)	31–36 (33.3)	7–9 (8.3)
Inner west ditch		500G	(3)	33–35 (34.0)	7–10 (8.3)
Middle west ditch	mid-silt		(2)	32 (32.0)	8 (8.0)
Outer west ditch		10G, 40, 70	(3)	31–34 (33.0)	8–10 (8.8)
South ditch		800, 980, 1060	(10)	32–36 (35.0)	8–9 (8.6)

G = *Glyceria fluitans* fruit present.

Fruits and seeds

Cruciferae

Brassica rapa ssp *sylvestris*, syn *B. campestris* ssp *campestris* (wild turnip, wild navew).

This species is represented by two black seeds which, though incomplete, appear to have been spherical, they are 1.1 and 1.3mm diam, each with a clear reticular pattern. The seeds are distinguished from those of *B. oleracea* (wild and cultivated cabbages) and *B. napus* (swede) by their spherical shape, clear reticulation and smaller size. Seeds of *B. nigra* (black mustard) are small (1.0mm–1.5mm) but the surface reticulations are thick and cord-like. Seeds of *B.rapa* spp *rapa* (cultivated turnip), a plant known to the Romans, are larger. M Fraser has studied seeds of *Brassica* spp and concluded that seeds of the wild subspecies are generally smaller than those of spp *rapa* although the diameter ranges overlap (Fraser 1981). Her measurements, with those from a number of published sources, give diameters of over 1.4mm for seeds of *B. oleracea*, *B. napus* and *B. rapa* spp *rapa*. The combination of small size and well-defined reticulation suggest that these seeds are referable to the wild spp *sylvestris*. Carbonised seeds, 1.1–1.5mm, of this type of Iron Age date have been found at Bu Broch, Orkney (Dickson, C 1987b).

Cf Raphanus sp (wild or cultivated radish) (illus 13.3, b)

Two reddish testa fragments, the larger 1.3mm × 1.2mm, were recovered from the sewage. Both have small angular polygonal cells mainly 7µm–18µm diameter, each with a small rounded lumen. One fragment also has an outer layer of palisade cells of unequal height forming a larger overlying network (illus 13.3, b). The other fragment lacks this network but has occasional large cells of *c* 25µm. Seeds of wild and cultivated *Raphanus* spp exhibit both cell types. The fragments are distinguished from those of *Brassica* spp mainly by the smaller size of the inner palisade cells; the testa cells of *Sinapis arvensis* (charlock) lack a large network and are uniformly small.

Graminae (grasses)

Grass grains were identified by reference to the keys and photographs in Krber-Grohne (1964). The identifications are based on the shape and size of the grain and hilum together with the cell pattern as seen after treatment with dilute sulphuric acid as described for cereal grains. Unidentified grains are mainly poorly preserved; a few are of genera not represented in Krber-Grohne's work which describes about half the genera present in the British flora.

Cereal bran and wheat glume bases

In order to identify the cereal grain fragments it was found necessary to prepare reference cereal grains to simulate the fossil state. As described by Dickson, C (1987a) grains are first treated to remove the starch andaleurone and to degrade chemically the cells to resemble those found fossil. To simulate very degraded bran fragments it may be necessary to pound, grind or rub grain and cook it as porridge or bread as described in the crop processing section and, for barley, in subsequent notes. The cooked bran fragments may then be retrieved from the matrix and heated in small quantities with 5% hydrochloric or sulphuric acid for a few minutes or until the desired degree of degradation is reached. For wheat or rye this may leave only the two testa layers (illus 13.1, a) or some bran fragments as is frequently found fossil. Other fragments will retain some of the diagnostic transverse cells of the pericarp, often heavily degraded, and comparable with those of the better preserved fossil bran. The grain fragments are rinsed and any remaining starch and aleurone brushed away before mounting the bran in a water soluble medium such as Gurr's Aquamount.

Rare attached glume fragments, longitudinal and transverse cells of the pericarp, testa and aleurone cells (of wheat and rye) were all found in the Bearsden sewage and all vary greatly in their preservation. The transverse cells, essential for distinguishing between wheat and rye, are particularly poorly represented. A 5ml sample from each investigated level in the sewage was examined particularly for transverse cells and 25ml from a particularly well-preserved level. 1% sodium hydroxide was used for a few hours only to disaggregate the silt and minimise further damage to the delicate fragments. The best preserved bran fragments were mounted in Gurr's Aquamount and examined at ×100 and ×400. About 10% of these showed fragments of transverse cells still adhering to the testa. A quantative assessment was not possible as even from the 25ml sample only about twenty fragments proved identifiable. Detailed, illustrated descriptions of the bran layers of *Avena*, *Hordeum*, *Secale* and *Triticum* most commonly found in fossil are given in Dickson, C (1987a). Winton (1916) and, in more detail, Winton and Winton (1932) give comprehensive illustrated accounts.

Triticum/Secale (wheat/rye) (illus 13.1, a)

The vast majority of the cereal grain fragments are of this type and consist of two layers of parallel elongate cells approximately at right angles to one another. The upper layer is of transparent cells, the lower has varying amounts of brown pigment and sometimes cork cells.

Secale cereal (rye) (illus 13.1, d)

In well-preserved fragments the transverse cells overlying the testa in rye are distinguished from those of wheat by their greatly thickened rounded end walls. Unfortunately only rare cells protected by overlying cell layers or which have overriding end walls have retained their thickening in these sewage deposits. Most of the transverse cells have unthickened walls, sometimes losing the pitting of the side walls, a feature which more often remains on degraded wheat transverse cells. The other distinguishing feature of rye pericarp lies in the disposition of the longitudinal rows of the transverse cells; these are frequently interspersed with half or smaller cells. The dorsal part of a wheat grain can have small cells but these appear to be confined to groups or short longitudinal rows. It will be appreciated that small fragments of degraded wheat and rye pericarp cannot necessarily be distinguished. In this material only fragments with cells preserved from several rows across the grain are identified as rye. The short cells range from 30 to 55 × 22 to 25µm; the main cells range from 70 to 100

(–125) × (15–) 18 to 45µm. Rare fragments only, identified by these criteria, were determined from each level.

Triticum cf dicoccum (emmer)

Well-preserved transverse cells of emmer can be distinguished from those of *T. spelta* (spelt) and *T. aestivum* (bread wheat) by their shorter cells with less thickened walls. Also the end walls of emmer cells tend to be straight or slightly rounded, those of spelt clearly rounded and of bread wheat, angular. These distinctions are clearly shown by Körber-Grohne and Piening (1980), figs 6, 7 and 9). However, on these poorly preserved fossils where pitting and thickening is reduced or has disappeared, these characters are less obvious. Fragments were recovered from each of the examined levels. The transverse cells have straight or slightly rounded end walls, which measure 55 to 125µm × 10 to 18 (22)µm. Fossil fragments from the dorsal area with underlying tube cells show the greater range of cell sizes, those at the ends of the hilum are shorter as are those from the ends of the grain. Cells from the dorsal area are shorter than those from the sides of the grain. Nevertheless the range matches that from recent reference grains of emmer although the cell sizes of this emmer and the spelt/bread wheat cannot be compared directly with those given by Körber-Grohne and Piening (1980) which are taken from the sides of the grain. The transverse cell walls are thinner than those of spelt and do not seem to preserve as well. Some putative fragments are too poorly preserved to measure the cells; none of the fragments is sufficiently well-preserved to illustrate.

Triticum spelta/aestivum sl (spelt/bread wheat) (illus 13.1, b)

Rare fragments with fairly well-preserved transverse cells, with pitted or thickened side walls and more or less thickened slightly or clearly rounded end wall were recovered from three levels. The cells range from (80) 110 to 210 (280) × (15) 18 to 22µm. Mainly small fragments were found which though up to 26 cells deep are only two to three cells wise, although one fragment (illus 13.1, b) is 20 cells wide, there are no half cells. One fragment has tube cells preserved; these are only found in the dorsal region and ends of grain of *Triticum* species with the exception of *T. monococcum* (einkorn wheat) which has ubiquitous narrow tubes (Körber-Grohne & Pening 1980). These fragments are distinguished from those of emmer by their generally longer, broader cells which, having originally stouter cell walls, preserve better. The cells have weakly to strongly rounded end walls and resemble certain of those found in both spelt and club wheats (the latter formerly named *T. compactum*, now included with the bread wheats but seemingly distinct in some grain characters. Most fragments are darker and better preserved than those of the cf emmer. The clearest transverse cells are often those which have been replace by fungal hyphae (table 36, b) or protected by the outer pericarp. It must be noted that all the hexaploid wheats, which include spelt and bread wheats, are interfertile although tetrapoid wheats such as emmer do not produce fertile hybrids with hexaploid ones (Zohary 1971).

To see if processing and simulated ageing of the bran varied in its effect on the different cereals, small scale pounding and porridge making of hulled wheats and grinding and baking of wheat and rye meal for bread was attempted. After cooking the bran was heated with dilute acid for up to 40 minutes to simulate the degraded transverse cells of the fossil bran. It was noted that the thin transverse cells of emmer were mostly destroyed or highly degraded, those of spelt and bread wheats were less degraded and those of rye only slightly degraded. Some wheat bran fragments lost their transverse cells altogether. The relatively well-preserved state of the rye cells suggests that the rare fragments of recognisable rye bran probably represents its actual contribution to the cereal fraction, as a relatively uncommon weed in the crop.

Triticum diococcum/spelta (emmer/spelt) (illus 13.1, e, f)

After grinding or pounding, wheat glume bases become difficult to recognise (Ill oo c). All those from the sewage lack well-preserved veins, most are poorly preserved and not always readily distinguished from rachis segments. The 142 fragments from three samples (they were probably overlooked in other sewage levels) which have been tabulated as glume bases include some rachis segments. Well-preserved glume bases may be identified. Körber-Grohne et al (1983: pl 6) shows the differences in the sinuous walls of the long cells; those of spelt are zigzag whereas those of emmer are rounded. Occasional glums of emmer and rare ones of spelt were tentatively identified by the preservation of these cells (illus 13.1, e, f). Glume bases of emmer are usually as thick as they are broad and tend to be narrower than those of spelt as shown by Körbe-Grohne et al (1983: fig 15). Using the criteria of shape or cell pattern, several of the glumes together with the smaller rachis segments have been tentatively identified as those of emmer (illus 13.1, c). Those which, from their size and cell pattern, could be of spelt are rather rare. As is pointed out in the crop processing section, spelt glume bases sometimes shatter in the processing and thus are likely to be under-represented when only sieved bran is present; this is shown on the flow diagram.

Hordeum (barley) (illus 13.1, h, i, j)

The fossil grain fragments of barley show two distinct states of preservation. Most are dark brown, usually stouter than those of wheat though equally fragmentary as though ground with the wheat and rare fragments occur throughout the sewage. The testa cell wall appears double as though two layers of nearly identical cells are superimposed (Dickson, C 1987a: pl I). Fragments which include the hilum may show a line of darker pigment parallel to and about 1mm from the hilum on either side (illus 13.1, h), similar lines can be seen on the dorsal face. These lines, left by the adjoining glumes, are seen on hulled barley grains, they have not been seen on naked grains.

The other barley grain fragments each consist of a more or less intact hilum up to 7mm long and 70µm wide; the testa extends from 1mm to 3mm on either side of the hilum (illus 13.1, i). The very delicate testa is mainly transparent with occasional much degraded diagonal brown cells and the elongate perisperm cells may be visible (illus 13.1, j). One fragment has well-preserved transverse cells 30 to 70 × 10 to 20µm in two or more layers (illus 13.1, j), presumably a chance preservation protected by the overlying tissues in the ventral furrow. Ten of these fragments were recovered from 1.18m to 1.20mm and one each from 98mm to 1m and 690mm to 700mm.

Similar transparent fragments were obtained by adding water to reference grains of hulled barley in a mortar, dehusking by rubbing with a pestle or mallet and floating off the chaff. The process was adapted from the traditional Scottish method of processing barley to thicken broth or soup described by Fenton (1978: 396). The resultant whole grain, but with somewhat abraded tissues on the dorsal and ventral faces, was simmered in water for three or four hours. After subsequent heating with 5% hydrochloric or sulphuric acid in a water bath for at least five minutes, the pericarp and aleurone layers were removed leaving the hilum and now transparent testa. Pearl barley, when similarly cooked, produces rather similar testa fragments but with only about 1mm preserved on either side of the hilum due to the modern more thorough rounding of the barley kernel. Prolonged cooking seems necessary before the cell contents disappear and the cell walls break down into degraded state of the fossils.

***Avena* (wild or cultivated oats (table 13.1, g)**

Rare fragments only were recovered, the hilums are incomplete and about 40µm wide. Hilar fragments may superficially resemble those of pearl barley, as the testa is similarly transparent. The very delicate testa of these fragments lacks cell wall structure but is identified by the ubiquitous, vermiform, tube-like cells which are 7 to 10µm wide (table 36, g); these are hypoderm cells which are often joined irregularly (Winton & Winton 1932: fig 78). Fossil grains commonly show the testa cells which are transversely elongate, side by side in rows in a modified herring bone pattern and/or the longitudinal cells with prominent hair bases of the outer pericarp (Dickson, C 1987a: pl I).

Leguminosae, seed fragments

Seeds of most legumes have smooth seed coats, hitherto mainly carbonised seeds have been found and identification is usually based on the size and shape of the seed and that of its hilum. None of the tiny fragments found at Bearsden includes the hilum and none is more that 3mm in diameter. Seeds of the family are characterised by having a palisade of thick-walled prismatic (malpighian) cells. The lumen is broader in the lower part of the cell and the cells are polygonal in surface view and often show radiating limes due to the pores separating the ribs which make up the thickened walls (Winton 1916). There is a hypoderm of hour-glass cells which are ribbed in some species. The testa cells may be diagnostic for individual species or groups of species and can be used to identify seed fragments, as demonstrated by Winton (1916). The testa fragments were recovered from the east annexe ditch, 680–700mm, 98mm–1m, 1.18m–1.20m.

Cf *Lens culinaris* Medicus (lentil) (illus 13.2, d, e)

Two seed fragments only 1.2mm × 0.5mm and 1.0mm × 0.6mm have palisade cells each about 33 × 5–6µm, which are rounded at their outer ends. The polygonal hypoderm cells are 18µm–22µm across with irregular brown centres. The very narrow palisade cells could not be matched on available reference seeds of British species but are remarkably similar to both palisade and hypoderm cells of *Lens culinaris* (lentil).

Cf *Vicia faba* (field bean, horse bean) (illus 13.2, a–c)

Rare dark brown testa fragments, the largest measuring 3mm × 2mm, have incomplete palisade cells measuring up to 135µm × 18–25µm across, the dark brown inner wall is 8µm–12µm across; the partly detached cuticle has impressions of the palisade cells with pores dividing each cell into six or seven sub-triangular areas. The hypoderm cells are up to 65µm across with ribs showing as radiating finger-like protrusions. Legume seeds with palisade cells of over 100µm in height include species of *Lupinus* and *Vicia faba* and *V. narbonensis*. *Lupinus* spp. Have a narrow inner part of the palisade cell which is geniculate and usually colourless. *V. narbonensis*, the possible progenitor of *V. faba*, has a very similar testa to that of the fossil but does not seem to have any history as a food plant. The cell characters are those of *V. faba* (Winton 1916) and the brown pigmented inner cell wall is very similar that found in the small brown forms of *V. faba*; this pigment is absent from the larger broad bean which is the form more usually eaten at the present time. The testa of *Pisum* (pea) has shorter palisade cells up to 100µm. Dr E Krzywinski kindly provided material from a medieval latrine from Bergen, Norway, and from a layer rich in *V. faba* pollen similar fragments of testa, up to 2mm, were found.

Cf *Vicia* sp (vetch) (illus 13.2, g, h, i)

The largest of four measures 2.0mm × 0.8mm, the palisade cells are up to 50µm long by about 9µm across. The detached cuticle bears impressions of a circular pattern of small polygonal areas each only about 2µm diameter, representing the tops of the palisade cells (table 36, g, i). At a lower level the lumen is rounded, golden brown and about 7µm across. The hypoderm cells are polygonal with a brown centre and average 22µm. The testa cells of British species of large-seeded legumes were compared but only *Vicia sativa* (common vetch) has cells of comparable size, shape and surface pattern.

Linaceae

Linum usitatissimum (flax, linseed) (illus 13.3, a)

Whole seeds of species of *Linum* occurring in Britain can be distinguished on size and shape but small fragments are less readily separable. The single fragment from the Roman levels of the inner west ditch though only 1.4mm × 1.1mm has the characteristic beak of *L. usitatissiumum*. Two fragments from the sewage levels, 2.9mm × 0.8mm and 2.4mm × 1.3mm represent parts of the backs of seeds. Each fragment has the tough sclerenchymatous fibres 100–150µm × 4.8µm which are characteristic of the genus, and the overlying round cells of 28µm–35µm diameter. Two of the fragments retain the brown squarish cells which underlie the fibres. These three cells layers appear to be similar in both *L. bienne* and *L. usitatissimum* but the former has smaller seeds, about 2.8mm × 1.6mm; seeds of *L.*

usitatissimum are much larger with a wider size range, a small sample range form 5.2–6.2mm × 2.4–3mm.

The two entire seeds of *L. catharticum* (purging flax), also from the sewage levels, are readily distinguished by their much smaller size, 1.3mm × 0.7mm.

Papaveraceae

Papaver somniferum (opium poppy)

Two seed fragments were recovered; the measurements are of the flattened mounted seeds, one nearly complete seed measures 1.2mm × 0.8mm, the other is a fragment 1.5mm long. The straight-walled polygonal cells are generally about 200µm in diameter, these and the underlying testa cells accord with those of *Papaver somniferum* (opium poppy) which has seeds measuring 1.2–1.4mm × 0.8–1.2mm. Seeds of British species of *Papaver* are less than 1mm long and the epidermal cells under 160µm diameter.

Umbelliferae

Anethum graveolens (dill) (illus 13.3, g)

Two incomplete fruits, now measuring 22mm × 18mm and 25mm × 15mm, each consist of part of the commissural face with remains of two segmented vittae which are about 180µm wide, these have polygonal cells 10–60µm × 18–25µm which are mainly longitudinally elongated. The underlying cells of the endocarp are well preserved and measure 35–70 µm× 3–7µm, they are in groups mainly transversely orientated. Palisade cells, 22µm × 35µm, with thickened corners are visible on one of the fruit. A third fruit is more tentatively identified since it lacks the vittae and ribs but size, shape and transverse and palisade cells are similar. The fruit match the cells and vittae of reference fruit although they lack the spongy wing margin and only one rib survives on one of the fruit.

Coriandrum sativum (coriander) (illus 13.3, j)

The identification is based on fragments of the stout fruit wall with diagnostic wavy ridges formed by sclerenchymatous fibres, the largest fragment of which measures 4.5mm × 3mm. The outer cell layers were removed from recent pericarps to show the thickened ridges of these cells as shown by Wilson (1979). The non-septate resin ducts which lie on the inside walls of the fruit were not recovered.

APPENDIX 2: DETERMINING THE THERMAL HISTORY OF THE BRAN WITH ELECTRON SPIN RESONANCE SPECTROSCOPY

It is fortunate that ESR spectroscopy is being developed as a technique to estimate the maximum temperature of previous heating of archaeological grain samples (Robins et al 1986). A sample from the Bearsden east annexe ditch taken at 1.38m depth was dispersed in dilute alkali, sieved, and the bran component carefully collected. Only the bran fragments of *Tricicum/Secale* (wheat/rye) were selected. A fragment of the cross cells of *T. spelta/T. aestivum* sl (spelt/bread wheat) was recognised (Ill oo b) and two glume bases of *T. dicoccum/spelta* (emmer/spelt) were recorded from the samples.

The bran was submitted to Dr D Robins for ESR determination. He noted (pers comm) that the sample gave a g value of 2.0041 and line width (6H) of 7.45 Gauss. The signal was relatively weak which indicated a short heating time, this observation is only qualitative at this time. The result was compared in the first instance with the cereal grain calibration curve. The reading is consistent with a temperature in the region of 180–200°C and therefore indicative of a bread rather than porridge or dumplings.

This result may be compared with that from a preliminary sample of cereal chaff from the stomach contents of Lindow Man, the Cheshire Iron Age bog body. The chaff gave a maximum temperature of between 200 and 250° and preliminary measurements suggested a short cooking time (Robins et al 1986). Hillman (1986) noted two charred farinaceous fragments, both *c* 0.5mm diameter and also from the stomach contents, and suggests that they were most likely to have derived from some sort of bread. Robins observed that the presence of charred material 'indicates severe heating or burning of the bread, an event that is likely to occur much more often during the high-speed griddling of flat bread over an open fire than during the slower, oven-baking of a leavened loaf' (Robins et al 1986). No such burnt fragments were found in the Bearsden sewage though especially looked for; it is notable that ovens have been recorded at a number of Roman forts. The lower temperature of the Bearsden bran could be connected with the baking method or the possibility that the dispersed bran may be from a mixture of bread and porridge. However, until more ESR studies have been carried out on a variety of cereal remains it would be premature to draw any definite conclusions especially on a single sample.

ADDENDUM

JAMES H DICKSON

When the archaeobotanical work on both pollen and macroscopic plant remains began in the mid-1970s there was little understanding of the great potential of waterlogged deposits containing dispersed faeces. Written very largely by the hand of Camilla Dickson who died in 1998, the report was submitted in 1985 when much less was known archaeobotanically about Roman sites in Scotland and in Britain as a whole than now. Stemming from the Bearsden discoveries, relevant lines of investigation were pursued by both CD and JHD together and separately. For instance, CD continued processing cereals experimentally and JHD grew figs in both Glasgow and Haute-Saône, France. Working with the Dicksons several researchers produced long and short pollen diagrams from bogs and turves relevant to the last 3,000 years in the Glasgow area. The archaeobotany of the Bearsden fort remains by far the most comprehensive in Scotland and one of the most detailed from any fort in the Roman Empire. This is primarily because of the highly detailed very rewarding investigation of the rich waterlogged, sewage-impregnated deposits in the east annexe ditch. Rather than alter substantially the extensive original report, the following points give some indication of the most important archaeobotanical developments that have taken place during the years since the mid-1980s.

1. It would have been better to have stated 'mainly plant-based diet' rather than 'mainly vegetarian diet'; vegetarianism is a life style choice which few if any Roman would have made. Biochemical and stable isotope analyses revealing diet have developed enormously since the early 1980s with a great many publications. As a mere two examples involving JHD, see Dickson, J H, Oeggl K, Holden T, Handley L L, O'Connell T, Preston T 2000, and Dickson J H, Richards M P, Hebda R J, Mudie P J, Beattie O, Ramsay S, Turner N J, Leighton B J, Webster J M, Hobischak N R, Anderson G S, Troffe P M & Wigen R J 2004.
2. Spelt has been recovered from the Oakbank Crannog in Loch Tay occupied for some 400 years during the transition from the Bronze to Iron Ages: see Miller, J, Dickson, J H, Dixon, N 1998 and Miller, J 2002.
3. There is now no need to wonder if fig trees might have been grown in the fort, or indeed anywhere else in Scotland, even if the Romans grew parthenocarpic varieties which produce ripe fruit without pollination. Very sugary and consequently long-lasting when dried, figs were part of the Roman military diet and distributed from the Mediterranean areas to all parts of the Empire: see Dickson, J H and Dickson, C 1996, Dickson, C 1994 and Dickson, J H, Lyth, J R S, Lécrivain, G M-J, Lyth, M M H 2011. Sparse fig pips were found at Elginhaugh fort: see Clapham, A J 2007.
4. There is now abundant evidence from widespread sites in Europe extending back to the Neolithic that large weft-forming mosses were used not just for many small scale domestic purposes including hygiene but even caulking boats, both log boats and more complex craft. It may well be that large mosses when locally available were commonly used by Roman troops: see Dickson J H 1973, Dickson, C & Dickson, J 2000 and Dickson, J H 2000. The recent book by Hobson (2009) on Roman toilets mentions the Bearsden fort.
5. The experimental processing of cereals and the making of bread is a large topic: see, for example, Dickson, C 1990, Procopiou, H and Treuil R 2002, Samuel, D 2009 and Valamoti, S M 2013.
6. During the last few decades much has been learned about former woodland management in Scotland, though not for Roman times: see, for instance, Smout, T C 1997.
7. The nature of the landscape when the Romans invaded west central Scotland has been investigated by several researchers supervised by JHD and CD. It is clear in all the well carbon-dated pollen diagrams that major woodland clearances had taken place before the Romans arrived, sometimes long before, sometimes shortly before but nonetheless before. Lenzie Moss, near Kirkintilloch, Lochend Loch Bog, near Coatbridge, Walls Hill Bog, near Johnstone, and Gartlea Bog, near Gartocharn, all have long pollen sequences which strikingly make the point; this was the doctoral work of Susan Ramsay. Judith Turner's important pollen diagrams from Bloak Moss in Ayrshire and Flanders Moss in the upper Forth Valley were produced in the early 1960s. However, it is unfortunate that the radiocarbon dates cannot to be trusted; this was long before the advent of AMS dating. For other work see: Boyd, W E 1984; Dickson, C 2007; Dickson, J H 1992; Dickson, J H, Dickson, C, Boyd, W E, Newall, P J & Robinson, D E 1985; Ramsay, S 1996; Ramsay, S & Dickson, J H 1997.

Chapter 14

INFRARED ANALYSIS OF CHARRED MATERIAL ADHERING TO POTSHERDS

FRANCES McLAREN

The precise identification of ancient wheats, such as the fragments found at Bearsden, is problematic due to the marked degree of overlap which occurs between the species whether the identification is based on gross morphology or histological features (Colledge 1988 and Holden 1990). The morphological identification of wheat, particularly the free-threshing wheats, is heavily dependent on the preservation of mature grains and diagnostic chaff (Hillman 1984; 1985; Jacomet & Schlichtherle 1984; Kislev 1984; Jacomet 1987). Unfortunately ancient samples of free-threshing wheats recovered from archaeological sites are usually found as almost pure grain samples with very little associated chaff. Furthermore, even when the chaff is recovered it may have characteristics of more than one type of free-threshing wheat (Kislev 1984).

The problems associated with identifying ancient wheats lead to a search for an independent method to backup morphological classifications, including the re-examination of those wheats where identifications based on gross morphology or histology were thought to be secure (Hillman et al 1993). Analytical chemistry has provided many techniques which have been applied with increasing success to resolve archaeological enigmas. Past achievements suggested that it was possible that chemical analysis could resolve at least some of the problems associated with the identification of ancient plant material (McLaren et al 1991). Most difficulties associated with the chemical analysis of archaeobotanical material stem from the long unknown history of the specimens. Even the post-excavational treatment is often forgotten. Additionally, the archaeobotanical sample is usually extremely small. For a chemical technique to be of any value to the archaeobotanist it needs; (A) to unambiguously identify a single grain to species or subspecies level and (B) to be sufficiently insensitive for the variation in the viability of the grain not to be a problem to the investigation (McLaren et al 1991).

14.1 THE USE OF INFRARED ANALYSIS

Infrared (IR) analysis was selected as an ideal technique with which to begin examination of archaeobotanical material primarily because it is non-destructive and both the sample and the chemical extracts survive and are available for further study. IR spectra are unique for each different type of organic or inorganic compound. The technique is rudimentary in that IR looks at the overall patterns of the specimen and not the fine detail of each individual component. Consequently, problems associated with archaeological material, such as diagenesis and modern contaminates such as plasticisers, do not generally effect the general IR formations as could be the case with the more sensitive techniques such as Gas Chromatography-Mass Spectroscopy (GC-MS). Another advantage of IR is that if necessary suspected contamination could be screened out. Furthermore, it is one of the most economical chemical techniques, the main costs being machine time and solvents, which may be redistilled for reuse. Like most chemical analyses the main problem are associated with the interpretation of the generated spectra but the morphology limits the possible options in the case of single seeds or plant fragments; for example, the gross morphology will indicate whether the material under analysis is part of a plum stone or a cereal grain.

14.2 WHAT IS THE CHARACTER OF ARCHAEOLOGICAL CHAR?

There is a general consensus of opinion that unless desiccation, waterlogging, mineralisation or mineral replacement is evident the majority of archaeobotanical material recovered in Northern Europe will have survived as a result of charring (Green, F J 1979; Murphy & Wiltshire 1994). Consequently, when archaeobotanists have conducted charring experiments to test the effects of heat on the morphology of seeds, they have tended to concentrate their efforts on high temperature charring to produce distortion patterns (Boardman & Jones 1990; Mason 1988; Charles; unpublished data). In order to test past heat exposures, some ancient material has been examined by Electron Spin Resonance (ESR) (Hillman et al 1985; Fairbairn 1991). When Robins examined the waterlogged bran from Bearsden by ESR he found that the material had been exposed to a temperature of between 180°C–200°C (p 277, Appendix 2). It is unlikely that all the Bearsden chars would have been exposed to the same amount of heat.

The Bearsden pot chars are most likely to have occurred as the result of cooking accidents. While the foods were being cooked a number of chemical reactions were taking place, including the Maillard reaction and caramelisation (Clawson & Taylor 1993). A feature of the Maillard or non-enzymic browning reactions is a brown toasting effect on the food. If the cooking continues unabated then the reaction processes continue as the food dehydrates and darkens until it becomes a char. The char is a surface phenomenon where carbon in its inert form; graphite has foamed with discrete pores (Evans & Biek 1976). At least some of the original chemical component (including long chain hydrocarbons) remain unaltered behind the strong inert wall of carbon.

When investigation began into the possible use of IR analysis on archaeobotanical materials we tested the ability of chemical compounds to survive charring. Fresh grains of wheat and rye including *T. spelta* L. were experimentally charred at a range of temperatures in a variety of open and closed systems (for a periods of up to 21 days). Flour was made into bread to explore the effects of cooking on the chemistry of ancient residues. Examination of the resulting IR spectra showed that charring and cooking had a minimal effect on the IR spectra and suggested that many surviving ancient organic residues were unlikely to have been subjected to high temperatures and critical flash points (McLaren & Evans unpublished data). The IR examination of the chemical components of ancient archaeological specimens continued with material which could be confidently identified by their morphology, eg *Cornus mas* L. stones which are readily recognisable even when in a fragmentary condition. Ancient botanical material was then examined from a wide number of sites ranging from wet land sites of Britain to the relatively arid sites of South-West Asia to see if the source of the material had any effect on the spectra. Happily, results showed that the source of the material appeared to have no effect upon the chemistry. The next stage was to build up a data base of IR reference material which included many typical food plants. However, the investigations have centred around the common cereals particularly the wheats and ryes. At least one sample of modern grain specimens was analysed of all the currently recognised species of wheat and rye. The chaff of selected species was also analysed. Within each species, we examined several different populations (up to 11 in some cases) which represented a broad range of morphological variants and geographical sources. We also examined wheats which we knew were hybrids. The spectra were compared on the basis of 'fingerprint patterns', with particular reference to the position of key peaks on the wave number axis.

It was generally found that variations amongst equivalent spectra from the different modern populations of any one species were very slight, whereas disparities between spectra of separate species (even when closely related) were very marked; ie infra-specific variation in the spectra was consistently exceeded by inter-specific variation. It was therefore clear that species-related differences in IR spectra offered an additional basis for identifying modern wheats and ryes at the species level.

The Bearsden cereal fragments proved an ideal range of ancient material to extend the application of IR in archaeobotany because these fragments derived from pot char and had therefore been processed and cooked. The samples would test whether the chemical signals picked up in the IR spectra of ancient charred grains changed as a result of the additional processing.

14.3 CHEMICAL ANALYSIS OF THE BEARSDEN CHAR

Three char extracts were examined, all taken from the outer surface of the sherds:

Sample A: <0.06 gm; NK75CQ; the granary;
Sample B: 0.06 gm; NK77EA; the gulley south of the officer's quarters of building 7;
Sample C: NK76GN; a pit in 'building 16'.

These samples were extracted in hexane, chloroform and propan-2-ol (McLaren et al 1990) and compared to the library of cereal IR spectra built up mainly from Gordon Hillman's collections of wheats from the 1970s held at the Institute of Archaeology, UCL. The best quality and the most diagnostic spectra were obtained from the propan-2-ol extracts as has been the case with most archaeobotanical material. However, this is not to say that the hexane and chloroform samples were ignored for in some cases the evidence obtained from these spectra revealed equally critical information.

The identification of samples A and C

The IR spectra of the Bearsden samples nos A and C were quite similar to the spectra of individual modern emmers and 'Spanish' spelts but no single match was clear, in contrast to the fingerprint match between Bearsden sample B and durum wheat (see below). It was evident, however, that samples A and C were distinct from the spectra of 'Northern' forms of modern spelt, commonly referred to as European Alpine spelt by Lennart Johnson (1972). Samples A and C were also distinct from emmer/spelt crosses. However when the wave lengths of the main IR peaks in these samples were analysed the results suggested that these samples could be a mixture of emmer and 'Spanish' spelt wheats.

In order to confirm the presence of a mixture, samples A and C were compared to samples of emmer and spelt using differential spectroscopy (Martin 1966). If identical amounts of the same compound are placed into the two separate light paths of an IR doublebeam spectrometer, then a straight line spectrum emerges; any small differential bands reflect a variation between the total quantities of each sample extract. The spectrum produced by comparing ancient charred material with modern plant sources by differential spectroscopy is unlikely to produce a completely straight line because the ancient charred extract contains an unknown volume of the extract. What can be assumed, however, is that if no major differentiated bands were present then this would suggest that the charred material and the plant source/s were identical.

On this basis the differential IR analysis confirmed that the propanol spectra of Bearsden samples A and C were the same as a spectrum of a mixture of two Spanish wheat samples, the tetraploid *T. turgidum* subsp *dicoccum* (Schrank) Thell. (traditionally called *T. dicoccum* Schübl. commonly called emmer) and the hexaploid *T. aestivum* (L.) Thell. subsp *spelta* (L.) Thell. (traditionally called *T. spelta* L. commonly called spelt)

The antiquity and origin of the spelt/emmer crop

Prior to modern farming practices, wheat crops generally consisted of mixed land races, which often included not only different varieties but also wheats of different ploidy levels. Archaeological evidence shows that emmer wheat, a readily identifiable glume wheat, was the stalwart of a South-West Asian wheat crop assemblage and maintained this position as farming spread west throughout prehistoric Europe (Zohary & Hopf 1993). Which wheat species were developed to spread throughout the temperate world were largely determined by the methods used by farmers for harvesting their crops and selecting grain for the next crop. They would have had a choice of either selecting specific wheat heads for seed corn or putting aside a more random proportion of the harvest for future sowing (for a more detailed discussion on the origins and spread of wheat farming see the paper by Hillman & Davies 1990). If the farmers continually selected for specific wheats then these plants would eventually dominate the crop. This method of seed selection is still used today in Eastern Turkey according to Dr Sencer (Hillman, pers comm). However, if the farmers constantly selected a random proportion of their harvest for future propagation then any crop would continually produce more or less the same land race mixture as before, provided no other factors altered.

As farming began to spread from the Neolithic nuclear areas of the Fertile Crescent through the temperate regions of the Old World, so wheat crops came into contact with some of their wild grass relatives, notably the *Aegilops* species. When this encounter occurred the close affinity between the crop and *Aegilops* enabled them to cross readily to form fully fertile hybrids. Spelt is one such successful hybrid and generally thought to be the result of a successful cross which occurred when a cultivated *T. turgidum* came into contact with *Aegilops squarrosa* L. = *Ae tauschii* Coss. The initial contact between the parent species is thought to have occurred when farming was introduced into the south-west corner of the Caspian belt because at present there is no evidence that *Ae. squarrosa* and wild emmer (*T. dicoccoides* (körn) ever overlapped in distribution (Zohary & Hopf 1993). *Aegilops* species are extremely variable in their ecological demands and consequently there are a number of different forms which can be found in a variety of habitats ranging from desert margins through to the elevated plateaux of Iran and Afghanistan (van Zeist 1976). When crosses occurred between *Ae. squarrosa* and a wheat, the parent *Aegilops* introduced a wider degree of climatic tolerance into the genetic make up of the progeny. Gradually these new wheats began to form an integral part of the crop as wheat farming continued to spread out to new environments.By the time wheat cultivation reached Neolithic Britain, the standard crop probably contained a number of wheat species (derived from all ploidy levels). Generally the hulled wheat species would probably have been found growing together and correspondingly the free threshing wheats (Zohary, pers comm, 1995). A typical example of an ancient free threshing wheat crop pattern can be seen in the wheats recently found at the Neolithic site of Balbridie (Fairweather & Ralston 1993; McLaren unpublished data).

During the 1930s the central issue of debate on the origin of free threshing hexaploid wheats (*T. aestivum* subsp *vulgare* (Vill.) Mackey also called *T. aestivum* L., *T. sativum* L. or *T. vulgare* Host) was whether the precursor of free threshing wheats was spelt (*T. aestivum* subsp *spelta* (L.) Thell.) or alternatively, was spelt a later mutant evolved from the free threshing crops once they had become established in Europe (Kuckuck 1973). During the 1950s the agriculturalist Kuckuck collected and examined a number of spelts from Shahr-Kord (a high plateau near Isfahan) where spelt had ceased to be grown as a crop during the previous 15 years although emmer was still grown. Kuckuck found that the spelt complex contained a range of morphological features and possessed other characteristics such as both winter and summer types. In this complex Kuckuck detected a number of parallel transitional spelt forms leading up to the free threshing wheats and so he felt able to refute the idea that spelt was a later European crop. The association between spelt and emmer crops is quite common in south-west Asia because of the similarity in their harvesting regimes (Zohary, pers comm, 1995). Bor (1970) erroneously described Kuckuck's Iranian spelts as wild when in reality they were probably tolerated as an element of the harvest and would not have survived unless they were part of a farming regime. Morris and Sears (1967) also carried out a programme of genetic research into the history of spelt. They also found a wide diversity of spelt genotypes which confirmed Kuckuck's observations on the origin of spelt. Not everyone has agreed with the proposition of a multiple origin for spelt. Lennart Johnson (1972), for example, on the basis of his analysis of wheat protein profiles, suggested that both the hulled and the free threshing hexaploid wheats were much more uniform than had been previously supposed. He felt that all the bread wheats probably derived from a single (monophyletic) origin rather than several (polyphyletic) origins.

IR analyses of a range of spelts

The IR spectra of the modern samples of European spelt wheats fell into two clusters; European Alpine spelts and the Spanish spelt. Analysis of a series of prehistoric British spelts found at the Iron Age sites of Thetford and Danebury (unpublished data) compared well to very primitive varieties of European Alpine spelt called *T. spelta* L. var. *Capruleum* B and *T. spelta* L. var. *duhumelianum* respectively.In contrast, the Bearsden spelt compared well with the spectra derived from modern Spanish spelts recently collected by Peña Chocarro (Peña Chocarro and Lamont, in preparation). Her collections included a field where a crop consisting primarily of spelt with emmer inclusions had been continuously grown together for some years specifically for bread production. When Hillman (pers comm) morphologically examined the Spanish spelt he observed many primitive features in the ears. The IR spectra indicate that a certain amount of introgression has occurred between the emmer and spelt over the years, particularly from spelt into emmer, ie cultivated spelt and emmer have crossed at some point in the past and produced fertile progeny. The fertile hybrids began to back cross with emmer and so each new generation looked morphologically more and more like the parent emmer while retaining some genetic components from spelt. The IR analysis of two Bearsden samples suggest that these same patterns of introgression probably occurred in the Roman crops.

The divergence between the IR spectra of a range of Alpine spelts and the southern Spanish spelts is quite distinct, however, at present it is impossible to say anything further about these two forms separated by IR. For example, no inferences can be made about possible separation into Mediterranean type spelt and Alpine type spelt because at present insufficient studies have been performed. The results at present indicate that by examining more than one chemical component of the plant, IR may signify more about plant relationships than would be the case by just analysing one chemical fraction such as the proteins. However, the exact origins of different forms of spelt must be considered provisional until more detailed analyses have taken place to elucidate the situation.

The identification of sample B by IR

The three spectra from this sample produced an excellent match with *T.turgidum* conv. *durum* (Desf.) MacKey (syn. *T. durum* Desf. commonly called durum wheat). Sample B also produced a fine match with Bronze Age ancient grains from the sites of Shotughai in Afghanistan (Willcox 1991) and Peñalosa in Spain (Contreras et al 1991). At present (1995) the Bearsden sample B is the first evidence for *durum* wheat in the British Isles.

The antiquity and origin of durum wheat

As a free-threshing wheat the presence of *durum* in an archaeobotanical sample is extremely difficult to establish. Zohary and Hopf (1993) applied genetic and environmental evidence to argue that *durum* wheat was the first established free-threshing wheat because all the necessary elements to create this domesticated cereal could be found in the fertile crescent. In contrast to spelt, *durum* wheat is generally regarded as a typical Mediterranean-type wheat since many *durum* types tend not grow well in cool oceanic climates particularly because they can be intolerant of frost (Percival 1974). Greig (1991) when reviewing the agriculture of mediaeval Britain came to the conclusion that mediaeval *durum* wheats were imports. Although, there is the slim chance that the occupants of Bearsden introduced a hardy variety of Mediterranean-type durum into the Britain Isles, this option is unlikely given the environment of the site and the relatively short period of occupation.

14.4 HOW CAN WE INTERPRET THE BEARSDEN WHEATS?

It is tempting to suggest that the presence of the durum wheat indicates that these Roman wheats were imported from Spain. The spelt/emmer crop needs more analytical study before anything can be implied about this match. At present IR has produced no evidence that any similar wheat mixtures were grown in Prehistoric or Roman Britain. The wheats from the Neolithic site of Balbridie are probably the best comparative example of what wheat types could be expected to form a typical British prehistoric wheat crop mixture (Fairweather & Ralston 1993; McLaren, unpublished data).

Unfortunately Classical authors do not provide any helpful clues about the growth of different wheats. The Romans simply divided wheats into two groups; the glume wheats and the naked free-threshing wheats (Percival 1974). Although they recognised and discussed a variety of wheat crops, including three specific references to spelt (Jasny 1944), their use of only colloquial names and habit of describing different crops by the name of a nearby town, such as Pliny's assertion that the best bread was made from a mixture of white Pisan and red Campanian wheat limits the usefulness of their information (Jasny 1944). Why would the Roman occupants of Bearsden import wheat? There may have a shortage of wheat in northern England. We have no good evidence for spelt wheat grown in Scotland at this time and emmer wheat was probably only produced on a small scale at favourable coastal localities. Roman millers had one consuming ambition – to produce fine white flour (eg the adverse comments of Galen outlined in Hillman 1985). This obsession resulted in many detailed commentaries on the technology of crushing, grinding and processing cereals for flour (Moritz 1958). Spelt wheat produces a light coloured flour in contrast to the dark flours of durum, emmer and einkorn (Jasny 1944; D'egido et al 1993; Boyacioglu & D'Appolonia 1994). In view of the current use of the spelt/emmer crop in Spain, together with C Dickson's (1990) morphological evidence which suggested that the waterlogged bran in the sewage could be partly from bran made from two or more wheat types, it is likely that brown loaves were being produced at Bearsden. The flour could not have been white because it was rich in bran; brown cork deposits in the bran show it to have been brown bread.

The popular name for durum wheat is macaroni wheat and as this name implies it is a very good wheat for making pasta. Durum is a hard wheat and when the flinty kernels are crushed they do not reduce to the very fine particle size of the soft bread wheats but form middlings or semolina, which are more suitable for porridge or pasta (Moritz 1958). Durum can be turned into good breads especially when mixed with other wheats (Percival 1974; Boyacioglu & D'Appolonia 1994) but the Bearsden durum wheat does not appear to be part of a cereal mixture. Both the Italians and the Chinese lay claim to the invention of pasta or noodles. However, the origins of pasta making are probably lost in the mists of time because every cooking tradition (including Near Eastern) has an element of boiled dough cookery (Tannahill 1988). It is therefore possible that some of the Bearsden cereals were used not only for bread but also for a pasta or even a porridge. IR analysis is non-destructive and therefore these extracts are available for further analysis. Analysis of the Bearsden char has shown that IR signature of food chars are not significantly different from the IR signature of the raw grains. Therefore, it will be possible to trace chemically the technology of food preparation from harvested seed to the final product. It is anticipated that further chemical investigations, particularly into the protein content of the Bearsden chars may throw light on the Roman army's use of cereals at Bearsden. Greig (1991) wondered why the Romans in Britain appeared to be so reliant on the standard British prehistoric crops of emmer and spelt when they obviously imported olive oil and the exotic fruits found in Roman London (Willcox 1977) to maintain their Mediterranean life style. The charred material indicates that at least some Mediterranean wheats found their way to Bearsden.

Chapter 15

DENDROCHRONOLOGY

MIKE BAILLIE AND ANNE CRONE

Four timbers were submitted in 1988: QUB Palaeoecology Centre numbers Q7549, Q7550, Q7551 and Q7552. When measured the samples produced 115, 80, 92 and 72 annual growth rings. Sample Q7549 had 24 sapwood rings (possibly complete). The other three samples were roundwood and had in all cases their heartwood/sapwood boundary present. One of the samples, Q7552, had sapwood present but this proved to be unmeasurable.

The three roundwood samples, Q7550, Q7551 and Q7552, matched each other forming a Bearsden mean master of 94 rings. Sample Q7549 did not match this short master or any of the individual samples. Exhaustive attempts were made to date the Bearsden mean master and the single sample Q7549 against the existing standard British and Irish chronologies. As the Scottish chronology goes back only to AD 946 and the samples are considered to be Roman in date, there was effectively no local chronology against which to compare this material. As a result, attempts were made to date the samples against the Roman material from Carlisle. Again this was unsuccessful. The short 94-ring pattern of the Bearsden master and the unavailability of local chronologies are probably the main limiting factors.

POSTSCRIPT

ANNE CRONE

Despite over two decades of dendrochronological work in Scotland since this report was written the situation as regards Roman dendrochronology has not changed at all. Some medieval chronologies now extend back into the late ninth century AD (Crone forthcoming) and there are Early Historic chronologies from south-west Scotland which cover the period 250 to 752 (Crone 1998). In pre-Roman Scotland chronologies covering the latter half of the first millennium BC have been developed, again only in south-west Scotland (Crone 2012), but few Roman sites have produced timbers suitable for dendrochronology. A single oak timber was recovered from Elginhaugh but could not be dated (Crone 2007). There are now more chronologies from Roman sites in northern England, ie Carlisle, Vindolanda and Papcastle (ibid for summary) and the Bearsden chronology was compared against these new datasets as well as against new Iron Age chronologies from Ireland (David Brown, pers comm) but this has not yielded any results.

Chapter 16

BONES

JACKALINE ROBERTSON

Factual data

A small assemblage of bone was recovered, comprising 119 small fragments that were recovered from a series of gulleys, ditches and hearths which also contained domestic debris such as wattle and daub. All but a single pig molar had been burnt and preservation of the remaining fragments was poor due to a combination of heat exposure and soil conditions. There was no evidence of any human remains within this assemblage. Instead these remains probably represent domestic cooking waste.

Methodology

The assemblage was identified to element and species with the aid of skeletal atlases (Hillson 1986; Schmid 1972) and the reference collection stored at AOC Archaeology Group (Edinburgh). Where an element could not be identified to species, it was instead described as large mammal (horse/cattle/deer/sheep/goat/pig), or indeterminate mammal (dog/cat). The results are presented in Table 1 and the following criteria were recorded: context, feature, element, species, side, fragmentation, size and any evidence of staining on the bone surface. Assessing the level of staining used the following method: no staining was rated '0'; some staining affecting less than 25% of the bone surface was designated as '1'; less than 50% surface staining was '2'; while 50–75% was described as '3' and greater than 75% was rated as '4'. A four point system was used to analysis preservation with excellent, good, adequate and poor. The assemblage was also examined for butchery marks, pathologies, bone working, burning and carnivore gnawing.

Results

The preservation of this bone assemblage was poor and only a single unburnt pig molar could be identified to both species and element. Other fragments identified were a vertebra, three vertebrae spines, a metapodial shaft and a long bone shaft. These fragments were clearly animal in origin and were possibly sheep/goat, although this could not be confirmed. The remainder of the assemblage was recorded as either large or indeterminate mammal where appropriate. None of these fragments exceeded 100mm in size and most were smaller than 50mm.

Only 18 fragments were completely calcified and this indicates that these were fully oxidised at temperatures of over 600°. The remaining 100 fragments were a mix of black, grey and blue indicating that these had been exposed to a lower temperature and probably for shorter periods of time. Butchery marks were observed on two small fragments. The first fragment had two small parallel cut marks that may be indicative of skinning; the second fragment was also found to have a shallow cut mark.

Conclusion

There is no evidence to suggest that the any of these burnt remains derived from human cremations. The cremation weight of an average human adult is generally estimated at around 800g (Rachel Ives, pers comm); as the largest concentration of bone from Bearsden was 38.7g it is highly unlikely any of these remains represent either an intact or even a disturbed cremation. The evidence of butchery and the identification of pig and probably sheep/goat bone all indicate that this assemblage probably represents domestic food waste which was disposed of within gulleys and ditches or simply not removed from the hearth feature during cleaning.

Table 16.1
The animal bone

Context	*Feature*	*Element*	*Species*	*Side*	*Number*	*Zone*	*Preservation*	*Size*	*Stain*	*Burnt*	*Butchery*	*Weight (g)*
NK74CM	(B1, N gully)	Molar	Pig	Indet	1	N/A	Poor	B	3	No	No	0.9
NK74CM	(burnt)	Frag	L/M	Indet	55	Indet	Poor	B	4	Mixed	No	
NK74CM	(wattle and daub)	Frag	I/M	Indet	11	Indet	Poor	A	4	Mixed	No	38.7
NK74DJ	(N granary)	Frag	I/M	Indet	6	Indet	Poor	A	4	White	No	
NK74DJ	(burnt)	Frag	L/M	Indet	1	Indet	Poor	B	4	White	No	
NK74DJ	(wattle and daub)	Tibia	L/M	Left	1	7	Adeq	B	4	White	No	6.1
NK77EG	(B7, S gully)	Vertebrae	L/	N/A	1	1, 2	Adeq	B	3	Mixed	No	
NK77EG	(burnt)	Vertebrae	L/M	N/A	3	4	Adeq	B	3	Mixed	No	
NK77EG	(wattle and daub)	Rib	L/M	Indet	1	2	Adeq	C	4	White	No	
NK77EG	(„)	Frag	L/M	Indet	1	Indet	Poor	B	3	Mixed	Yes	
NK77EG	(„)	Frag	L/M	Indet	8	Indet	Poor	B	3	Mixed	No	12.6
NK77FA	(„)	Frag	L/M	Indet	1	Indet	Poor	B	3	Mixed	Yes	
NK77FA	(„)	Frag	L/M	Indet	7	Indet	Poor	B	3	Mixed	No	
NK77FA	(„)	Frag	I/M	Indet	6	Indet	Poor	A	3	Mixed	No	9.2
NK78BP	gully between B1 and 2	Frag	L/M	Indet	1	Indet	Poor	B	4	White	No	0.8
NK79AV	B10, burning	Frag	L/M	Indet	1	Indet	Poor	B	4	Mixed	No	1.9
NK80DG	burning S of BH	Frag	L/M	Indet	6	Indet	Poor	B	4	White	No	6.4
NK80EH	(under)	Frag	L/M	Indet	2	Indet	Poor	B	4	Mixed	No	1.8
NK80EH	(cobbles)	Frag	L/M	Indet	3	Indet	Poor	B	3	Mixed	No	
NK80EH	(S of)	Frag	I/M	Indet	1	Indet	Poor	A	3	Mixed	No	
NK80EH	(bath-house)	Metapodial	L/M	Indet	1	Shaft	Adeq	B	4	White	No	7.0
NK80EI	(gully S of latrine)	L/B	L/M	Indet	1	Shaft	Poor	B	4	White	No	2.5

Key: 0 = no staining; 1 = <25 and staining 2 = <50%; 3 = 50–75%; 4 = 75–100% . Size given in millimetres: A <10; B = 10–50; C = 50–100; D = 100–50; E = 150–200; F = >200

Chapter 17

INSECT REMAINS

JOHN LOCKE

17.1 INTRODUCTION

Insect remains from various parts of the Antonine fort have been examined, with particular reference to the beetles. Insects were examined from the following features:

1. East annexe ditch
2. Inner west ditch
3. Middle west ditch
4. Outer west ditch
5. South ditch
6. Depression south of building 7
7. Building 7

They were identified using the insect collections at the Royal Scottish Museum and Doncaster Museum and Art Gallery. The species-lists are represented in tables 17.1–17.7, with the nomenclature following that of Kloet and Hincks (1977). The lists are not strictly comparable with one another because of the different methods by which the insects were extracted. Most of the assemblages were obtained during the course of sorting samples for botanical macrofossils. Generally one requires larger samples to obtain sufficient insects. In addition, many of the insects are an order of magnitude smaller than the plant remains and thus less easy to recognise.

This was made apparent when two small samples from the east annexe ditch which had already been sorted for plant and insect remains were subjected to paraffin flotation. The number of beetles obtained by the latter method was several times that obtained from sorting the whole residue. In addition the insect assemblages obtained from the botanical samples showed a bias towards larger, more easily recognised fragments, particularly larval cases of Caddis-flies.

17.2 ANALYSIS

17.2.1 East annexe ditch

Seven small sub-samples were taken from the main column, at depths of 300mm–400mm, 400–500mm, 500–600mm, 700mm–800mm, 800–900mm, 1.4m–1.5m and 1.5m–1.6m. Each measured 500mm × 100mm deep and weighed 0.5kg.

These samples were subsequently processed at the Environmental Archaeology Unit, York University. The samples were carefully disaggregated in water and then the insect remains were extracted using the paraffin flotation methods described by Coope and Osborne (1967). Some impression of the relative efficiency of this method may be gained by comparing the species-list from this feature (table 17.1) with those from other features at the site (tables 17.2–17.7).

Over 130 taxa of Coleoptera were identified, numbering just under 1,000 beetles. Although the remains of other insects were found eg Trichoptera (Caddis-flies), Diptera (true flies) and Hymenoptera (bees, ants, etc), these were insignificant in comparison with the number and diversity of the beetle remains and yield relatively little information about the depositional processes taking place within the ditch.

The sub-samples represent two very distinct faunas, with the sample from 500mm–600mm appearing to be intermediate. One faunal group corresponds to layer A and the other to layers B and C combined. The 500mm–600mm sub-sample appears intermediate between the two simply because it comprises the bottom of layer B and the top of layer A, the break apparently occurring at about 520mm and represents the abandonment of the fort. Thus this fraction contains two distinct faunal groups. The two faunal groups are discussed below.

Layer A, 520mm–1.8m

This layer represents the occupation of the site as evidenced by the presence of large numbers of beetles with strong synanthropic associations. The synanthropic beetles fall into two clear groups; obligate synanthropes (species which can only survive in this country in association with man), and opportunist synanthropes (species occurring in the wild in this country but able to take advantage of habitats created by man).

The four species of grain beetle present, *Cryptolestes* (= *Laemophloeus ferrugineus*, the Saw-Toothed Grain Beetle *Oryzaephilus surinamensis*, *Palorus ratzeburgi* and the Grain Weevil, *Sitophilus granarius* make up the first group, with a single specimen of the Human Flea *Pulex irritans*. The second, more diffuse, group is made up of species associated with the waste products of human occupation, namely the dung of domestic animals, rotting vegetation ('compost'), and mouldering vegetation such as is found in hay and straw-stacks.

Table 17.1
East Annexe Ditch: Coleoptera

Taxon	*Sample-Depth (cm)*							
	30–40	*40–50*	*50–60*	*70–80*	*80–90*	*140–50*	*150–60*	*Rampart*
Notiophilus biguttatus (F.)	*	*		*	*	1	*	*
Pterostichus cupreus (L.)	*	*	*	1	*	*	*	*
Pterostichus minor (Gyll.)	*	*	*	*	*	*	1	*
Haliplus sp	1	*	*	*	*	*	*	*
Coelambus sp	*	*	*	*	1	*	*	*
Hydroporus memnonius Nicolai	1	*	*	*	*	*	*	*
Hydroporus pubescens (Gyll.)	1	*	*	*	*	*	*	*
Hydroporus spp	4	2	4	1	*	*	2	*
Agabus sturmi (Gyll.)	1	*	*	1	*	*	*	*
Helophorus brevipalpis (Bed.)	*	1	4	*	*	*	*	*
Helophorus grandis (Ill.)	*	*	1	1	*	*	*	*
Helophorus granularis (L.)	*	*	1	*	*	*	*	*
Helophorus spp	1	1	2	3	*	2	2	1
Cercyon analis (Payk.)	*	1	3	4	1	1	1	*
Cercyon atricapillus (Marsh.)	*	*	1	*	*	1	*	*
Cercyon haemorrhoidalis (F.)	*	*	*	1	*	*	1	*
Cercyon melanocephalus (L.)	*	*	*	*	1	*	*	*
Megasternum obscurum (Marsh.)	*	2	1	*	*	*	*	*
Cercyon sp	*	*	*	*	1	1	*	*
Hydrobius fuscipes (L.)	*	*	2	*	*	*	*	*
Anacaena globulus (Payk.)	3	1	*	*	*	*	*	*
Laccobius sp	*	*	2	*	*	*	*	*
Octhebius minimus (F.)	*	3	*	*	*	*	*	*
Octhebius pusillus Steph.	*	1	*	*	*	*	*	*
Hydraena britteni Joy	32	3	3	*	*	*	*	*
Hydraena spp	*	3	4	*	*	*	*	*
Ptiliidae spp	4	2	3	*	2	4	1	*
Acrotrichis sp	*	*	1	*	*	*	*	*
Nargus velox (Spence)	2	*	*	*	*	*	*	*
Nargus sp	2	*	*	*	*	*	*	*
Catops sp	*	*	*	1	1	*	*	*
Nicrophorus investigator Zetterstedt	*	*	1	*	*	*	*	*
Neuraphes sp	1	*	*	*	*	*	*	*

Table 17.1 (continued)

Taxon	Sample-Depth (cm)							
	30–40	40–50	50–60	70–80	80–90	140–50	150–60	Rampart
Euconnus sp	*	*	*	*	*	1	*	*
Micropeplus fulvus (Gr.)	*	*	*	*	1	*	*	*
Micropeplus staphylinoides (Marsh.)	1	1	*	*	*	1	*	*
Micropeplus sp	*	*	1	*	*	*	*	*
Anthobium atrocephalum (Gyll.)	*	*	*	*	*	1	*	*
Olophrum fuscum (Gr.)	*	1	3	*	*	*	*	*
Olophrum piceum (Gyll.)	1	*	*	*	*	*	*	*
Acidota cruentata Man.	*	1	1	*	*	*	*	*
Lesteva heeri Fauvel	5	2	1	*	1	*	*	*
Lesteva longoelytrata (Goeze)	1	*	*	*	*	*	*	*
Lesteva punctata (Gr.)	1	2	*	*	*	*	*	*
Lesteva sp	1	*	*	*	*	*	*	*
Anthophagus alpinus (Payk.)	*	1	*	*	*	*	*	*
Eusphalerum sorbi (Gyll.)	6	*	*	*	*	*	*	*
Eusphalerum torquatum (Marsh.)	3	1	*	*	*	*	*	*
Omalium caesum (Gr.)	*	*	1	1	*	*	1	*
Omalium italicum Bernhauer	*	*	*	*	1	*	*	*
Xylodromus concinnus (Marsh.)	*	*	*	2	1	*	*	*
Philorinum sordidum (Steph.)	1	*	*	*	*	*	*	*
Carpelimus spp	*	*	*	*	1	*	*	*
Platystethus arenarius (Fourc.)	*	*	1	1	1	*	1	*
Anotylus nitidulus (Gr.)	*	*	*	*	2	*	*	*
Anotylus rugosus (F.)	1	*	*	1	*	1	*	*
Anotylus sculpturatus (Gr.)	*	1	1	*	1	*	*	*
Anotylus sp	1	*	*	*	*	*	*	*
Oxytelus fulvipes (Gr.)	1	*	*	*	*	*	*	*
Oxytelus laqueatus (Marsh.)	*	1	*	*	*	*	*	*
Oxytelus sculptus (Gr.)	*	*	*	*	*	1	*	*
Oxytelus spp	*	*	*	*	*	1	*	*
Stenus bimaculatus (Gyll.)	1	*	*	*	*	*	*	*
Hemistenus nitidiusculus (Steph.)	*	1	*	*	*	*	*	*
Stenus spp	5	5	6	*	2	*	*	*
Euaesthetus ruficapillus Boisduval and Lacordair	*	*	*	2	*	*	*	*

Table 17.1 (continued)

Taxon	*Sample-Depth (cm)*							
	30–40	*40–50*	*50–60*	*70–80*	*80–90*	*140–50*	*150–60*	*Rampart*
Lathrobium elongatum (L.)	1	2	*	*	*	*	1	*
Lathrobium irnpressura Heer	*	*	*	*	1	*	*	*
Lathrobium longulum (Gr.)	*	*	*	1	1	*	*	*
Lithocharis sp	*	*	*	1	*	*	*	*
Othius angustus (Steph.)	1	*	*	*	*	*	*	*
Othius sp	1	*	*	*	*	*	*	*
Leptacinus pusillus (Steph.)	*	*	*	*	*	1	*	*
Gyrohypnus fracticornis (Muller, O.F.)	*	*	1	1	1	*	*	*
Gyrohypnus punctulatus (Payk.)	*	*	*	*	*	1	*	*
Xantholinus longiventris Heer	*	3	*	*	*	1	*	*
Philonthus spp	*	*	*	*	*	1	*	*
Tachyporus hypnorum (F.)	*	*	1	*	*	*	*	*
Tachyporus transversalis (Gr.)	*	*	1	*	*	*	*	*
Tachinus subterraneus (L.)	*	*	*	*	1	*	*	*
Aleocharinae spp	14	7	16	7	10	2	3	*
Bythinus macropalpus Aube	2	1	*	*	*	*	*	*
Brachygluta fossulata (Reichenbach)	1	*	2	*	*	*	*	*
Geotrupes stercorosus (L.)	1	*	*	*	*	*	*	*
Colobopterus haemorrhoidalis (L.)	*	*	1	*	*	*	*	*
Aphodius ater (Deg.)	1	*	*	*	*	*	*	*
Aphodius contaminatus (Hbst.)	*	*	4	1	1	*	*	*
Aphodius spp	*	*	*	*	*	1	1	*
Calyptomerus dubius (Marsh.)	*	*	2	*	*	*	*	*
Clambus sp	*	*	2	*	*	1	*	*
Cyphon spp	32	15	2	1	*	1	*	*
Athous vittatus (F.)	*	1	*	*	*	*	*	*
Agriotes obscurus (L.)	*	*	2	*	*	*	*	*
Dalopius marginatus (L.)	1	1	*	*	*	*	*	*
Cantharis livida (L.)	*	*	4	*	*	*	*	*
Kateretes pedicularius (L.)	*	2	*	*	*	*	*	*
Kateretes sp	1	*	1	*	*	*	*	*
Meligethes spp	7	*	*	*	1	*	*	*
Aspidiphorus orbiculatus (Gyll.)	*	*	*	*	*	1	*	*

Table 17.1 (continued)

Taxon	Sample-Depth (cm)							
	30–40	40–50	50–60	70–80	80–90	140–50	150–60	Rampart
Cryptolestes ferrugineus (Steph.)	*	1	38	57	65	34	28	*
Oryzaephilus surinamensis (L.)	*	*	15	36	39	16	22	*
Henoticus serratus (Gyll.)	*	*	1	*	*	*	*	*
Cryptophagus spp	*	1	1	5	3	*	2	*
Atomaria spp	*	*	2	*	*	2	1	*
Ephistemus globulus (Payk.)	*	*	1	*	3	*	*	*
Aridius bifasciatus (Reitt.)	*	*	*	*	2	*	*	*
Lathridius consimilis (Man.)	*	*	*	1	*	*	*	*
Lathridius pseudominutus (Strand)	*	*	3	2	1	2	*	*
Eniecmus spp	*	*	*	1	2	*	*	*
Corticaria sp	*	*	2	*	1	1	2	*
Phylan gibbus (F.)	*	*	*	*	1	*	*	*
Palorus ratzeburgi (Wiss.)	*	*	8	6	5	3	1	*
Anthicus floralis (L.)	*	*	1	1	*	*	1	*
Plateumaris discolor (Kunze)	*	*	*	*	*	*	*	1
Chrysolina varians (Schaller)	*	*	2	*	*	*	*	*
Hydrothassa marginella (L.)	*	*	1	*	*	*	*	*
Prasocuris junci (Brahm)	*	*	1	*	*	*	*	*
Phyllotreta nemorum (L.)	*	*	*	1	*	*	*	*
Apion spp	3	*	*	*	*	*	*	*
Sitophilus granarius (L.)	*	*	15	23	20	11	18	*

GRAIN-BEETLES

The general archaeological significance of the grain-beetles is discussed in a later section. This section is addressed to the problem of how large numbers of grain-beetles came to be in the fill of the east annexe ditch.

The graph of 'percentage composition' plotted against 'sample-depth' (table 17.2 shows a remarkable consistency in the relative proportions of the four species to one another in a layer of over 1m deep).

The implication of this is that the grain-beetles in this layer represent a single infestation, particularly interesting in that the most abundant is *Cryptolestes ferrugineus*. At all other archaeological sites from which similar infestations have been recorded *Oryzaephilus* predominates (Kenward & Williams 1979; Hall et al 1980). At these sites steps had clearly been taken either to prevent further infestation, as at the Coney Street site in york, where a layer of clay seal was laid down over the remains of a major infestation, and at Skeldergate, York, where damaged grain was dumped in the shaft of a disused well (Hall et al 1980). A layer of carbonised infested grain at Droitwich (Osborne 1977) may represent deliberate burning of damaged grain to prevent subsequent infestation of unaffected stocks.

Thus it is possible that the presence of the grain-beetles is a consequence of the dumping of damaged grain well away from the main granaries in the fort. This is the 'active dumping' hypothesis'.

STACK-DWELLING INSECTS

Further evidence for the 'active dumping' hypothesis comes from the presence in this layer of a number of species commonly associated with mouldering hay and straw which disappear at the end of the period of occupation. These are *Xylodromus* *concinnus*, and species of the genera *Cryptophagus*, *Corticaria*, *Lathridius* and *Atomaria*. These fall into the group of opportunist synanthropic species. These are more likely to have been feeding on animal bedding than on grain.

ROTTING VEGETATION AND DUNG

Rotting vegetation and dung are not dissimilar in composition and many of the species recovered from this layer are found in either. These include all the species of *Cercyon* listed in table 17.1 and many of the Oxyteline genera *Anotylus* and *Oxytelus*. Some species show more marked preferences; *Megasternum obscurum*, the two species of *Micropeplus* and *Euaesthetus ruficapillus* prefer rotting vegetation while *Platystethus arenarius* is usually found on dung.

There are specialist dung-beetles present (*Aphodius* spp). These are not usually associated with human excrement but with the dung of large herbivores. *Aphodius contaminatus* is associated with horses, though it may also be found on cow dung (Landin 1961).

The above groups of insects provide information as to the nature of the deposit and its origins. They strongly suggest that the ditch fill comprises refuse from within the fort, the refuse being for the most part damaged grain, but also some straw refuse and rotting vegetation. The small numbers of dung-beetles preclude definitive statements as to the large herbivores in the vicinity of the site. Nor can one say whether the animals were within the site or outside the ditches as dung-beetles are remarkable adventitious species.

Other insects give clues to the environment of the ditch itself. These are the hygrophilous carabid beetles *Pterostichus cupreus* and *P. minor* which indicate sparse vegetation in the vicinity of water.

This sparse vegetation changes dramatically in layers B and C.

Layers B and C

These represent the slow infilling of the ditch after the fort had been abandoned. By this time the ditch had filled with water as evidenced by the different water-beetles present. The several species of *Hydroporus* indicate the presence of relatively clean acid water, as does *Agabus sturmi*. Members of the genus *Laccobius* prefer still water with a coating of algae on the bottom, as do *Hydrobius fuscipes* and *Anacaena globosus*. The presence of larvae of *Eristalis* (drone-fly) and of Trichoptera (caddis-flies) confirm this picture. However, the insect fauna is dominated by species feeding on waterside vegetation. *Octhebius*

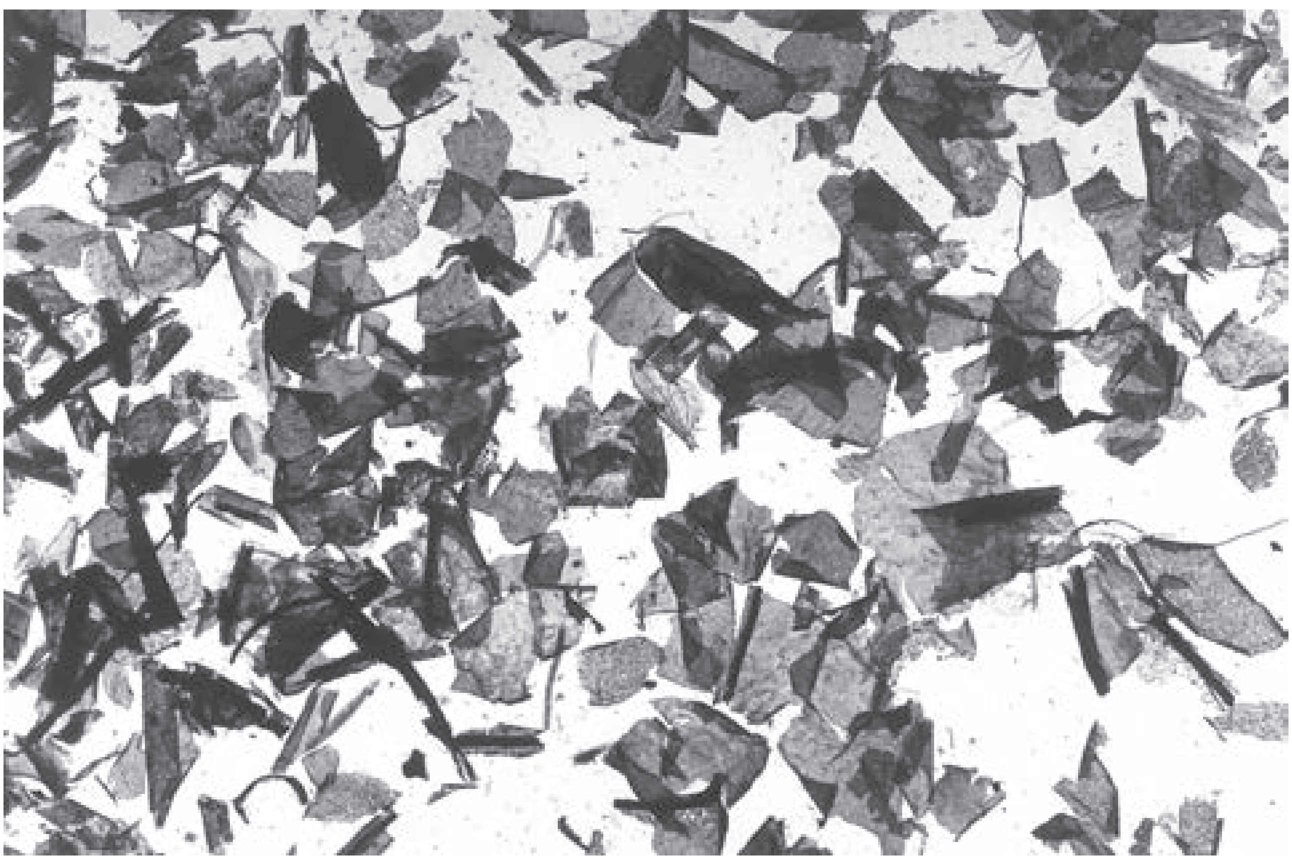


Illustration 17.1
Fragments of grain skins from the sewage in the east annexe ditch. In the centre is the wing of a psychodid fly, an insect associated with sewage.

Table 17.2
Inner West Ditch: Coleoptera (Combined data from column samples AA and AAB)

Taxon	*Sample-Depth (cm)*							
	14–17	*20–3*	*24–6*	*26–9*	*30–4*	*34–7*	*38–40*	*48–50*
Nebria salina Fairmaire and Laboulbene	*	*	*	*	*	1	*	*
Notiophilus biguttatus (F.)	*	*	*	*	1	*	*	*
Trechus quadristriatus (Schrank)	*	*	*	*	*	*	*	1
Pterostichus strenuus (Panzer)	*	*	*	*	*	*	*	1
Hydroporus spp	*	*	*	*	*	*	*	3
Ilybius aenescens Thomson, C.G.	*	*	*	*	1	*	*	*
Helophorus spp	*	*	*	*	*	1	1	*
Coleostoma orbiculare (F.)	*	*	*	*	*	*	*	1
Cercyon haemorrhoidalis (F.)	*	*	*	*	1	*	1	*
Megasternum obscurum (Marsh.)	*	*	*	*	2	1	*	*
Hydrobius fuscipes (L.)	*	*	*	*	1	*	*	1
Anacaena globulus (Payk.)	*	*	*	*	*	*	*	3
Laccobius sp	*	*	*	*	*	*	1	1
Hydraena spp	*	*	*	*	*	*	*	6
Ptiliidae spp	*	*	*	*	*	*	1	*
Olophrum piceum (Gyll.)	*	*	*	*	1	1	*	*
Lesteva heeri Fauvel	*	*	*	*	1	*	*	1
Carpelimus spp	*	*	1	*	*	*	*	*
Anotylus rugosus (F.)	*	*	*	*	*	*	*	1
Stenus spp	*	*	*	*	*	*	1	1
Lathrobium elongaturo (L.)	*	*	*	*	*	*	*	1
*Stenus bimacuiatus (*Gyll.)	*	*	*	*	*	*	*	1
Lathrobium impressurn Heer	*	1	*	*	*	*	*	*
Gyrohypnus fracticornis (Muller, O.F.)	*	*	*	1	1	*	*	*
Philonthus sp	*	*	*	*	*	1	*	*
Platydracus pubescens (Deg.)	*	*	*	*	*	*	1	*
Tachinus laticollis (Gr.)	*	*	*	*	*	*	*	1
Tachinus signatus (Gr.)	*	*	*	*	1	*	*	*
Aleocharinae spp	*	1	*	1	*	*	*	*
Aphodius contaminatus (Hbst.)	*	*	*	1	*	*	*	*
Aphodius lapponum (Gyll.)	*	*	*	*	*	*	1	*
Aphodius prodomus (Brahm)	*	*	*	1	*	*	*	*
Aphodius spp	*	*	1	*	*	1	*	*

Table 17.2 (continued)

Taxon	*Sample-Depth (cm)*							
	14–17	*20–3*	*24–6*	*26–9*	*30–4*	*34–7*	*38–40*	*48–50*
Cyphon spp	*	*	*	*	*	1	*	1
Limnichus pygmaeus (Sturm)	*	*	*	*	*	*	*	2
Oulimnius tuberculatus (Muller, P.J.W.)	*	*	*	*	*	1	1	*
Rhugonycha fulva (Scop.)	*	*	*	*	*	*	*	1
Malthinus frontalis (Marsh.)	*	*	*	*	*	*	*	1
Meligethes spp	*	*	*	*	1	*	*	1
Cryptolestes ferrugineus (Steph.)	*	1	*	1	1	*	*	*
Telmatophilus caricis (Olivier)	*	*	*	*	1	*	*	*
Plateumaris sp	*	*	*	1	*	*	*	*
Apion sp	*	*	1	*	*	*	*	*
Strophoscmus capitatus (Deg.)	*	*	*	*	*	*	*	1
Sitona suturalis (Steph.)	*	1	*	*	*	*	*	*
Sitophilus granarius (L.)	*	*	*	*	*	4	*	*
Limnobaris t-album (L.)	1	*	*	*	*	*	*	*

Table 17.3
Middle West Ditch: Coleoptera

Taxon	*Sample*	
	Mid	*Top*
Anacaena globulus (Payk.)	1	1
Laccobius striatulus (F.)	1	*
Thanatophilus dispar (Hbst.)	1	*
Omalium rivulare (Payk.)	1	*
Carpelimus sp	1	*
Stenus sp	1	*
Lathrobium longulum (Gr.)	1	*
Aphodius sp	1	*
Aphodius constans Duftschmidt	*	1
Cyphon sp	1	*
Niptus hololeucus (Faldermann)	1	*
Cryptolestes ferrugineus (Steph.)	1	*
Oryzaephilus surinamensis (L.)	1	*
Cryptophagus sp	1	*
Sitophilus granarius (L.)	1	*

Table 17.4
Cuter West Ditch: Coleoptera

Taxon	Sample	
	0–3	*3–6*
Haliplus sp	1	*
Cryptopleururn minutum (F.)	*	1
Hemistenus nitidiusculus (Steph.)	*	1
Aleocharinae spp	1	1
Oryzaephilus surinamensis (L.)	*	1
Plateumaris sericea (L.)	1	*

spp and *Hydraena* spp are found in still water, clambering amongst vegetation or living in the mud at the edge, as do *Helophorus* spp and *Stenus* spp. The three species of *Cyphon* present feed on rushes in their larval stages. Other species associated with marsh plants are *Prasocuris junci* (*Veronica beccabungae*), *Hydrothassa marginata* (on Ranunculaceae) and *Kateretes pedicularius*.

The remaining species are for the most part characteristic of damp mossy places. The Omalines *Olophrum fuscum* and *O. piceum* are typical in this respect as are the species of *Lesteva*. The two species of *Olophrum* are frequently found in plant debris under Salix scrub and so may indicate the presence of willow.

Insects from more distant habitats are also present, albeit in small numbers. The 'dor' beetle, *Geotrupes stercorarius*, is found on pasture land in cow dung. Also from pasture land comes the 'click' beetles *Athous vittatus* and *Agriotes obscurus*, the larvae of which feed on the roots of grasses.

There are a number of species found on flowering plants. They include *Eusphalerum torquatum*, *E. sorbi*, *Meligethes* spp and *Philorinum sordidum* which is found on gorse. *Chrysolina varians* is found on *Hypericum*.

There are also species indicative of woodland. These are *Dalopius margiatuns*, another 'click' beetle; *Cantharis livida* and *Henoticus serratus* which is regarded as being a species diagnostic of old forests (Hammond 1979).

In many respects the insect assemblages from this layer are very similar to those recorded from Pleistocene sites. The grain-beetles found in layer A are absent, with the exception of a single specimen of Cryptolestes. This may owe its presence to the bioturbation of the interface between layers A and B by the insect larvae described above.

THE NATURE OF THE TRANSITION

At about 520mm the insect fauna changes dramatically. There is no blending of the fauna of layer A with that of layer B. Layer A was not water-covered during its deposition, which appears to have been quite rapid. Layer B represents a period when the ditch contained a permanent body of water. This suggests that layer A was deposited just before the fort was abandoned.

17.2.2 Inner west ditch

The species-list from this feature is given in table 17.2, combining the data for the column samples AA and AAB.

Occupation of the site, as evidenced by the presence of the obligate *synanthrope S. granarius*, appears to have ceased at some point in the 340–370mm fraction. Prior to this the fauna of the ditch is restricted, possibly because the ditch was kept clear. The only beetles present are incidental soil-dwelling Staphylinids such as *Lathrobium impressum* and *Gyrohypus fracticornis*, dung-beetles (*Aphodius* spp) and the grain beetle *C. ferrugineus*.

At 300mm–303mm the first evidence for flooding of the ditch is seen. Water-beetles such as *Ilybius aenescens* and *Hydrobius fuscipes* appear. Subsequently species associated with waterside vegetation appear (*Cyphon* spp, *Telmatophilus caricis*) as do species associated with leaf litter and moss (*Coelostoma orbiculare*, *Olophrum piceum*) and species found in rotting vegetation (*Megasternum obscurum* and *Anotylus rugosus*).

It is apparent even from the limited evidence available that the same process occurred here as took place in the east annexe ditch during the deposition of layers B and C.

Again, species of pasture (*Meligethes* spp, *Rhagonycha fulva*) are present, as are species associated with trees. *Malthinus frontalis* is found in woodland, while *Strophosomus capitatus* feeds on birch.

The Elmid beetle *Oulimnius tuberculatus* is interesting in that it is usually found on the stony beds of large rivers (Holland 1972). Its presence here is thus something of a anomaly. However, it has a widespread distribution in the Clyde Valley today (Holland 1972).

Table 17.5
South Ditch: Coleoptera

Taxon	Sample-Depth	
	101–5	*106–10*
Megasternum obscurum (Marsh.)	1	1
Anucaena globulus (Payk.)	*	1
Hydraena spp	1	2
Hydraena britteni Joy	*	1
Catops sp	*	2
Anthobium atrocephalum (Gyll.)	1	*
Cyphon spp	1	1
Agriotes sp	*	1
Ips typographus (L.)	*	1

Table 17.6
Depression W33: Coleoptera

Taxon	*Sample-depth (cm)*				
	13–16	*19–22*	*30–2*	*33–5*	*35–7*
Trechus obtusus (Gr.)	1	*	*	*	*
Pterostichus sp	1	*	*	*	*
Hydroporus sp	*	1	*	*	*
Helophorus sp	*	*	1	*	1
Megasternum obscuruin (Marsh.)	2	*	*	*	*
Stenus bimaculatus (Gyll.)	1	*	*	*	*
Xantholinus linearis (Olivier)	1	*	*	*	*
Aleocharinae sp	*	*	*	1	*
Aphodius sp	*	1	*	*	*
Cyphon sp	1	*	*	*	*
Cryptolestes ferrugineus (Steph.)	1	*	*	1	*
Oryzaephilus surinamensis (L.)	*	*	*	1	*
Barynotus squamosus Germar	*	*	1	*	*
Sitophilus granarius (L.)	*	*	*	1	*

17.2.3 Middle west ditch

Two samples were examined, the first a 2kg bulk sample which was washed down in the manner described for the east annexe ditch samples. This came from the middle of the silt fill and contained much evidence of occupational debris. The second assemblage, from the top silt, came from small botanical samples and thus has a much more restricted fauna.

The middle silt contained three of the four species of grain pest found in the east annexe ditch, but in much lower concentrations. The absence of *Palorus ratzeburgi* is not significant. As table 17.3 shows, these species occur together in fixed proportions. One would have to wash down about 10kg of this layer before one would expect to find a single individual of *Palorus*.

Much the most interesting specimen from this layer, and indeed from the site itself, is the single individual of *Niptus holoeucus*, the Golden Spider Beetle. Although it is a common domestic pest today, it has only been recorded from one other archaeological site in Britain, that of the Church Street Roman sewer in york (Buckland 1976a). This record strongly supports Buckland's interpretation that it is a species introduced by the Romans (Buckland 1976b).

Also noteworthy is *Thanatophilus dispar,* a Silphid beetle feeding on carrion. This has frequently been found in Interglacial deposits but is much rarer today.

17.2.4 Outer west ditch

Two samples available gave an extremely limited fauna on which it is impossible to place a firm interpretation other than to note the presence of *Oryzaephilus surinamensis* in the lower sample, indicating that this represents deposition during, or immediately after, the period of occupation.

17.2.5 South ditch

Again this yielded only a very restricted fauna, comprising species which would be perfectly at home in a ditch, with the exception of *Ips typhographus*, a bark beetle feeding on spruce, not native to Britain unless feeding also on pine.

17.2.6 Depression in fort

On the evidence of the insect assemblages, this was at least a damp marshy place during the occupation of the site. It may even have been water-filled. It is the only feature where aquatic and waterside species are found associated with grain beetles, the three common grain beetles being present.

17.2.7 Building 7

This sample yielded one specimen each of the more common grain-beetles, *C. ferrugineus* and *O. surinamensis*. Considering

Table 17.7
Building 7: Coleoptera

Taxon	
Cryptolestes ferrugineus (Steph.)	1
Oryzaephilus surinamensis (L.)	1

the widespread distribution of these species across the site, there is little significance in their presence there.

17.3 GENERAL IMPLICATIONS OF THE GRAIN-BEETLES

Buckland (1981) has suggested that *Crytolestes ferrugineus* may have been a British species before the Roman occupation as it is capable of surviving in the wild. However, it has not been recorded from a pre-Roman site and the evidence points to it having been imported in association with *Sitophilus granarius* and *Oryzaephilus surinamensis* and *Palorus ratzeburgi*. This supports Kenward's view that the Romans were importing considerable quantities of grain to the north of Britain (Kenward & Williams 1979). The most similar assemblages come from northern military establishments at York and Carlisle. Small numbers of grain-beetles have been found on Roman sites in the south of Britain, at Barnsley Park, Gloucestershire (Coope & Osborne 1967) and Fishbourne (Osborne 1971).

The assemblage from Bearden is outstanding in view of its geographical location at the north-western edge of the Roman empire and it says a great deal for the Roman transport system that within a century of occupying Britain they had introduced Near-Eastern beetles to southern Scotland.

17.4 CLIMATOLOGICAL IMPLICATIONS OF THE FAUNA

The fauna contains no exotic species indicative of a climate markedly harsher or milder than that prevailing in the area today. There are a number of species with definite northern affinities such as the Omalines *Olophrum fuscum*, *Anthophagus alpinus*, *Acidota cruentata* and the weevil *Barynotus squamosus*, but all of these have been recorded from Scotland in the past hundred years. Given the northerly latitude of the site little can be said, except that the climate experienced by the Romans during their occupancy of the fort was noticeably cooler than that of the English Midlands today.

The numerical dominance of *Cryptolestes ferrugineus* over *Oryzaephilus surinamensis* was mentioned earlier. This may reflect the temperature as *Cryptolestes* is less susceptible to low temperatures (Howe 1965). This would imply that conditions were considerably cooler than those prevailing in the north of England at this time.

Chapter 18

PARASITOLOGICAL INVESTIGATIONS OF THE EAST ANNEXE DITCH

ANDREW K G JONES AND JEF MAYTOM

18.1 INTRODUCTION

Several pollen samples taken from a central column of the outer east annexe ditch Bearsden contained ova which represented those of the intestinal parasite *Trichuris*, the whipworm. In order to determine the species of the eggs, a group of ten samples, also collected from the central column, was submitted to the Environmental Archaeology Unit, University of York, for a detailed parasitological examination.

Following a procedure outlined by the Ministry of Agriculture, Fisheries and Food (1977: 3) for examining modern faecal samples, a 3g sub-sample of each sample was placed in a 500ml conical flask with approximately 20 1–2mm diameter ballotini and 42ml water. The flasks were shaken for 2–4 days until the soil was thoroughly disaggregated. The resulting suspension was poured through a freshly flamed 250 micron sieve to remove coarse particles, and 0.15ml aliquots of the filtrate mounted in glycerine jelly using 22mm × 50mm coverslips. Slides were scanned at × 120 using a transmission microscope and all the ova counted. Two counts were made for each sample. Where possible ova were measured using a eyepiece graticule and stage micrometer. Recent experiments have shown that although parasite ova can withstand the vigours of pollen analysis, the size of the eggs can be modified by the process (Hall et al 1983). Accurate identification is therefore only possible if samples are carefully prepared using reagents which do not affect eggs size.

18.2 ANALYSIS

Throughout the deposits two kinds of ova were observed. One, a barrel-shaped structure sometimes possessing two polar plugs, was typical of the genus *Trichuris*. Whipworms are parasitic nematodes which infest the lower intestine and caecum of many mammals throughout the world. Eggs are produced in large numbers and shed into the gut lumen and passed with faeces. Light infestations usually cause little harm to the host, while heavy worm burden can cause prolapse of the rectum, diarrhoea and blood in the faeces.

The condition of the *Trichuris* ova was assessed by considering the numbers which fall into the following categories:

1. complete, ie possessing two polar plugs;
2. damaged, ie the shell is complete but the condition of either one or both plugs suggest that the ova are beginning to disintegrate;
3. shell complete lacking any trace of polar plug;
4. shell broken or crumpled.

The other kind of egg possessed a mamillated outer shell characteristic of the genus *Ascaris*, roundworm. This nematode can grow to 300mm and, like the whipworm, produces large numbers of eggs which are passed with faeces. The larvae, which hatch from ingested embryonated eggs, migrate through the host tissues and can cause considerable damage. Nevertheless, many people harbouring small numbers of worms do not suffer severe

Table 18.1
Dimensions of *Trichuris* ova from samples 116–18 and 174–76cm in the east annexe ditch

Sample 116–18	*Width*	*Total length*	*Length minus polar plugs*
Maximum	28.64	56.0	54.8
Minimum	24.9	–	47.3
Mean	27.0	–	51.5
SEM	0.5	–	1.0
N	6	1	6
Sample 174–6			
Maximum	29.9	61.0	56.0
Minimum	23.7	52.3	44.8
Mean	27.0	56.0	50.3
SEM	0.2	1.1	0.4
N	42	7	42

All measurements in microns. SEM = Standard error of the mean.
n = number of observations.

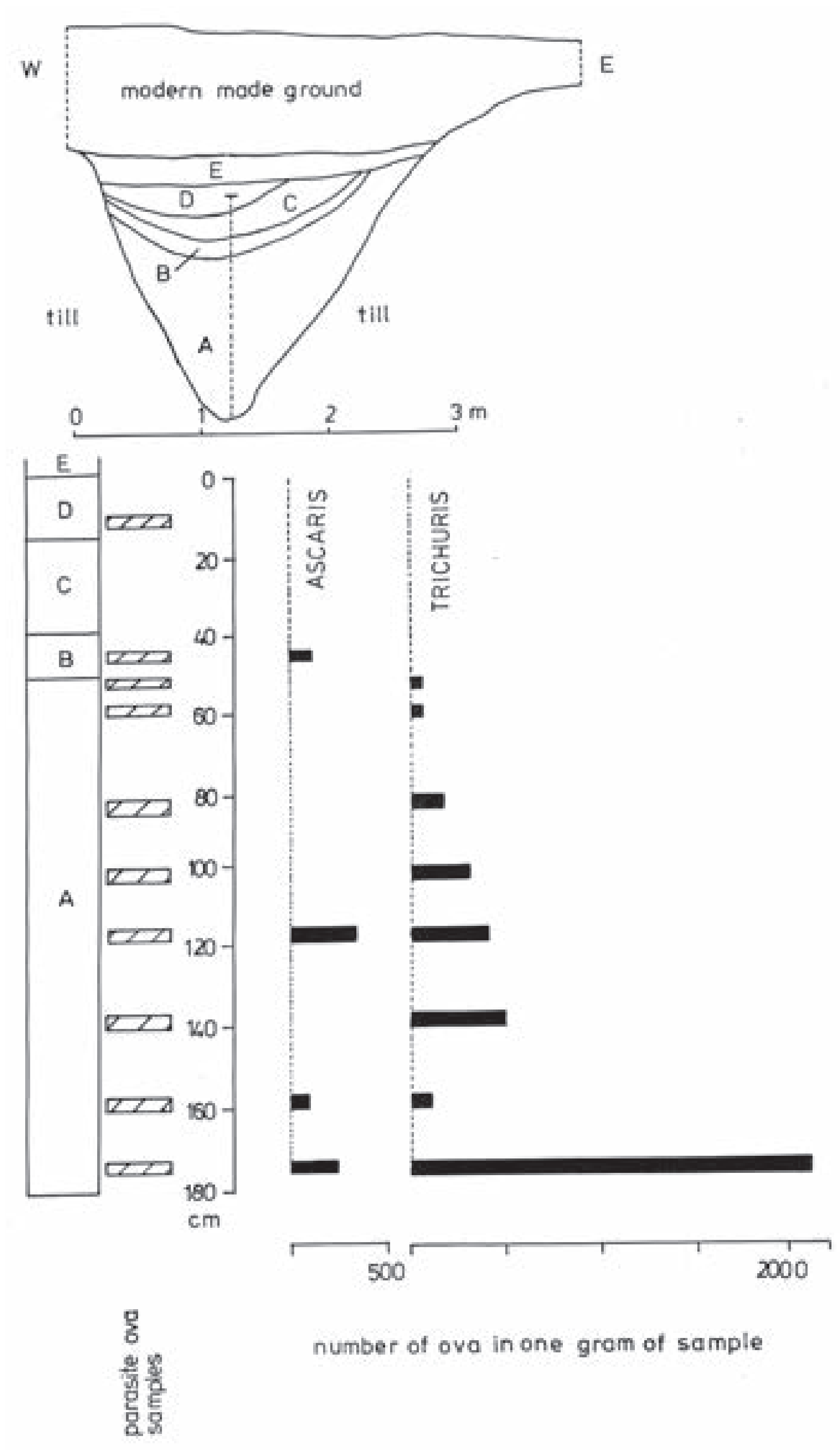


Illustration 18.1
The distribution of *ascaris* and *trichuris* in the east annexe ditch.

symptoms. *Ascaris* ova were classified as either complete or broken. No other parasitic ova were recognised.

Illus 18.1 shows that *Trichuris* ova were more abundant in the deposits than the *Ascaris* eggs. Furthermore, the eggs were not evenly distributed through the samples. The upper five samples contained less than 200 ova per gram of deposit, while the lower samples showed a gradual increase in egg concentration with depth to a maximum of 2,350 ova per gram. Sample 158–60, however, did not reflect this trend giving a modest egg count of 200 ova per gram.

Both *Ascaris* and *Trichuris* eggs have been widely reported from archaeological deposits in Britain and mainland Europe, including the Danish bog burials (Jones, A K G 1982). Most published records assume the ova to have been passed by man or argue that the *Trichuris* ova are from the human whipworm *Trichuris trichiura* either because the number of *Trichuris* ova exceeds those of *Ascaris* or because the dimensions of the eggs of the ancient material compare closely with modern specimens of the species. Unfortunately, the ova of *A. lumbricoides* and *A. suum*, the large roundworms of man and pigs respectively, produce ova of identical size. There are only two hosts indigenous to north-west Europe which can harbour *Trichuris* and *Ascaris*, man and pig.

Some of the lower samples gave sufficient numbers of eggs to allow identification of species. A total of 48 *Trichuris* ova were measured from the two samples (116–18 and 174–6). Only seven ova possessed both polar plugs and gave a mean total length of 56.0 microns, length minus polar plugs of 50.3 microns (n = 42) and mean width of 27.0 microns. A comparison of the ranges and mean dimensions of the Bearsden ova (table 18.1) with similar data for modern human and pig whipworms (Beer 1976) showed the archaeological material to be almost identical to *T. trichiura*, the human whipworm.

The upper five samples produced mainly broken and crumpled ova suggesting that either the soil conditions in the upper metre of the ditch fills were not conducive to the survival of the parasite ova, or that the ova were considerably abraded before they became incorporated into the ditch. By contrast, the eggs from all but one of the lower samples were moderately well preserved. Comparing the condition of the ova with other archaeological samples from York and Oslo (Jones, A K G 1984; Jones, A K G forthcoming) the material can be classified as moderately to well preserved.

18.3 DISCUSSION

There can be little doubt that the lower fills of the ditch contained faeces and that the kinds of egg indicate that they were passed by people rather than pigs. No evidence of domestic animal faeces was recovered.

The condition and numbers of ova in the samples from the upper fills of the ditch suggest that the layers between 440mm and 1.2m contained only a small faecal component. Evidence from the excavations at 16–22 Coppergate, York (Jones, A K G 1984) have shown that a large percentage of deposits dated to the late ninth century and tenth century contain small numbers 950–800 ova per gram. Deposits which are primarily faecal in origin contain 1,000–60,000 ova per gram. Thus it seems that a large number of ova were scattered upon land surfaces and gradually decayed as they became incorporated into archaeological deposits.

The presence of small numbers of parasitic ova, even if their size suggests they were passed by people, does not necessarily mean that the whole context was largely faecal. There is increasing evidence that whipworm and *Ascaris* infections were widespread in Britain during the Roman and medieval periods. It seems likely, therefore, that the parasite eggs may have been distributed around and within the Roman fort in a similar way to those at Coppergate. Thus the small numbers of parasite ova found in the upper ditch fills may not indicate the presence of large quantities of human faeces deliberately dumped in the feature, but simply the gradual accumulation of dirt and dust from the fort.

It would be tempting to suggest that the distribution of parasite ova in the column reflects changes in the worm burden of the human population during the period the ditch silted up. However, there are many factors which suggest that such a conclusion is almost certainly unjustified. Firstly, there is no evidence that the fills of the ditch were laid down at a constant rate. The lower fills are likely to have been laid down in a shorter period than the upper fills. The results from samples 158–60 may be interpreted to indicate that the lower fills did not all accumulate gradually, but sporadic dumping or slumpage occurred. Secondly, it is possible that changes in the numbers and condition of the ova are caused by differential preservation. Finally, there is little evidence to suggest that the ditch was receiving the same kind of refuse throughout its functional life. Whether the ova in the upper fills were eggs washed in with other soil particles, or if they were from deliberately deposited faeces will probably always remain in doubt.

Chapter 19

LEATHER

DENNIS B GALLAGHER

19.1 INTRODUCTION

Seventeen fragments of leather were recovered during the excavation. All the identifiable leather fragments of nailed footwear belong to a type of shoe known as a *calceus*. These were similar in form to the modern shoe, in which the upper is cut separate from the soles and attached to them by means of a lasting seam. This contrasts with the other form of military footwear, the *caliga*, where the sole and upper is constructed from one piece of leather (cf Groenmann-van Wateringe 1967: 129–46). The *calceus* normally was a light form of shoe, but the Bearsden examples strengthen the suggestion that during the Antonine period a heavily nailed version of this shoe type replaced the *caliga* as military footwear in northern Britain (Rhodes 1980: 114). Other nailed versions of *calceus* have been found in Antonine contexts at Bar Hill (Keppie 1975: 78), Rough Castle (MacIvor et al 1980: fig 16–17) and Hardnott (Charlesworth & Thornton 1973: 150).

The smaller sole fragment, although incomplete, illustrates aspects of the methods of manufacture. Two of the inner soles (19.2.3 and 6) have slots for thongs. These were intended to hold the several layers of sole together prior to nailing (Keppie 1975: 68; Rhodes 1980: 115). The placing of the slots indicates that the thongs were placed in a diamond pattern, similar to *calcei* from Hardnott (Charlesworth & Thornton 1973: 142–5).

The two more complete lower sole fragments are heavily nailed in six rows, with a break for the arch of the foot (a Type c nailed shoe according to the classification of Rhodes 1980: 107). There are similar nail patterns from Rough Castle (MacIvor et al 1980: fig 16–17), Bar Hill (Keppie 1975a: 78, no 57), Hardnott (Charlesworth & Thornton 1973, 142–3) and London (Rhodes 1980: 104, 591) The hobnail heads at Bearden were sub-circular, most being in the region of 8mm–10mm in diameter. The complete lower shoe (19.2.1) showed considerable wear on the outer left heel, a normal wear pattern. The dense grouping of nailheads on the heel indicates that the wear necessitated the insertion of new hobnails between the shanks of the worn originals.

Little survives of shoe uppers. There are two examples of heel stiffeners (19.2.1 and 4), which were used to strengthen the quarters. The thicker leather of the heel stiffener of 1 ensured

Illustration 19.1
A leather shoe.

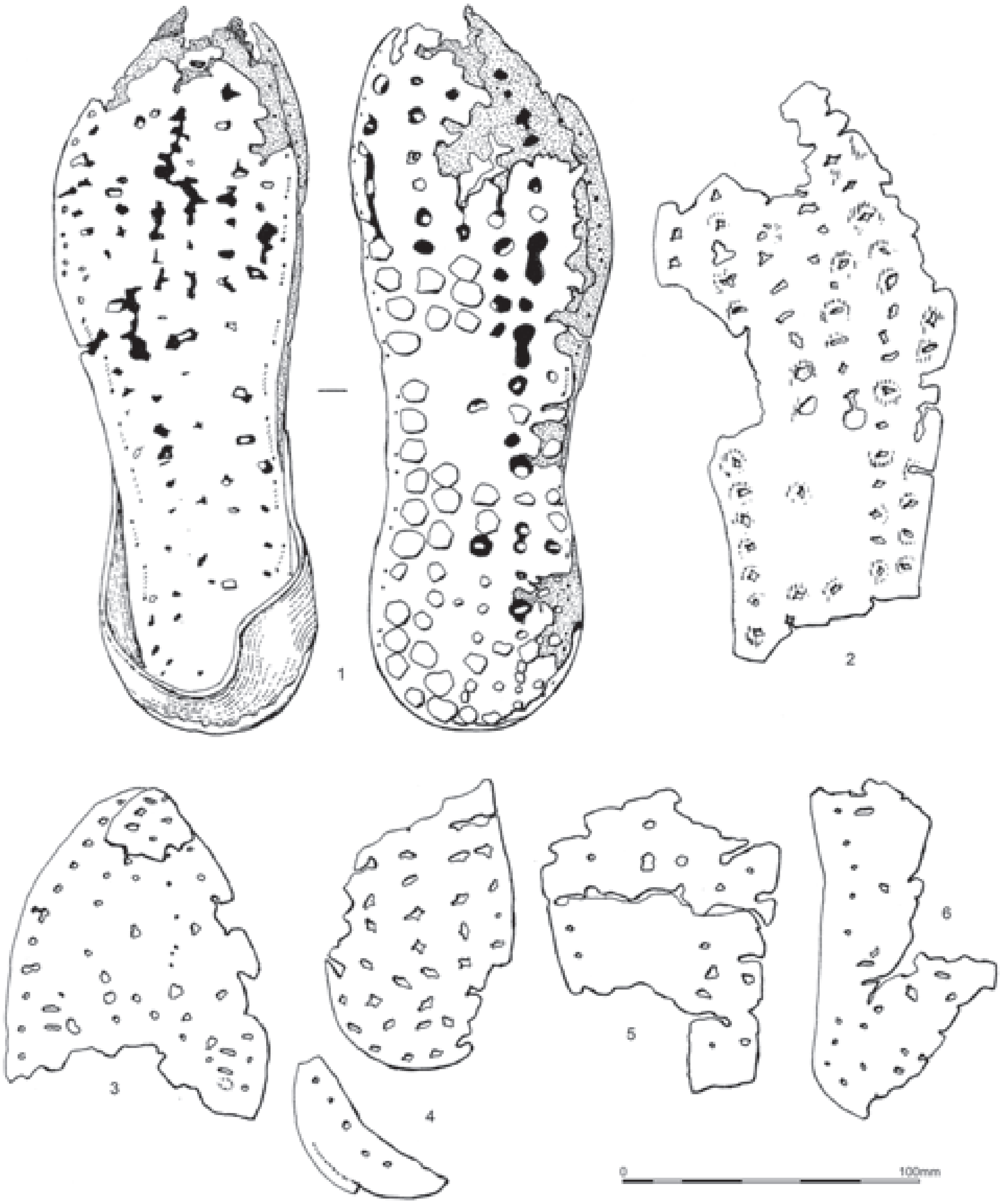


Illustration 19.2
Leather shoes.

the survival of a small part of the quarter of that shoe. This was constructed of very fine leather, different from the heavy leather of the lower shoe. Its quality is one factor in explaining the poor survival, on some sites, of shoe uppers in comparison with bottom units (Rhodes 1980: 100–1).

19.2 CATALOGUE

1. Left foot consisting of four layers of sole, a heel stiffener and a small fragment of the quarters of an upper (illus 19.1 and 19.2.1). Present length 245mm. The outer sole has six rows of hobnails plus grain to flesh stitching around its perimeter. The nails display normal wear on the outer side of the heel. The heel stiffener is tucked in between the outer sole and the lowest of the inner soles. The lower part of the quarters, made of fine leather, survives against the heel stiffener. The inner soles are bound together with a lasting seam, with an average stitch length of 11mm, which also held the uppers. The uppermost sole is penetrated by a number of hobnails, some of which have had their ends hammered flat. Allowing for 10% shrinkage (Rhodes 1980: 102), the shoe is an adult size 7.

   NK78AS; middle west ditch, silt below organic layer.

2. A fragment of the fore part of an outer sole with holes made by six rows of hobnails plus the impressions of some of their sub-circular heads (illus 19.2.2).
3. A forepart of a left inner sole with the fragment of the toe of an outer sole. Grain to flesh stitching around the perimeter and two pairs of thong slots, one pair on each side of the sole. Flesh side uppermost (illus 19.2.3).
4. Heel fragment of outer sole, with holes from hobnails, and part of a heel stiffener. (illus 19.2.4)
5. Two adjoining fragments of inner sole with flesh side uppermost. Holes from grain to flesh stitching along the edge and also from hobnails (illus 19.2.5).
6. Inner sole of right foot with flesh side uppermost. Perimeter with grain to flesh stitching plus irregular tacking across the width of the heel. There are two pairs of thong slots, one pair on each side of the sole. The lower side has the impression of hobnails (illus 19.2.6).
7. Fragment of the left side of an upper of a *calceus*, similar to Keppie type B (Keppie 1975: 70–1), with stubs of parallel ribbing, margin scalloped.

   NK78AA; inner west ditch, bottom of organic layer.

Chapter 20

RECONSTRUCTION DRAWINGS

MICHAEL J MOORE

All reconstruction drawings are based on a combination of verifiable information and educated guesses, and the examples in this book are no different. There is, however, a further aspect: how to treat the blank spaces, the areas which have not been excavated. Should they be left empty or filled with buildings which might reasonably be presumed to have stood there? The two crucial areas at Bearsden in this respect are the southern part of the annexe and the area to the west of the fort where it is presumed lay the civil settlement. In the annexe we have included some token features, but also imagined a large, fenced paddock for exercising the cavalry mounts. The presumed civilian buildings have been expanded from a possible two to four and the drawing cut tight to these. The building which occupied the west end of the central range of the fort is also unknown, but a case has been made for it being the commander's house, so we have placed that there (with an adjacent vegetable garden). Problems abound in the southern part of the fort so buildings have not been conjectured, but shown as being built with their materials (timber stacks, stone heaps and carts) ready for use.

Decisions have to be taken. There is a sound argument for the causeways to the north and south of the fort being in the centre of the large enclosure and they have been placed there, with the gates elsewhere. A different interpretation is possible, but the space available for the drawings is limited. Similarly, the headquarters building has been left without a forehall in spite of the argument in favour of one. However, two other interpretations of the headquarters have been provided elsewhere in the report.

In general, in relation to the buildings in the fort and annexe, we have offered reconstructions which are based as closely as possible on the available evidence. Sometimes this could prove confusing. For example, it is likely that the walls of the stone buildings were rendered and then painted with red lines to simulate rather finer dressed stone work. This would be difficult to depict in small-scale monochrome illustrations. In keeping with the generally poor quality of most of the buildings (as indicated by their irregular setting-out), all but the commander's house have been shown as single storied, usually with a reed-thatched roof for which there is some evidence. The barracks and stables are shown as they might have appeared within a month or so of completion when cracks in the covering daub would have begun to show. In comparison to the timber building, the stone granaries were well set out and well built.

In some instances (illus 21.19 and 21.20) the buildings, for which there is little or no evidence for the position of doors and windows, have been shown in unadorned form to illustrate more clearly their relationship to each other and the steeply sloping site. The inclusion of figures in many drawings adds a sense of scale.

Reconstruction drawings, like any other illustrations, have great capacity to stimulate the imagination. One important aspect of the report is the discussion of the supply of the soldiers. An intangible element in that discussion is the grain and fodder for the horses. The illustrations of these requirements – and of the amount of dung which these animals would create – graphically bring home the scale of this aspect of life on the frontier.

It should be noted that at times the illustrator, approaching the evidence of excavation from a different viewpoint to that of the excavator, suggests alternative interpretations.

Chapter 21

DISCUSSION

This discussion cannot do full justice to the detailed specialist reports which form such an important part of this account of the work at Bearsden. I have attempted to give an over-view rather than repeat these reports and the reader is directed to them for further information. One point, however, requires stressing, which is the evidence for the date of the site. This uniformly points to a single period of occupation spanning the middle years of the second century, that is the time that the Antonine Wall was built and occupied. Unfortunately, the evidence does not permit a closer dating. The few items in the building layers (7.1.1.45; 46; 7.2.3.2; 3; 3.7.49) cannot be dated tightly enough to aid discussion of the foundation of the fort, and the same may be said from the larger quantities of material from the destruction layers.

21.1 THE SITE BEFORE THE ROMANS

Pollen analysis has demonstrated that when the fort was built the vegetation was established pasture with some partially cleared woodland (4.2; 13.12). Trees were mainly of alder and hazel with some willow; there was a little oak and less birch. Grasses, heather and rushes grew in cleared areas. The turves used to construct the fort ramparts were mostly cut from rather wet well-grazed pasture with rushes. This is supported by analysis of the brown earth soil below the west rampart a little north of the presumed position of the west gate, which indicated the existence of a wet meadow environment capable of supporting agriculture (4.1). Indeed, the appearance of small fragments of charcoal in the soil sample below the main zone of earth worm activity suggests that the land was used for agriculture before the arrival of the Romans. The reduction in the original forest cover restricted the types of trees available for use by the Roman army. Analysis of the beetles suggests that the climate was little different from that pertaining today, but possibly a little cooler (17.4).

21.2 THE ANTONINE WALL

No trace survived of the Antonine Wall rampart. However, a hard strip of subsoil at the east end of the site, 4.3m wide, probably marks the position of the stone base. This strip lay 9m behind the ditch, which was about 2.5m deep, but varied in width from 6.5m or more at the west end of the site to 8.3m at the east end, perhaps reflecting erosion down the slope. The single measurement for the base, itself not entirely certain, combined with the variety in the width of the ditch results in it being difficult to plot the putative line of the north rampart of the fort. The line on the plan can only be the best guess.

The putative base matches the average width of the Antonine Wall rampart, 4.3m which is 15 Roman feet, though wider dimensions are recorded in the western part of the Wall (Keppie 1974: 156–63; Robertson 2015: 17). However, the closest sections to Bearsden fort are in New Kilpatrick Cemetery where two visible lengths are 4.3m wide, one widening to 4.6–4.7m (Keppie 2009b: 57). The base is also 4.3m wide at Thorn Road, the next known record to the west of Bearsden (Keppie 1974: 160). There are few measurements for the ditch and the berm in this area. At Peel Glen, 2.5km to the west, the berm was 8.6m wide and the ditch 7m, both roughly comparable to Bearsden.

21.3 THE FORT

21.3.1 The fort platform

The topography of the site has already been described (3.1), but to reiterate briefly, the northern half sloped from north to south into an east–west depression while the southern half was more or less flat. Two points may be added. The headquarters building was placed on a slightly higher elevation in the southern half of Bearsden 1. This consideration may have influenced the exact location of the fort at this particular point. There appears to have been an attempt to even up the fort platform by infilling part of the east–west depression. Such evidence survived at 'building' 8 while the soft fill of the ground in the area to the south of the bath-house from the fort/annexe rampart to the latrine suggested in filling here also.

21.3.2 Measurements and builders

Roy and other antiquarians as well as the early OS mappers provided a simple plan for the fort, a single enclosure lying east–west and attached to the rear of the Antonine Wall. During the excavation, an internal subdividing rampart of this enclosure was located, similar in form to the other ramparts, though few sections across any surviving rampart were possible. It gradually became clear that the large enclosure was not originally subdivided into a fort and annexe but had been divided during construction. The evidence for this is worth stating here as it colours all subsequent interpretation.

One room of a bath-house had been erected in a location which implied that the building was to have been aligned north–south immediately inside the east rampart of the larger enclosure; it was, however, demolished and a new bath-house constructed on an east–west alignment.

There appeared to have been no headquarters building in the centre of the fort; it was only deep into the post-excavation work that Geoff Bailey suggested (pers comm) that the courtyard building (11) was part of a headquarters building (11 and 15) and that this had been erected in the centre of the larger enclosure.

These two facts were sufficient to lead to the conclusion that an original large enclosure (Bearsden 1), with these two buildings in their normal locations, had been modified during construction and divided into a fort (Bearsden 2) and annexe. The lack of ditches between fort and annexe strengthens this conclusion.

The larger enclosure measured 152m × 113m over the ramparts, 1.72ha, and 143m by 104m internally, 1.48ha. Following division of this into a fort and annexe, the former was reduced to 113m × 102m, an area of 1.15ha, internally 104m × 93m, 0.95ha.

The dimensions may be compared to other forts on the Antonine Wall. The forts larger than Bearsden 1 are Carriden, Mumrills, Balmuildy and Old Kilpatrick, with Castlecary similar in size; all are primary forts, that is, forts built during the implementation of the first plan for the Antonine Wall. When the secondary forts, that is, those erected as part of the revised plan, are taken into consideration, Bearsden 2 is smaller than Bar Hill, Auchendavy, Cadder and possibly Castlehill but larger than Rough Castle, Westerwood, Croy Hill and Duntocher; it thus sits squarely in the middle of this group of forts.

Table 21.1
Forts on the Antonine Wall: internal area

Carriden	*c* 1.6*
Mumrills	2.6
Rough Castle	0.4
Castlecary	1.4
Westerwood	0.78
Croy Hill	0.6
Bar Hill	1.3
Auchendavy	1.1
Cadder	1.12
Balmuildy	1.6
Bearsden 1	1.48
Bearsden 2	0.95
Castlehill	*c* 1.0
Duntocher	0.2
Old Kilpatrick	1.7

Bold indicates a primary fort, with both Auchendavy and Bar Hill listed as such in view of the present uncertainty. * Bailey 1997

An inscription found beside the northern granary records work by the century of Quint . . . in the Twentieth Legion (5.2.1.1; *RIB* 3506). This legion was based at Chester and is recorded on many inscriptions as helping to build the Antonine Wall. It is not known whether the soldiers of this legion built the whole fort or perhaps only the stone buildings. Elsewhere legions are recorded building at the forts of Croy Hill (*RIB* 2161, 2162, 2163), Auchendavy (*RIB* 2180) and Balmuildy (*RIB* 2191), while auxiliary units are recorded at work at Castlecary (*RIB* 2155). Bar Hill has furnished building stones of both auxiliaries and legions, including the Twentieth Legion (*RIB* 2170, 2171).

21.3.3 The defences

The variety in the number of ditches round the fort and annexe is worthy of comment. The north rampart was protected by the single ditch of the Antonine Wall. There were three ditches to the west, two to the east and one wide ditch to the south. The *actus* grid (illus 21.12, and discussed below) suggests that the outer west ditch may be an addition to the main plan for the defences as the western edge of the frame is the outer lip of the middle west ditch. This could imply either that the first proposal was for two ditches to encompass the site, or that from the beginning two ditches were considered sufficient to the east and south but a third was required to the west. The ground falls away steeply to the south, and less sharply, but still noticeably, to the east. However, to the west the land today is almost level, before rising gradually about 300m from the fort. For that reason an extra ditch could have been thought necessary to the west.

It is not certain where the south termination of the outer west ditch lies. Roy ignored it, commenting that the fort was surrounded by ‘a double envelope’ while his plan shows only two ditches (illus 2.1). There was no distinction in the fill of the three western ditches which may imply that the outer ditch was filled at the same time as the others. The 1863 OS map of the site, surveyed in 1860, records only a wide depression running round the fort and annexe south of the Military Way (illus 2.2). This depression is a little wider than the south ditch, but over twice as wide as the two east ditches. On the west side the depression is about half as wide again as the three ditches, and widens to the north. This may be significant, but it does not offer any help in determining the southern limit of the outer ditch. This has been placed at the south-west corner of the defences as the most logical place and for that reason alone it is represented thus on the plans. The width of the depression in the OS map presumably reflects centuries of ploughing over the defences.

The reason for the extra wide ditch to the south is problematic. This ditch is about equal to the two east ditches and the inner two west ditches in width, but is not markedly deeper when measured from the south lip; the north slope is very different as the ground surface is higher here. As the subsoil is boulder clay it is unlikely that the central spine between two ditches had collapsed and been removed in antiquity. Indeed Roy (1793: 159) states that the defences were best preserved on the south side and thereby implies that the ‘double envelope’ was visible there in 1755. It might be considered possible that the trench coincidentally crossed the junction between two ditches beside the causeway outside the south gate, but the trench lay a little too far to the west for this to carry conviction. The reason for the width of the south ditch must remain uncertain.

The eastern ditches do not extend as far north as the Antonine Wall rampart, stopping 17m short. The Wall changes direction here, turning slightly south, and it is possible that a gap, made too large by miscalculation, had been left to allow for this southern turn. The two eastern ditches of the fort at Rough Castle did not extend north of the Military Way which exited the fort at the east gate but a small enclosure lay here. At Mumrills, the outer west ditch stopped at the Military Way while the inner three extended to the south side of the rampart. At Croy Hill and at Balmuildy the outer ditches did not reach the back of the rampart; these situations could be explained in a similar way to that at Bearsden (Robertson 2015: 86 and 104 for the plans). No fortlet was found at Bearsden the existence of which otherwise might explain this arrangement.

The inner east ditch was not available for examination, but the outer ditch was roughly half full of sewage by the time the fort was abandoned. The simplest explanation for this is that the sewage flowed from the latrine into inner ditch and then backed up into the outer ditch. On that basis, it is presumed that the inner and outer ditches were conjoined immediately to the north of the causeway outside the east gate of the annexe.

The east and west ramparts of Bearsden 1 were 4.5m wide, a little more than the normal width for the Antonine Wall rampart, but the fort/annexe rampart was 4.35m wide. The ramparts were formed of turf blocks. No turfwork survived higher than 300mm, with a maximum of three layers of turf each 80mm–100m thick, rather thinner than the 140mm recommended by Vegetius (3, 8). One argument has been that the turves of such thickness were difficult to obtain on the Antonine Wall, and a suggested thickness of 130mm was proposed, this then being reduced by subsequent compression, which would bring us close to the thickness at Bearsden. The thickness would also indicate that the turves were laid turf-to-earth (for discussion see Hanson &

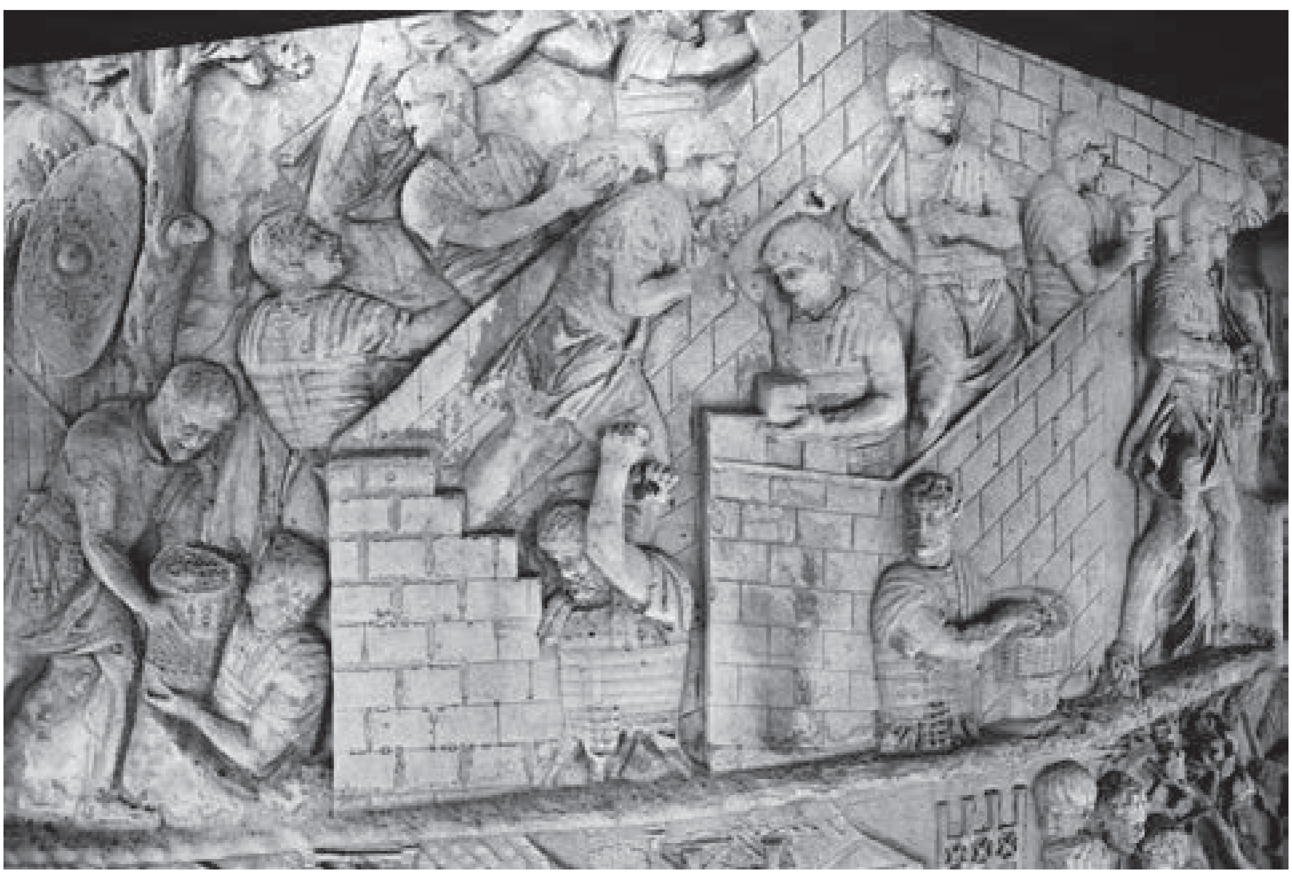


Illustration 21.1

Trajan’s Column in Rome shows the construction of a Roman fort. The soldiers carry turves on their shoulders. In the centre a turf is being removed from the shoulders of a soldier ready to be placed on the rampart. The earth is being removed from the ditches in baskets.

Maxwell 1983: 82) The turves in the west rampart, the only place where they could be measured, varied in size, but several were found to measure about 450mm × 300mm, close to the regulation size of 430mm × 300mm stipulated by Vegetius (3, 8). No evidence was found to indicate the batter of the rampart.

Outside the east rampart of the fort an area of burning, about 1.5m wide and up to 120mm thick, overlay an area of cobbling. Within the burnt debris were willow, alder and hazel branches about 10mm–15mm in diameter. These probably formed part of the timber breastwork of wattles fallen from its original position on top of the rampart and burnt when the fort was abandoned; the recovery of such evidence is unusual.

None of the fort's gates has been located. The east and west gates presumably lie under Roman Road. The ditches outside the assumed position of the north and south gates of Bearsden 2 were examined before it was realised that this fort was secondary; it was not possible later to examine similar areas in the centre of Bearsden 1. The lack of causeways in the centre of Bearsden 2 suggests that causeways in the centre of Bearsden 1 were retained. This is supported by the results of a resistivity survey along the line of the south ditch which led to the tentative identification of a causeway about 24m wide over the south ditch in the centre of Bearsden 1.

The location of the gates, however, remain uncertain. It is possible that they were not moved from the centre of Bearsden 1, but the plan of the fort suggests that each lay in the centre of the north and south sides of Bearsden 2. In this case, travellers would have had to pass along the berm from the causeway to the gate to enter the fort. Bailey has pointed out to me that the position of the south gate at Cadder may have been moved when, as he argues, the central range was turned through 90°.

21.3.4 The roads

Bearsden 2 was crossed by the usual pattern of roads. They were generally formed of cobbles surfaced with gravel or crushed sandstone. Under present-day Roman Road presumably lay the *via principalis* passing between the west and east gates. This was not examined. From the centre point of the fort the *via praetoria* led northwards. The space between buildings 3 and 7 was 10m, though not all of that was necessarily metalled; the surviving metalling was 3.8m wide. The *via decumana*, leading to the south gate, was 9.2m wide. A strip of metalling, 6.3m wide, behind building 12 was possibly the *via quintana*. The interpretation of buildings 11 and 15 as the headquarters building, however, casts doubt on this assumption. It was wider than the paths in the fort but if building 12 was a storehouse an area of hard standing to its south may have been necessary for the unloading of carts; the granaries at Housesteads were loaded from the *via quintana*. The width of the *via praetoria* and the *via decumana* suggests that the space allowed for the *via principalis* and its 'verges' would be about the same, 10m, and this is the space which has been allowed between buildings 4 and 9.

Narrower streets or paths, 1.7m wide, lay between buildings. There were frequently gaps between the metalling and the buildings but no indication what the ground cover was during occupation of the fort.

Running around the fort inside the rampart lay the intervallum space. This included a road, varying in width from 2.1m to 3.2m, and an open space from 1.5m to 3.7m wide between the road and the rampart, though this may have been as wide as 5m inside the north rampart. At some forts ovens were placed in this area, but none were found at Bearsden. In one location, within the western intervallum road, a water tank was discovered; elsewhere there were patches of cobbles and small pits while post-holes inside the south and east ramparts suggest the existence of structures.

21.3.5 The stone buildings

Sandstone was favoured for building and sculpture with slate used for some floors, for example in the cold bath. Undressed cobbles might be used in the side walls of drains, and occasionally in the heated range of the bath-house while some undressed boulders lined the passages of the main furnace. The sandstone was available locally, for example from outcrops in the Kelvin Valley 2.5km to the south-east (5.1).

The form of construction of all buildings was coursed rubble, though of various standards. The primary bath-house contained the best dressed stones and it appears that many were re-used in the hot dry room and some in the cold bath of its successor. Many stones exhibited diamond, diagonal or vertical broaching. The granaries were next best in terms of construction, with the steam range of the bath-house the poorest. All walls were clay bonded with the core also containing sandstone fragments, and, not least in view of the bonding material, we may presume were plastered. The walls were normally 900mm–1m wide placed on cobble and clay or cobble foundations.

Little evidence survived for the roofing materials. No slates were found. Placing aside 'building' 16 and the bath-house, the greatest concentration of tiles was in and immediately to the area of the north granary. These were all fragmentary but probably from *tegulae*, roofing tiles (6.1). Part of a structural timber, smaller roundwood and clay-covered rushes were found on the floor of the latrine and it is possible that they were used to roof this building (13.9.8). Otherwise a different form of organic covering could have been used such as shingles. Vegetius (2, 23) comments on the use of reeds, rushes or thatch for the roofs of drill halls if tiles or shingles were not available. Caesar (*Gallic War* 6, 2) used thatch to roof the huts in his winter quarters in Gaul, but this was obviously a temporary arrangement.

21.3.6 The timber buildings

Most buildings in the fort were of timber. They were based upon a frame of vertical timbers placed in post-holes. These post-holes were usually about 400mm in diameter, though they were often smaller, and were normally 400mm–500mm deep. It was not possible to determine if variation in the size of post-holes had any significance. The post itself, surviving as an impression, was generally 100mm–120mm square. It was usually, but not always, held in place by a packing of stones: elsewhere clay was used (illus 3.2.31; 3.3.13; 14; 21.2).

The posts were considerably smaller than those recorded at contemporary Bar Hill, where the posts themselves often survived (Macdonald & Park 1906: 51). The stumps there had an original diameter of 150mm to 200mm and were set in post-holes with a diameter of about 600mm and from 600 mm to 750mm deep.

The wood commonly used at Bearsden was alder, hazel, oak and willow with ash and birch less so. Alder in particular with some oak and ash were used as structural timbers with the wattles mainly of hazel and willow with some alder; oak planks or boards were used in one of the barracks. Two nails were found with oak adhering and a third embedded in a piece of conifer (11.3.7.325; 326; 327). Large quantities of burnt daub indicated the nature of the walls of the buildings; there is some indication that rushes were used instead of straw to strengthen the daub. In one area small holes were recorded between two post-holes. These, if used, would have held the stakes which formed the basis of panels of wattle and daub. The distance between the main uprights suggests that the wattles at Bearsden would have been woven horizontally round vertical stakes (Hanson 1982: 179). It is not clear why stake-holes were not found elsewhere. They were carefully sought, but it is possible that later denudation of the site had removed all trace of them in many areas, while in those areas where they might be expected to have survived, the accumulation of later deposits – most notably the Victorian clay for the terraces – had resulted in compaction of the subsoil and thus a squeezing of the Roman intrusions. Thus many post-holes were most difficult to find, and it may be that the stake-holes had all but disappeared altogether.

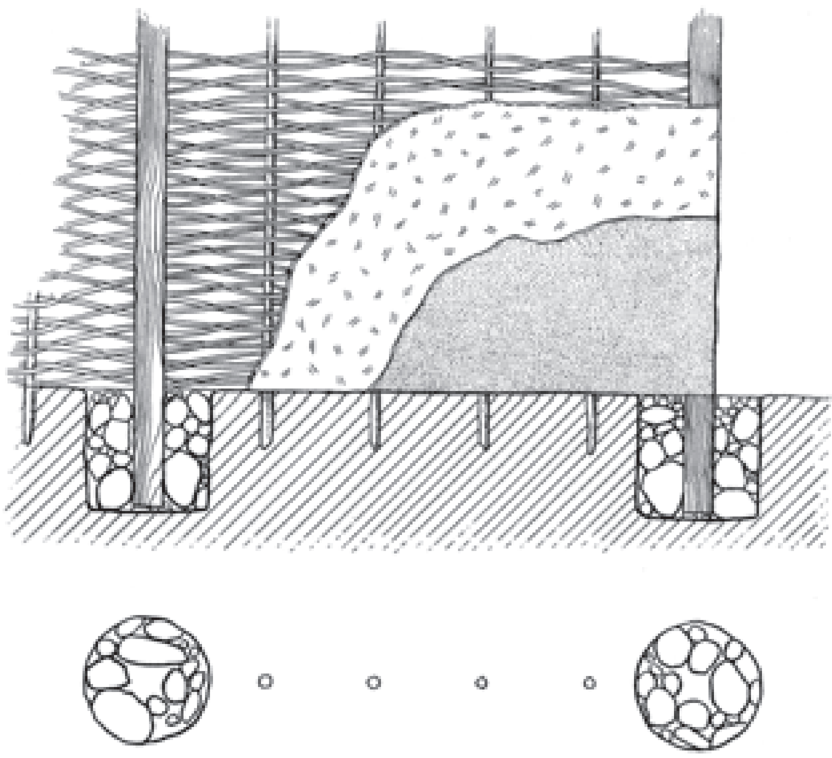


Illustration 21.2
Plan and restored elevation of the wall of a timber building. Drawn by Tom Borthwick.

The walls of the timber buildings were not all straight, for there was often at least one post out of alignment (cf the barrack-blocks in the contemporary fortlet at Barburgh Mill; Breeze 1974b). The post-holes were generally about 1.7m apart, though they could vary from 900mm to 2.4m. The width of the rooms was double the normal distance between the posts, about 3.4m; it seems probable that where a complete plan of a building could not be recovered, the 'double spacing' indicates the existence of a room. The spacing of the timbers is normal for the Antonine period (Hanson 1978: table 5), when timbers seem to have been placed rather further apart than in earlier years. Hanson has also noted that simple post-hole construction rather than sleeper-beam construction is more frequent in the second century (Hanson 1982: 177). He has suggested that posts of 75mm–100mm would be unlikely to support a second storey (Hanson 1982: 180). Posts of a diameter of about 100mm square could support a span of 6m, considerably more than the 4m wide barrack-blocks of Bearsden (Moleworth 1910: 117, 153, 156). This issue only becomes significant when considering the nature of the headquarters building.

A floor survived in only one room: the eastern room of the men's quarters in building 7, and even then it is little more than a patch of gravel. In the adjacent officer's quarters an area of packed clay may represent a floor especially since it was overlain by some burnt daub, though a gravel floor would be expected. Rushes were found in a drain beside building 7, a barrack-block, and in the latrine and may have been from the roof. Only one fragment of window glass was found in a barrack, in the men's quarters of building 3. The windows would presumably have been closed by wooden shutters, but equally the glass may have been removed and taken with the army when the fort was abandoned. Only two fragments of window glass were found elsewhere, one beside building 12 and the other near the bath-house (9.2.2.56–8).

Some fittings were found, including a drop hinge in the gulley to the north of building 1 (11.3.3.100), staples to support drop hinges in the east intervallum, the gulley to the north-west of building 3, the hot dry room and a pit to the south of the bath-house (11.3.3.116–119). Parts of locks were recovered from the middle west ditch (11.3.3.101; 102). Fragments of strapping and sheeting possibly from doors, window grills, etc, were found in

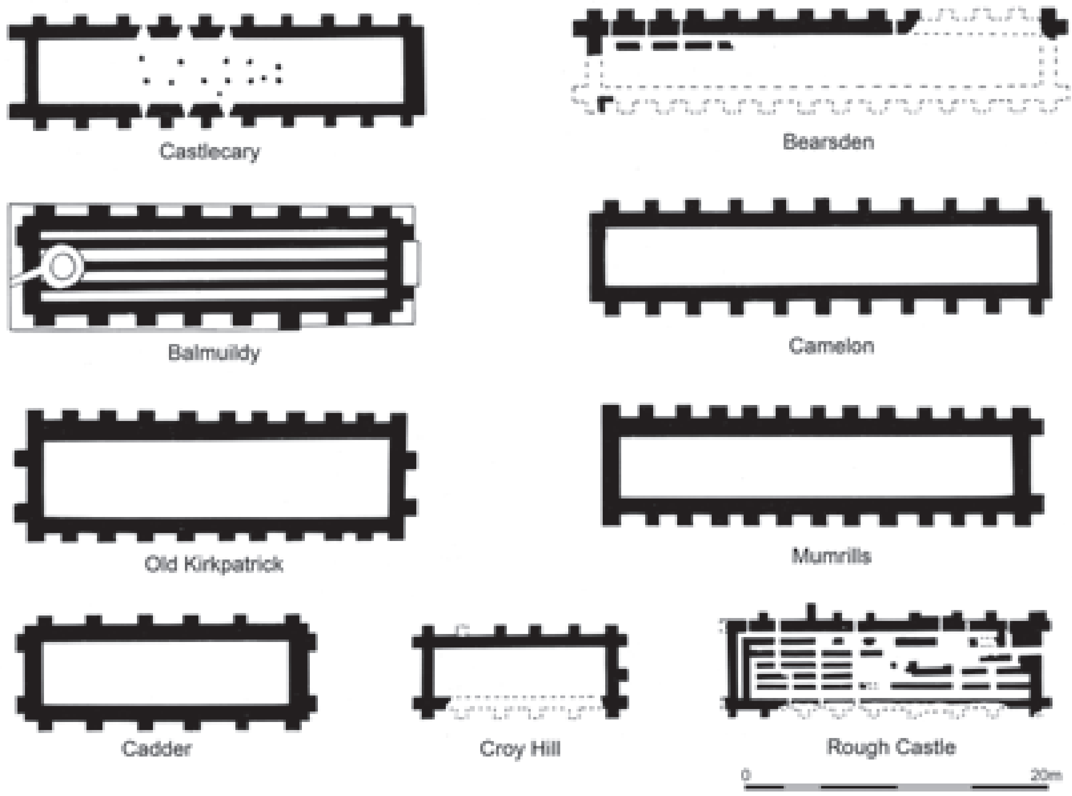


Illustration 21.3
Plans of granaries.

or beside buildings 1, 6, 7 and 16, the bath-house and the latrine (11.5.158–221). Nails were ubiquitous across the whole site.

Once completed, these buildings would have been virtually indistinguishable from their stone counterparts. The plastered walls would no doubt have been painted, possibly in lines to simulate stone blocks. Unfortunately no evidence survives from Britain to indicate that any barrack-blocks here had painted upon their walls scenes from Greek mythology such as are known from Germany (Baatz 1993: Taf 2). One might suspect that the marks on the walls of barrack-rooms were in any case more usually of a more prosaic nature.

The post-pipes were filled with soft, brown soil. In no case was there any evidence surviving to suggest that the post had been uprooted by rocking to and fro, and, while occasionally charcoal flecks at the top of the post-hole indicated the position of the post-hole, such flecks were rarely found within the post-pipe.

21.3.7 The identification of the buildings

The granaries

The only buildings not of timber within the fort were the two stone granaries (4 and 9), recognisable from their unique plan, and in particular their buttresses. The granaries had raised floors to help keep the food dry and fresh, and side vents in the walls below floor level aided these processes. A layer of fine burnt debris covered the floor of the basement of the north granary. Analysis of such material in granaries elsewhere suggests that it may have derived from the periodic sterilisation through burning of the interiors of granaries, but in this case analysis was not able to suggest the derivation of the debris. Sufficient tiles were found in and around the north granary to suggest that its roof was of tile; nothing can be said about the roof of the south granary.

The granaries were the same width, 5.5m externally, but the northern granary was 32.7m long and the southern calculated as at least 22m long. The walls of both varied in thickness but averaged 1m. The floor area of the north granary was about 107.35m^2, reduced to about 61.4m^2 if a corridor 1.5m is allowed through the building (Gentry 1976: 25). The southern granary had a floor area of 77m^2, equivalently reduced to 44m^2. The total floor area of the granaries was therefore 105.4m^2. Storing grain to a height of 2m would provide a capacity of 210.8m^3. Gentry's figures for the requirements of 100 men for a year were 53m^3. In theory, therefore, the two granaries would provide grain to feed nearly 400 men, though this does not take into account the fodder for the horses.

The proportion of the granary space to the internal area of the fort is 1:4, which is the same as Cadder, and similar to Bar Hill and to Rudchester and Housesteads on Hadrian's Wall (Gentry 1976: 30, table 1). Gentry emphasises the many unknowns, not least whether all types of food were stored within the granaries, but these figures are an indication that Bearsden falls within normal parameters (illus 21.3).

Barrack-blocks and 'storehouses'

Buildings 3 and 7 are recognisable as barrack-blocks. Each contained a large room for the officer at the rampart end of the building, where it is normally placed, and eight smaller rooms for the men. Little can be said of the internal arrangements of the barrack-blocks. In the officer's quarters of building 5 lay a small hearth, while one in the base of an amphora was found in a barrack-room in building 3. A small patch of gravel flooring survived in one room in building 7. No evidence was found to hint at how many men slept in each room.

The other buildings within the fort are not so easy to identify. In the northern part of the fort three long narrow buildings (1, 2 and 5), similar in size to the adjacent barrack-blocks, were investigated. Unfortunately it did not prove possible to examine these buildings as thoroughly as the barrack-blocks, and thus it is not clear whether those parts excavated were accurately representative of the rest of the buildings. However, it does seem clear that there were no partitions in building 1, while the partitions in the other two buildings were differently spaced from those in the barrack-blocks. In the belief that these buildings may have served as stables, the phosphate levels and the insect remains were examined, but inconclusively.

Building 12 in the central range is closely paralleled in other Antonine Wall forts, most clearly at Cadder and Balmuildy, and is probably a storehouse (Robertson 2015: 101 and 104). It should be noted, however, that such buildings normally extend to the back of the central range and this building does not appear to do that. The distribution of different types of pottery was helpful in reinforcing the evidence provided by the plans that buildings 3 and 7 were barrack-blocks while the others were not: see pp 350–9.

The headquarters building

Building 11 in the central range requires rather more consideration. Once the existence of the courtyard had been recognised, the building was tentatively interpreted as a commanding officer's house. This was on the basis of the existence of the courtyard. The lack of a south range to the building led to the abandonment of this theory. The similarity of the plan – three ranges round a courtyard in the style of the *fabrica* at Inthtuthil (Johnson 1983: 183–8) – led to the suggestion that it was a workshop. The lack of any evidence for industrial activity militates against this proposal. During the post-excavation work Geoff Bailey offered (pers comm) a third possibility, that buildings 11 and 15 together comprise parts of the headquarters building. This proposition needs to be examined at some length as the evidence is contradictory.

In favour of the suggestion that buildings 11 and 15 together formed the headquarters building:

- a courtyard normally forms the forward part of a headquarters building;
- the building is in the centre of Bearsden 1;
- the linking of buildings 11 and 15 creates an acceptably sized headquarters building;
- the well discovered in the grounds of Maxholme (Macdonald 1934: 326) would have been appropriate to a headquarters building;
- the small number of artefacts found here would be appropriate for a headquarters building (Giles, pers comm).

Against the suggestion:

- the three post-holes which should have formed the southern part of the western wall between buildings 11 and 15 were not found; while it is possible that a modern intrusion destroyed them, this is not conclusive (see p 37);
- the metalling south of building 12, interpreted as the *via quintana*, is directly east of the gap between the southern post-holes of building 11 and the northern post-hole of building 15; this gap was originally interpreted as indicating the line of the *via quintana*; there is hardly sufficient space for the road to turn south and pass along the east wall of the headquarters building, but it is possible that the metalling led to a side entrance to the headquarters building as is visible at both ends of the aisle to the cross-hall at Chesters on Hadrian's Wall, though such entrances have not been recognised at other forts on the Antonine Wall;
- there is a range to east and west (and possibly also the north) of the courtyard, which is unusual on the Antonine Wall. It is, however, paralleled at Balmuildy, Mumrills and Cadder where the courtyards were flanked by ranges but with no indication of subdivisions (Miller 1922: 22–5; Macdonald & Curle 1929: 426–30; Clarke 1933: 35–7).

The interpretation of the courtyard as an industrial building or part of the commander's house must be rejected. Its location in the centre of Bearsden 1 is a powerful argument in favour of its interpretation as part of the headquarters building. It is helpful that its east and west ranges are paralleled at other Antonine Wall forts. The main difficulty lies in explaining the gap in the putative west wall of the building. However, the way in which the west wall of building 11 and the corner of building 15 line up is suggestive. In conclusion, the evidence, on balance, supports buildings 11 and 15 being part of the headquarters building.

The headquarters building at an estimated 23.50m north–south by 19.70m east–west would be comparable to that at Bar Hill, 25.50m × 23.47m, and Cadder, 23.47m × 17.68m. The latter is a secondary fort and the former possibly also. The headquarters buildings in the primary forts, Mumrills, Castlecary, Balmuildy and Old Kilpatrick, are all larger than Bearsden, while those in the secondary forts, Rough Castle, Croy Hill and Cadder, are all smaller.

To turn to internal arrangements. A headquarters building normally consisted of a courtyard, cross-hall and rear range of

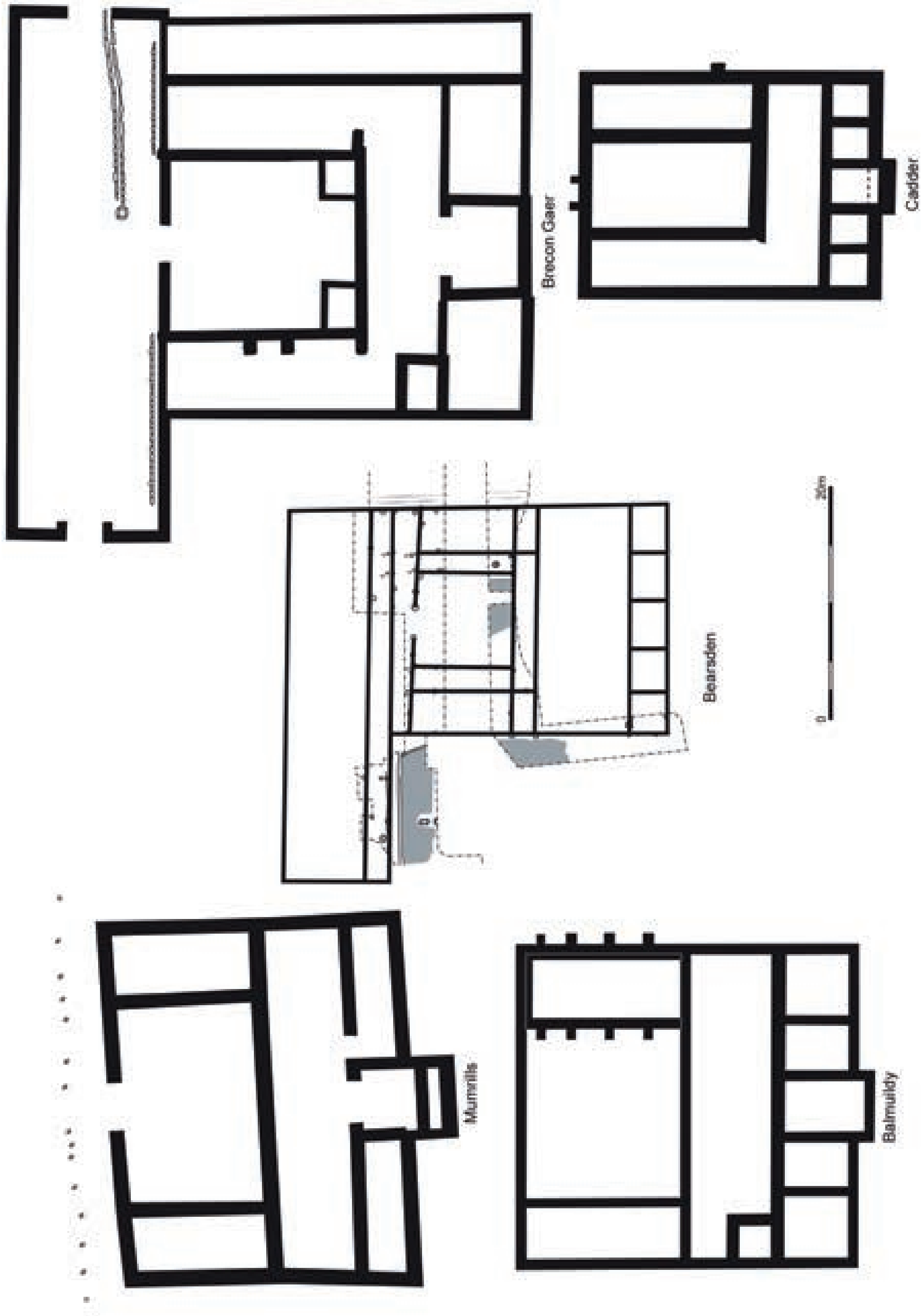


Illustration 21.4
Headquarters buildings on the Antonine Wall.

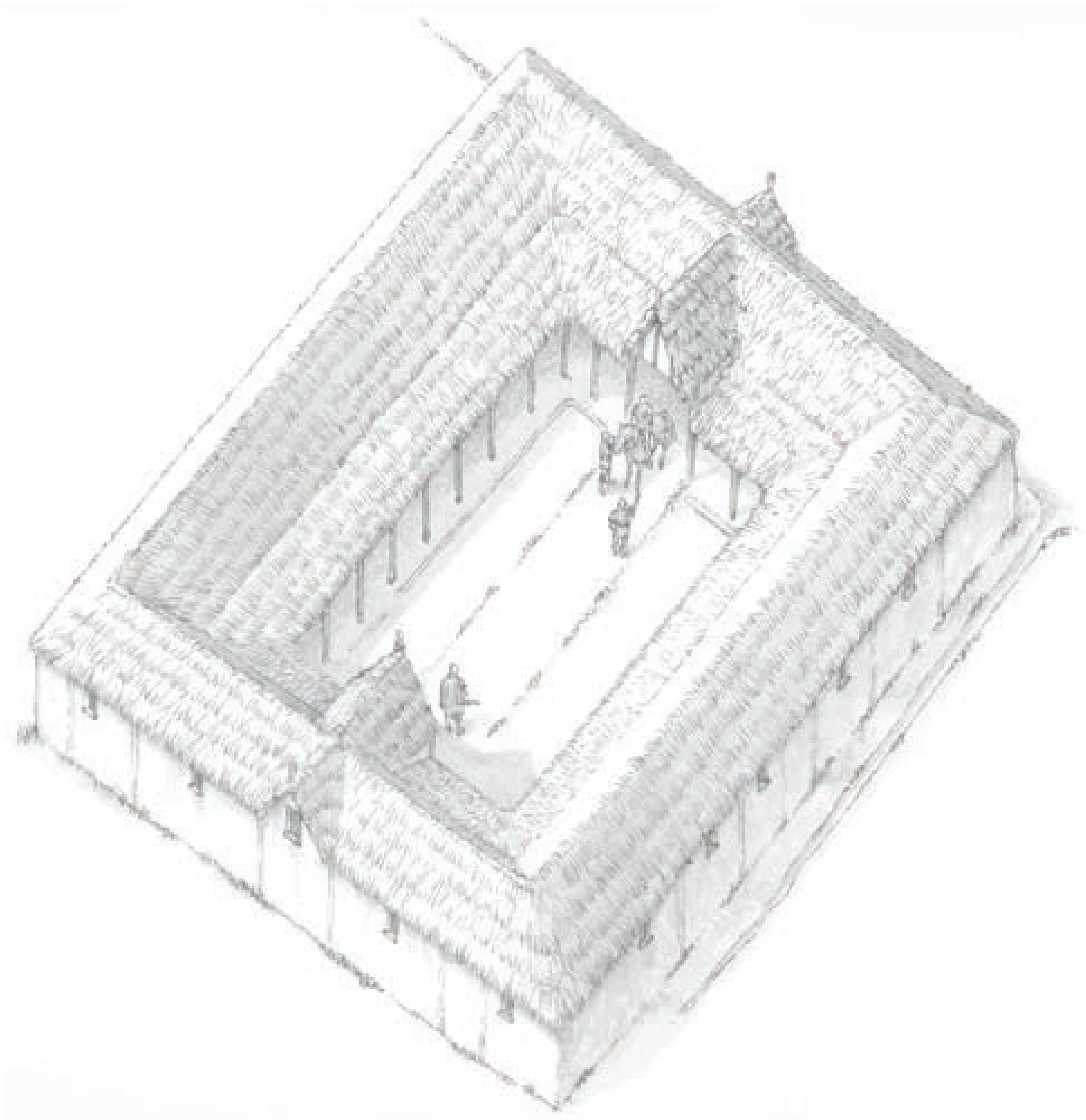


Illustration 21.5
A reconstruction of the headquarters building without a forehall and without a basilica. This version is offered on the basis of the lack of evidence for a cross-hall. Its post-holes suggest that its vertical timbers were no more substantial than those in other buildings within the fort. In keeping with the general poor quality of the internal structures in the fort, this is shown as a single-storey structure with a thatched roof. Drawn and described by Michael J Moore.

five rooms. At Bearsden the courtyard can be recognised, but the area where the cross-hall would have lain was not available for excavation. The right-angle of posts (building 15) should indicate the south-west corner of the building, but otherwise it is not possible to determine the internal arrangements. The irregular linear feature to the east of the more northerly post at this corner may suggest the location of the north wall of the rear range of rooms. The rooms, however, would then be shorter east–west than north–south which would make them unique on the Antonine Wall. Unfortunately no other post-hole was found which would help clarify the arrangements in this part of the building.

Table 21.2
Headquarters buildings on the Antonine Wall

Fort	*N–S*	*E–W*
Mumrills	33.22m	36.27m
Rough Castle	24.99m	13.11m
Castlecary	29.57m	26.52m
Croy Hill	16.29m	20.57m
Bar Hill	25.50m	23.47m
Cadder	23.47m	17.68m
Balmuildy	26.21m	24.99m
Bearsden	23.50m	19.50m
Old Kilpatrick	27.43m	24.99m

A forehall?

Bailey has also suggested that there was a forehall to the north of the headquarters building. There are pros and cons for this proposal.

In favour of the existence of a forehall:

- a long forehall could encompass the posts in building 10 which otherwise have no explanation, though it remains possible that these posts form part of another building;
- the forehall would include the area immediately north of the courtyard and would therefore eradicate a possible northern range to the headquarters building which would otherwise be a unique feature on the Antonine Wall;
- it could offer an explanation for the many posts in the northern range of the building.

Against the suggestion:

- the gap in the west wall of the building remains a problem in defining buildings 11 and 15 as a headquarters building, though it does not in itself affect the proposal for a forehall;
- if the two most northerly rows of posts in buildings 11 and 10 are taken as dividing the south aisle from the nave, the aisle would be only 2m wide. This is narrower than the aisle in the timber forehall at Zugmantel, which is 3.3m wide, and the aisle in the stone basilica at Birdoswald, a putative exercise hall, 2.85m (Johnson 1984: 124, fig 95; Wilmott 1997: 97). Further, the approximate width of the forehall, about 8m, is narrower than the more normal 12m;
- the posts in building 10 do not completely match those in the northern part of building 11; this could be explained if the southern 'aisle' of the forehall was a corridor running into building 10, with the next row of posts to the north in each building forming the south wall of the forehall; this arrangement would, however, appear to be unique and leaves unaccounted a random post at the south-east corner of building 10; although, 100mm square timbers are thought not to have been strong enough to support an upper storey, with appropriate bracing they could have risen to sufficient height for an exercise hall (Hanson 1978).

In conclusion, there are more arguments for buildings 10, 11 and 15 forming part of a headquarters building with a forehall than against. The minimum length of the building would have been 30.07m. The width of the building is even more difficult to compute, but would have been perhaps 8m.

There appears to be two main types of forehalls, those consisting of a single hall and the other a hall with an aisle to each side. The proposed Bearsden forehall measuring 30.07m × 11.2m compares well to other buildings with aisles. The aisle-less stone forehall at the Saalburg, reconstructed over 100 years ago, measures 40m × 11.5m while the timber example at Zugmantel was also 40m long, but had a nave 4.5m wide with aisles of 3.3m.

We are left with a number of possible unique elements to the headquarters building: the shape of the rear rooms; the forehall; construction in timber, all other such buildings on the Antonine Wall being of stone, though the possibility that some of the stone headquarters buildings in other forts had timber predecessors must be borne in mind.

Finally, we should note that the building was not moved when the enclosure was divided between fort and annexe. It remained in its asymmetrical location helping to provide the fort with a most unusual plan.

The rear part of the fort

Examination of two areas in the *retentura,* the southern third of the fort, was less successful than the investigations north of Roman Road. In the eastern half of the *retentura* excavation of one area (16) failed to reveal traces of buildings, though several small pits containing burnt debris were found. In the west half of the *retentura* restricted excavation among greenhouses revealed a granary, as discussed above, and a complex of post-holes forming no clear pattern of buildings (13/14). It seems probable that at least two buildings lay here. Pottery was unrepresented in comparison to the rest of the fort, with but two fragments of cooking pots and one of a plate from buildings 13/14.

21.4 THE ANNEXE

The annexe was carved out of the larger enclosure, Bearsden 1. It was about half the size of Bearsden 2, containing 0.47ha within its ramparts.

Three stone buildings were located in the annexe: part of a primary bath-house; its successor; a latrine. Elsewhere, clay-and-cobble foundations, post-holes, including two lines of three, and patches of cobbles were recorded, but little sense can be made of them. So much pottery was found in the area south-west of the bath-house and immediately east of the fort rampart (30% of the total coarse ware by weight) as to suggest that it served as a rubbish dump, though perhaps some of the material was used to

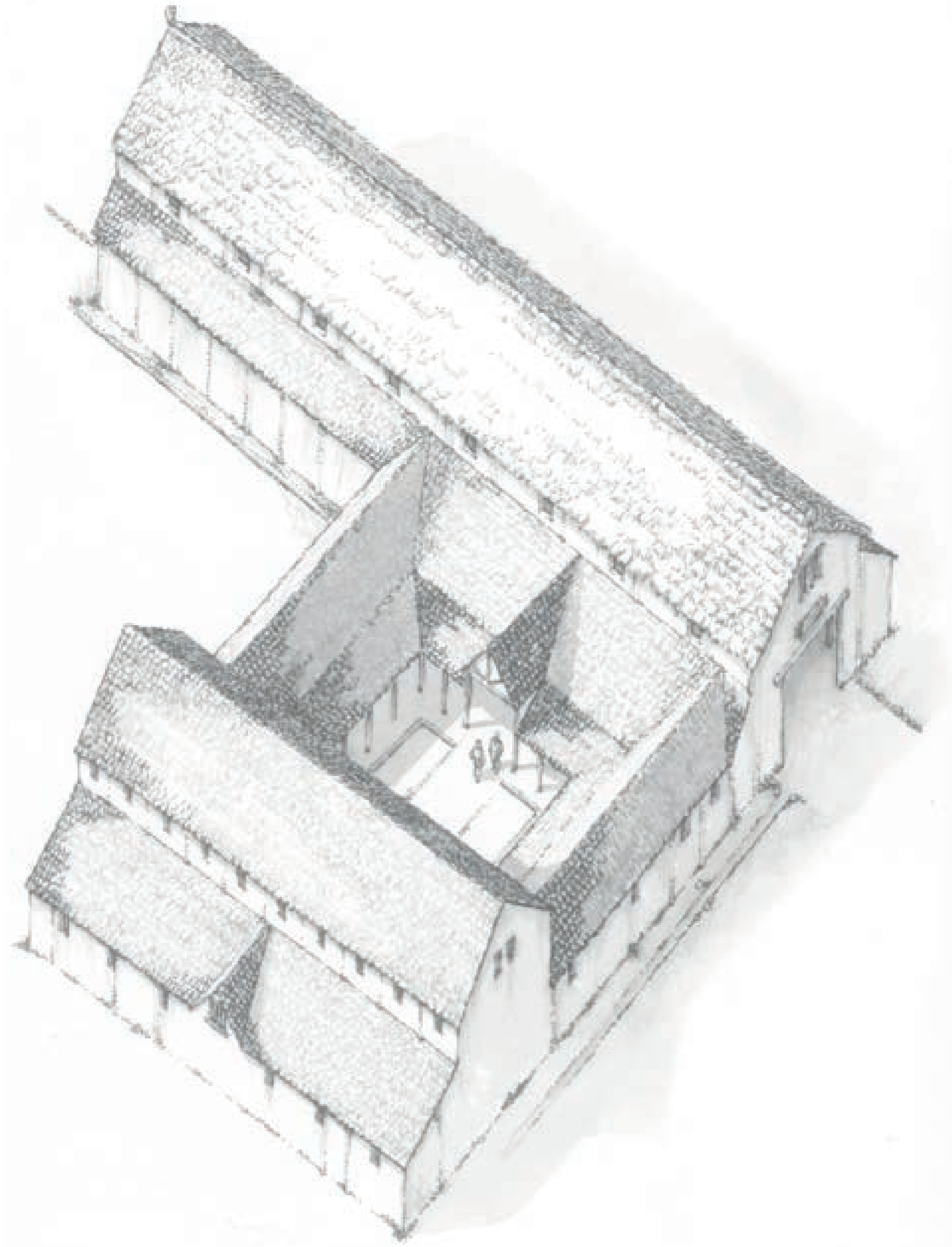


Illustration 21.6

A reconstruction of the headquarters building with a forehall. This reconstruction shows a relatively well-built conventional HQ building with shingle roofs. Attached to its front is a forehall of the type found in several cavalry forts. The forehall, if built to the dimensions suggested by Bailey as shown here, would have been a very substantial building, if built to the dimensions shown here. The thatched roof would have weighed in the region of nine metric tonnes, much more when wet with rain. None of the post-holes found appear large enough to have accommodated the substantial timbers required to support such a roof, therefore this reconstruction, though the ideal design for a cavalry fort, must remain the least likely of three possible interpretations of this building. Drawn and described by Michael J Moore.

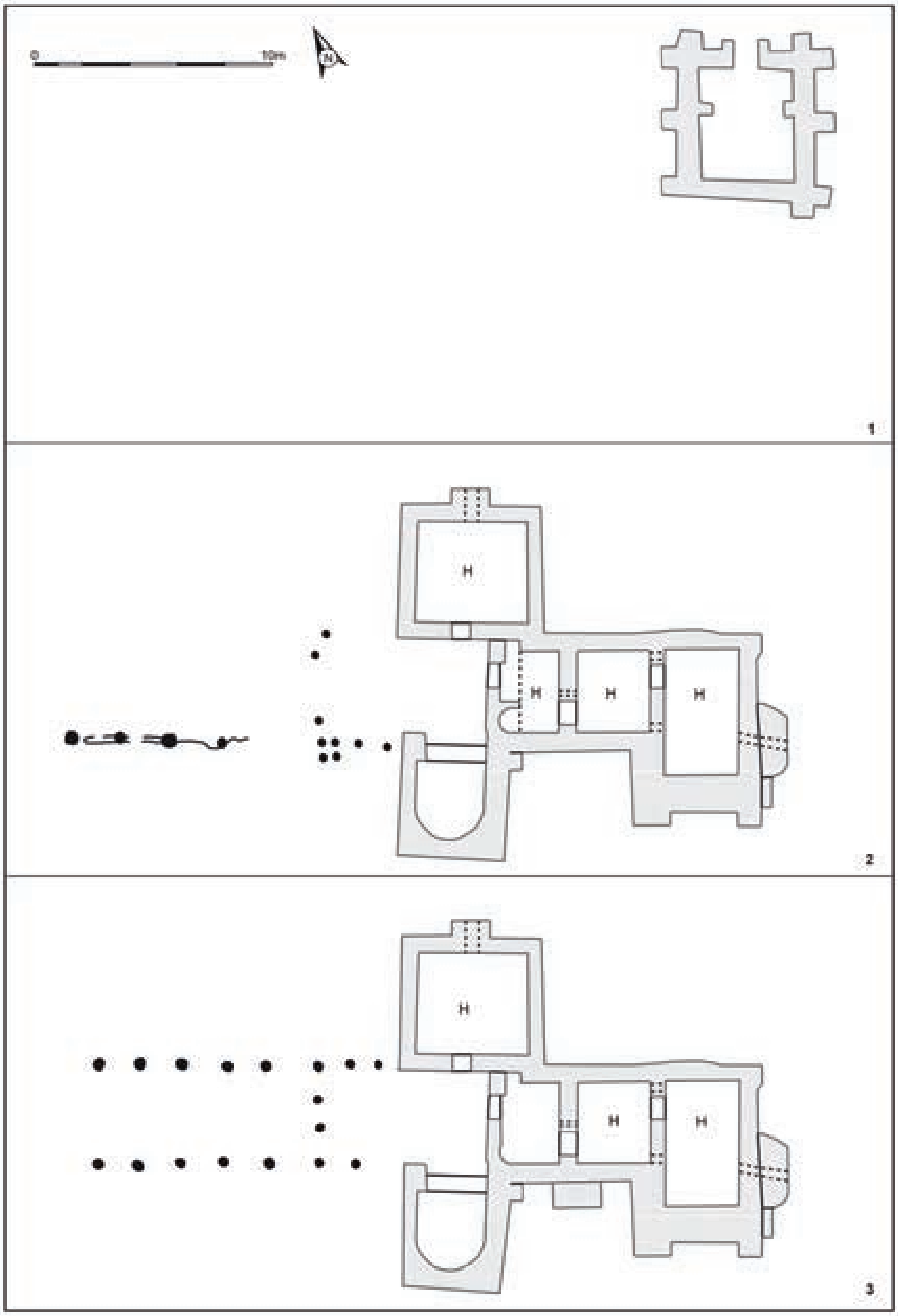


Illustration 21.7
The development of the bath-house.

help fill the hollow which crossed the annexe at this point. The adjacent area to the west, but on the other side of the rampart, also appears to have been used as a dump for several misfired vessels were retrieved here. No evidence was to found to suggest that the activities in the annexe were other than military in character. Investigations in advance of development took place on several occasions between 2002 and in 2012 in the southern part of the annexe. No buildings were discovered; there was some evidence for dumping and demolition deposits overlying some random post-holes, but in other areas the Roman features appear to have been totally destroyed by the construction of the Victorian buildings (Duncan & Leslie 2003: 32; Will & Sneddon 2010; Becket 2012).

21.4.1 The bath-house

The primary bath-house

On the Antonine Wall the bath-house was usually placed in the fort (Bailey 1994: 300–5). This is the normal arrangement in both primary and secondary forts; the placing of the bath-house in the annexe at Rough Castle may be due to the small size of the fort. Bailey has pointed out that the bath-houses tended to be simple structures and it may have been intended that they should be temporary to be subsequently replaced or extended (Bailey 1994: 300). Certainly, the bath-house at Balmuildy was demolished when the annexe was added to the fort and a larger building erected over the in-filled fort ditches. Bailey has argued that the original bath-house at Bearsden was intended to be one of the simpler structures and the opportunity was taken of the creation of the annexe to rebuild it to a larger scale. The high quality of the masonry, however, may suggest that the intention was that the building was to have been permanent. The lack of buttresses in the south wall of the building indicates that the intention was for it to extend in that direction. The building would therefore have been in a similar location within the fort to the bath-houses at Mumrills, Castlecary (assuming that the known bath-house was not that of the commanding officer's house: Bailey 1994: 304), Westerwood, Bar Hill, Balmuildy, and possibly Old Kilpatrick, all lying parallel to and inside one of the fort ramparts (Bailey 1994: 301). Bailey has suggested (pers comm) that the latrine may have lain at the south end of this building. This would have created a building a little short of 22m long north–south, assuming that it stopped short of the latrine, and probably containing three rooms. This is well within the range of the early bath-houses in Antonine Wall forts. As a drain was provided through the rampart for the sewage to flow out of the fort, it is likely that the latrine was one of the original suite of buildings in the fort. The early provision of a latrine would, in any case, not be surprising; there is a similar sewage outlet at Castlecary which would appear to have been part of the original planning of the fort (Christison et al 1903: pl IV).

All but six of the 38 voussoirs and fragments thereof were found in the rubble above the room (5.2.2.). Of the six, four were recovered from the adjacent hot room; the other two from elsewhere in the bath-house were fragments. It seems likely therefore that the voussoirs were all used to roof this room.

The internally projecting walls are problematic. They divide the internal space into two areas, one measuring 3.9m × 1.4m and the other 4m × 2.6m. As already noted, Bailey has argued that these may represent a hot room and a warm room (Bailey 1994: 302). At Cadder, the smallest room appears to have been the changing room, measuring 4.1m × 1.8m while at Bar Hill the first warm room measured 3.9m × 1.6m. These are in the range of the smaller compartment at Bearsden, but neither room served the same purpose. Other hot rooms in Antonine Wall bath-houses are generally closer in size to the whole room in the primary bath-house at Bearsden.

Finally, we may note the conclusion already reached, that while the roof may have been erected, the basement was not dug out and a hearth had been placed on the natural clay suggesting that the room provided shelter for the soldiers building the secondary bath-house.

The secondary bath-house

The secondary bath-house appears to have been built in two phases. The original building consisted of a timber changing room and cold room, a stone heated range and, to the south of the cold room, a stone cold bath. A hot dry room was added to the north of the cold room, probably even during construction. The construction of the changing room and the cold room in timber cannot be proved to have occurred elsewhere on the Antonine Wall, but it is paralleled in both the bath-houses at Walldürn in Raetia (Baatz 1973). The stone steam range of three rooms does have parallels elsewhere on the Antonine Wall (Bailey 1994). The internal bath-house at Balmuildy contained four rooms, a probable cold room with a cold bath, two warm rooms and a hot room, in a row with an additional heated room, presumably the hot dry room, to the side of the cold room. A 'paved court' in the main row and beside the cold room may have been the changing room (Miller 1922: 41–7). Again, there was evidence for modifications before the building was demolished and a new bath-house erected in the annexe. The hot dry room may have been an addition (Bailey 1994: 302).

The bath-house at Cadder started life with a simple three-room steam range which was later modified by changing the location of the furnace, adding a cold bath and a circular hot-dry room, itself modified (Clarke 1933: 53–60. Although no timber element was discovered, the existence of a cobbled surface on the side away from the furnace hints at the location of a room here.

The bath-house at Bar Hill consisted of a row of rooms immediately inside the north rampart of the fort, apparently of two phases, the first consisting of a steam range of three rooms, later extended by the addition of a further heated room, changing room and latrine (Keppie 1985: 58–64).

My purpose here is not to undertake an analysis of bath-houses on the Antonine Wall, but to emphasis that the Bearsden building follows a conventional plan with a steam range of three heated rooms, a timber changing room, and a cold bath to one side, later modified and elaborated through, for example, the addition of a hot dry room. The amendments to these bath-houses, as at Bearsden, is notable considering the short life of the Antonine Wall.

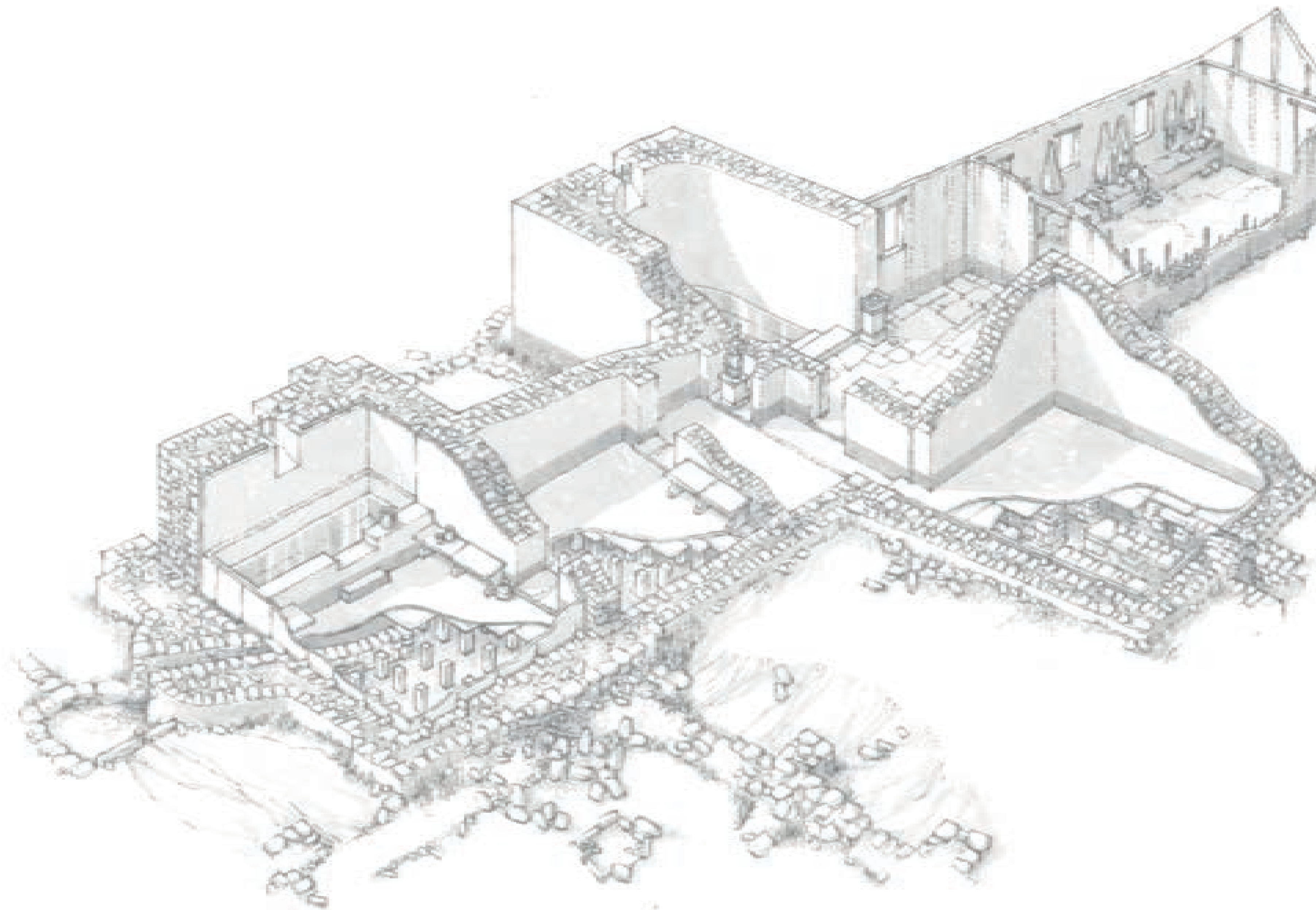


Illustration 21.8

Cut-away view of the bath-house from the north-east. At the top right can be seen the timber-framed changing room with its rammed gravel floor, wooden benches lining the long walls and pegs for the bathers' garments. In the central block lie the flag-floored cold-room with its apsed cold plunge bath, and on the right the hot dry room, its floor supported by the dwarf walls of the hypocaust below. Next comes the first warm room with a decorative semi-circular niche which may have contained a statue of the goddess Fortuna. A second warm room follows and then the final hot room with its heated bath.All the bath-house rooms are plastered. Doubtless they would have been lime-washed to reflect the limited daylight from the small windows. These were probably glazed in the actual baths suite but perhaps only shuttered in the changing room. The small altar in the cold room adjacent to the plunge bath and the statue of Fortuna make the point that religion was an integral part of the soldiers' daily life, even when socialising in the baths. Fortuna was a particularly appropriate deity for the bath-house where soldiers traditionally gambled. In the centre foreground can be seen the remains of a hot room apparently demolished to make way for the surviving baths suite, or perhaps as the result of a change of plan during construction. Drawn and described by Michael J Moore.

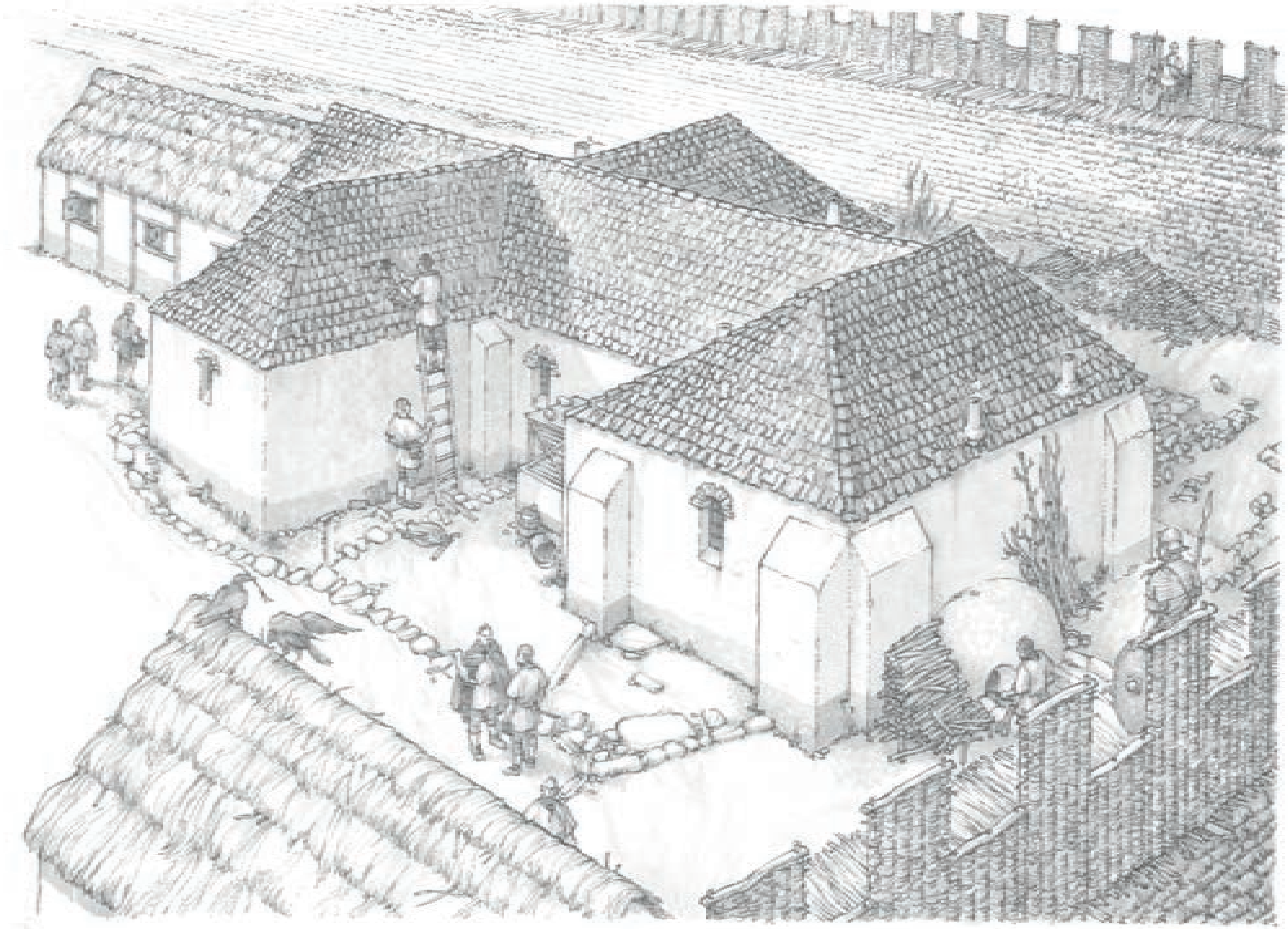


Illustration 21.9

A reconstruction of the bath-house as viewed from the south-east. The stone-built eastern part of the building is shown with well-finished external plastering and neat shingle roofs, that of the cold plunge under repair. The western range, probably a changing room, is shown as a well-constructed, timber-framed thatched building. Adjacent to the stoke-hole of the hot bath in the foreground are stacked fire wood and kindling; more is stacked in the lee of the Antonine rampart. The breast-work of the annexe's eastern rampart can be seen in some detail in the right foreground. This is shown as prefabricated wicker hurdles attached to a framework of timber posts. Panels of this type are surprisingly resilient and capable of deflecting spears and arrows. They would be easier to install and maintain than a timber palisade. A corduroy of brushwood protects the rampart top, providing a firm, well-drained footing for patrolling sentries. Drawn and described by Michael J Moore.

The operation of the bath-house

The arrangements in the heated range and hot dry room were broadly similar with each heated by a fire placed in a furnace chamber, but differed in detail. The floor of the hot dry room was supported on dwarf walls and the walls clad in wall-jacketing held in place by iron T-pieces (11.3.3.141). The heat from under the floor seeped up the gap between the walls and the jacketing, so that five of the six sides of the room were heated. The floors of the rooms in the heated range were placed on pillars usually formed of single stones. The hot room was furnished with wall-jacketing formed of upright flags held in place by iron T-pieces (11.3.3.132; 133; 138), but this arrangement was not used in the two warm rooms. In the second warm room, the floor came right up to the walls with heating ducts within the walls; nevertheless, two T-pieces were recovered from the basement of this room (11.3.3.139; 140). In the two pits found outside the west wall of the changing room were buried fragments of box-tiles and these were found elsewhere on the site. It cannot be ascertained where these were used in the building; they may have been intended for use in the primary bath-house and discarded.

The burning in the area of the stoke-hole for the heated range appeared to be more intense than at the stoke-hole for the hot dry room. Soot still adhered to the walls of the stoke-hole and the pillars and sides of the furnace passage had been badly damaged by the heat. Burnt debris had been washed down to the south of the furnace chamber in the drain and also over the ground. On the other hand, the stoke-hole of the hot dry room showed little evidence for heat and little burnt debris was found in the area. A similar situation was noted at Mumrills and the excavators there suggested that this was because different fuel had been used, wood in the heated range and charcoal in the hot dry room (Macdonald & Curle 1929: 458–9; 490). The possibilities also exist that the hot dry room at Bearsden either had a short life or was infrequently used (we do not know how often Roman soldiers bathed). The hot dry room appears to have been an addition to the bath-house. If the above suggestion that it was added during construction of the main building is wrong and it was later, the hot dry room may indeed have had a short life.

The charcoal found in and beside the flue and stoke-hole of the hot room and the stoke-hole of the hot dry room was of alder, birch, oak and rowan (one fragment). The drain south of the stoke-hole of the hot room produced rare fragments of heather and occasional burrs from bark. A small amount of burnt peat was found in the hot room flue, and burnt turf in its stoke-pit. It would appear that a variety of fuels was used in the hypocausts of the bath-house, at least for the last fires.

The stone walls in all parts of the building were bonded with clay. The walls were plastered internally, though this rarely survived. The walls of the timber

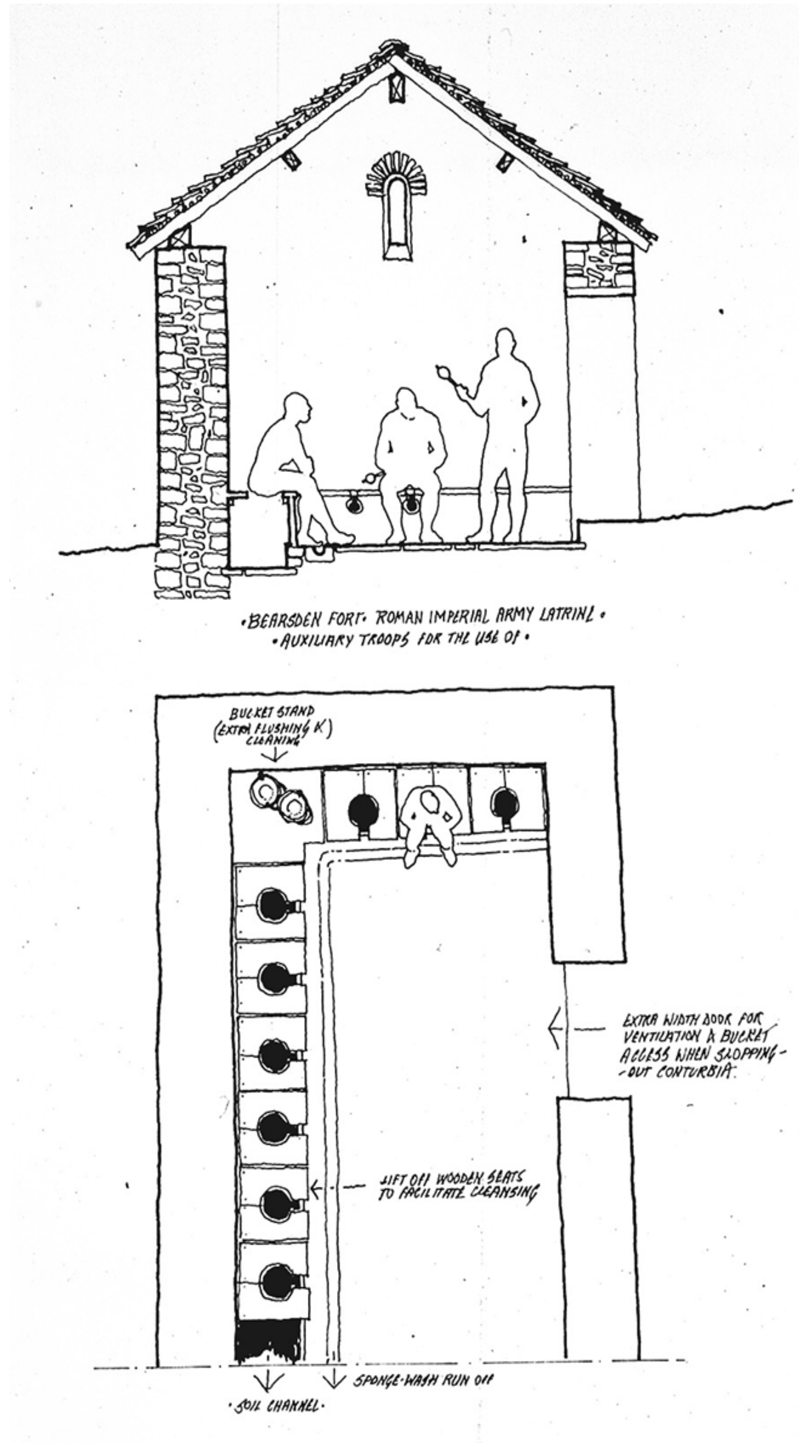


Illustration 21.10
Reconstruction plan and section of the latrine. Drawn by Michael J Moore.

end of the building were of wattle and daub. No doubt all walls were also plastered on their exterior surfaces, though no evidence survives: certainly the use of clay bonding leads to this conclusion. The lack of voussoirs in the area of the bath-house suggests that the roof was not insulated in the manner intended for the primary bath-house (cf Rook 1978: 275–6 on other roof forms). Few fragments of tiles were found in the building so perhaps the roof was of shingles or even thatch. Window glass found near the cold bath indicates that it was fitted into a wooden frame with glazing bars. The lack of window glass may be the result of it being removed from buildings before the fort was abandoned.

Something can be said of the internal fittings. A stone bench end and a seat were found in the second warm room and a further two bench ends of different design in the hot room. The niche in the first warm room presumably held a basin or a statue. A stone female head from a statue or bust was found in the cold bath; as this was next to the warm room it could therefore easily have found its way there during or after the destruction of the building (5.2.1.6). A positive identification of the head with Fortuna, the goddess normally associated with bath-houses, is not possible and Keppie has suggested that the head may represent a local goddess. Two parts of an altar, unfortunately uninscribed, were found on the floor of the cold room and the fragment of a possible second in the cold bath, while parts of two plinths may have been the bases for these altars (5.2.1.4; 5.2.1.5; 5.2.1.10; 5.2.1.11). A sculpted head which acted as a water-spout was recovered from just south of the changing room (5.2.1.7). Keppie notes that the gaping mouth resembles external fountain heads at Pompeii, Herculaneum and Glanum, so perhaps the example at Bearsden sat outside the building leading to the question of where the water came from. Several stones were decorated, one with the figure, possible a soldier, and another with a frieze of leaves and tendrils (5.2.1.8; 5.2.1.9). In spite of all the drains, the only item of jewellery was an intaglio depicting Minerva from a ring found on the floor of the cold room (10.1.1).

The history of the bath-house

There was one major structural change during the construction of the bath-house, and possibly a second. The first was the demolition of the primary bath-building before completion, apparently with its retention as a mess room while the second bath-house was being constructed. The second would appear to have been the addition of a hot dry room to the main bath-house.

Modifications were noted in two rooms of this bath-house. In the changing room the floor was replaced, with a layer of burning intervening between the two gravel surfaces. There were two modifications to the first warm room. Firstly, the floor was lifted, the pillars removed, the basement filled with clay and the floor replaced. Later, a new floor was laid. This, in part, may have been due to the subsidence of the earlier floor.

None of these modifications, in either room, can be dated. There may be something to be said for seeking to link the first change to the warm room, the infilling of the basement, to the addition of the hot dry room which appears to have caused partial reconstruction of the north-west corner of the first warm room.

21.4.2 Latrine

The latrine was strategically situated to the south-east of the bath-house and at a lower level where it could use the water from the bath-house. Two main drains led to the latrine. One combined drains from the cold room, the cold bath and the first warm room, reaching the north-west corner of the latrine as an open gulley; the other led south from the furnace chamber of the steam range and passed under the entrance to the latrine to join the sewage outfall just inside the annexe rampart and thereby help the flow of sewage.

The latrine was built of stone, at least in the lower courses, but it was placed against the inside face of the east rampart of the annexe rampart. A parallel lies at Bar Hill where the north wall of the latrine and changing room is formed by the inside face of the north rampart of the fort (Keppie 1985: 62). The roof of the latrine may have been of thatch as rushes were found on the floor.

The sewage channel was shallower than normal and, as no evidence survived to indicate stone seats, it is possible that the seating was of timber, though in any case few stone seats are known in Britain. There was space for nine seats (illus 21.10 and 11). The sewage passed along a drain and through the stone base of the annexe rampart. It was not possible to examine the inner east ditch of the annexe, but the outer ditch was sectioned and this proved to be roughly half full of sewage, its state when the fort was abandoned. It must be presumed that the inner ditch also contained sewage, the ditches linked at their southern ends. Although the sewage collected in the ditches so close to the fort, it is unlikely that the soldiers would have smelt it as it lay beneath a covering of water.

The examination of the sewage demonstrated that it contained fragments of moss. This, it has been suggested, was used by the soldiers to clean themselves. Recent discussions have considered the use of sponges for this purpose, citing the few references which survive (Hobson 2009: 139; Wilson, A 2011: 102–4). Seneca described how a German gladiator committed suicide by choking himself with a wooden stick tipped with a sponge which was devoted to the vilest uses, though, as Hobson points out, the purpose of the sponge on the stick is not explained and 'it might have been used for wiping the toilet' (Seneca, *Epistles* 70, 20; Hobson 2009: 139). Martial refers to a dinner which will soon be 'a matter for a luckless sponge on a doomed mop stick' (Martial, *Epigrams* 12, 48, 7–8; Hobson 2009: 140). A text in the Baths of the Seven Sages at Ostia refers to a sponge stick (*AE* 1941, 5). Claudius Terentius also refers to a sponge-stick (*xylosphongium*) as meaning something nasty or of no value (*P. Mich*. 471, 29). In Britain, marine sponge spicules were found in a sewer in York and Wilson agrees that they were probably used for cleaning, unlike the freshwater sponge spicules (Wilson, A 2011: 104, quoting Buckland 1976: 14–15). It is not clear whether sponges were held communally or individually; if the former, they would certainly have been a health hazard.

The discovery of the moss at Bearsden is an important contribution to this discussion. It suggests what happened in this latrine, and moreover the use of moss is not far removed from the grass mentioned in the Jerusalem Talmud as a cleaning agent (yT *Shabbat* 82a (11c 2–20), cited by Wilson 2011: 102).

Within the latrine, a shallow channel or gutter ran round the inside of the seating. Such a channel is usually interpreted as carrying the water into which the cleaning material was dipped (Wilson, A 2011: 102–3). Certainly, water flowed into the channel at Bearsden for a tile was carefully placed at the point where the drain from the bath-house entered the building, tipping the water either into the sewage channel or the interior channel. It seems likely therefore that the channel was used for wetting the moss before its use as a cleaning agent. Consideration has been given to the use of the gutter as removing spillage from those using the latrine, but the arrangement of the latrines in the Baths of the Cyclops at Thugga in North Africa demonstrates that it did not have this function (Wilson, A 2011: 104). Gemma Jansen has discussed the illnesses associated with toilets. Touching the toilet seat was a prime source of contamination and through this, or by swallowing faeces, diseases such as typhus, typhoid, cholera and dysentery can be transmitted to humans, aided of course by flees, lice, flies, mice, rats and cockroaches, the last mentioned

Illustration 21.11
A reconstruction of the interior of the latrine. Drawn by Michael J Moore.

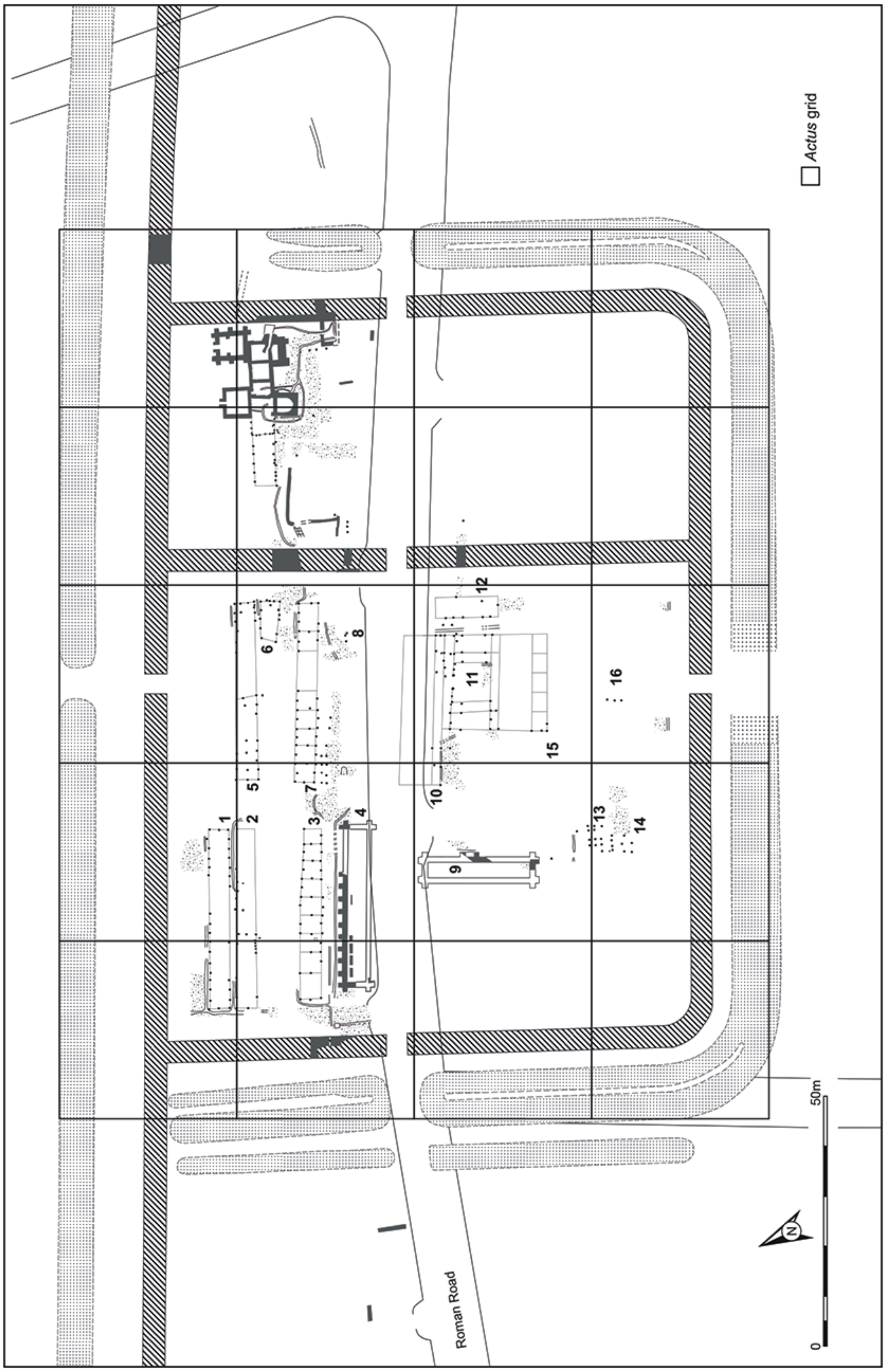


Illustration 21.12
Plan of Bearsden with the *actus* grid superimposed.

by the Elder Pliny as being found in bath-houses (Jansen 2011: 159; Pliny *NH* 11, 99). A wooden toilet seat is more difficult to clean than a stone one, while a sponge would retain bacteria, water being insufficient to cleanse it (Jansen 2011: 160). Moss as a cleaning agent to be immediately discarded would therefore have much to recommend it.

21.5 THE PLANNING OF THE FORT AND ANNEXE

The plan of Bearsden is very different from that of a 'normal' fort such as Housesteads on Hadrian's Wall. Indeed at first glance it would appear that the only consistent aspect lies in its inconsistency. To the west lay three ditches, to the east two, while to the south there was a broad ditch the width of two elsewhere. Within the fort there were open areas towards the south-east and also between certain buildings in the north half, though this may have been caused by the steep slope here. One granary was placed, unusually, in the forward half of the fort. The barrack-blocks were smaller than usual. The headquarters building was not in the centre of the fort. Finally, beside the *via principalis,* the main road through the fort, two depressions appear to have been left open during the life of the fort. While several of the individual idiosyncrasies of the fort's layout can be paralleled at other Antonine Wall forts, it is the general impression created by the combination of all these factors which renders the plan of Bearsden so distinctive.

yet it is clear that the irregular plan was not the result of mere happenstance, as the superimposition upon the plan of Bearsden of a grid based upon one of the major units of measurement, the *actus* (= 120 Roman feet) demonstrates (illus 21.12). A grid measuring 5 × 4 *actus* fits neatly over the fort (this was recognised by Dennis Gallagher). The outer lines of the grid lie on the outer lips of the ditches on all four sides, with the exception of the west where the line follows the outer lip of the middle ditch, suggesting that the outer ditch is in some way an addition to the basic plan. Half an *actus* within these lines, the next grid lines fall neatly upon the ramparts: the fort and annexe combined measure 4 × 3 *actus* and the rampart between fort and annexe lay close to a further grid line. The main east–west centre line of the grid passes through the centre of the enclosure. The headquarters building faced onto the central point of the grid on its east–west alignment. Furthermore, four of the five full-sized timber buildings in the northern part of the fort are each about an *actus* long measured externally (building 3 is the exception being shorter), while the distance over the widths of buildings 2 and 3 combined is half an *actus*, that over 5 and 7 being a little short of this measurement, though the distance from the southern row of the post-holes at the west end of building 7 to the north wall of building 5 is almost exactly half an *actus*.

There is no doubt therefore that the fort was carefully planned. Far from being a jumble of buildings thrown together, the fort reflects a care, even sophistication, in planning. The Roman military engineers knew what they wanted and provided a fort which corresponded to their needs. The plan of Bearsden should demonstrate, beyond question, that a site such as Housesteads is not the only type of Roman fort, and that Roman forts were built for specific needs, each one being unique. Analysis of the plan for a fort should therefore help to reveal the part that its garrison had to play in the organisation and functioning of the frontier.

There is a further point about the grid. Bearsden 1 relates to the grid, but so do four buildings of Bearsden 2, as does the location of the rampart between the fort and the annexe. It seems possible therefore that the soldiers who started building the first fort stayed on to lay out the second, implying no break between the two phases. On the other hand, if there was a physical plan, this may have been handed over to the new building gang.

The start point for understanding the detailed planning of Bearsden has to be Bailey's suggestion that buildings 11 and 15 together form a headquarters building. This structure sits in the centre of Bearsden 1 and on the most elevated point south of the *via principalis*. It was planned in relation to this enclosure and when that was divided into fort and annexe the building was not moved. Vegetius (3, 8) stated that in a camp the standards are first set in their place, followed by the tent which served both as the headquarters and the commanding officer's accommodation. It is not surprising, therefore, that the headquarters building at Bearsden should have been constructed first.

To its east lay a small building of the type normally interpreted as a storehouse for no better reason that it lacks diagnostic characteristics. To its west lay a granary. yet, a second granary was placed north of the *via principalis*, a most unusual location. The reason for this probably lies in the reluctance to move the headquarters building into the centre of the reduced fort, which in turn implies that the building was completed, or nearly so, when the decision was taken to create the annexe. Leaving the headquarters building asymmetrically placed to one side of the fort resulted in there being insufficient space for the commanding officer's house in its normal location, to the right of the headquarters building. In Antonine Wall forts that is the location of every commanding officer's house with the single exception of Rough Castle. The alternative place for the commanding officer's house was therefore to the west of the headquarters building. But did it lie between the headquarters building and the granary, or to the west of the granary?

It is unfortunate that neither space was available for excavation, with the exception of the northern part of the area between the headquarters building and the granary where several post-holes were recorded and, as we have seen, interpreted as part of a forehall. If the interpretation of building 10 as a forehall is preferred there would be insufficient space in this area for a commanding officer's house.

If, however, we assign the posts to the house rather than the forehall, and allow the normal space for paths between buildings and for the intervallum to the west, the available space in both locations was about the same, 25m north–south by 20m east–west. If the commander's house occupied either of these spaces it would be larger than those at Rough Castle and Cadder. The arrangements at Rough Castle and at Mumrills (and at Housesteads on Hadrian's Wall), however, offer a hint as to how the lack of space may have been dealt with at Bearsden for at both forts the commanding officer's house extended further south than the other buildings in the central range. A projection of 5m south of the headquarters building,

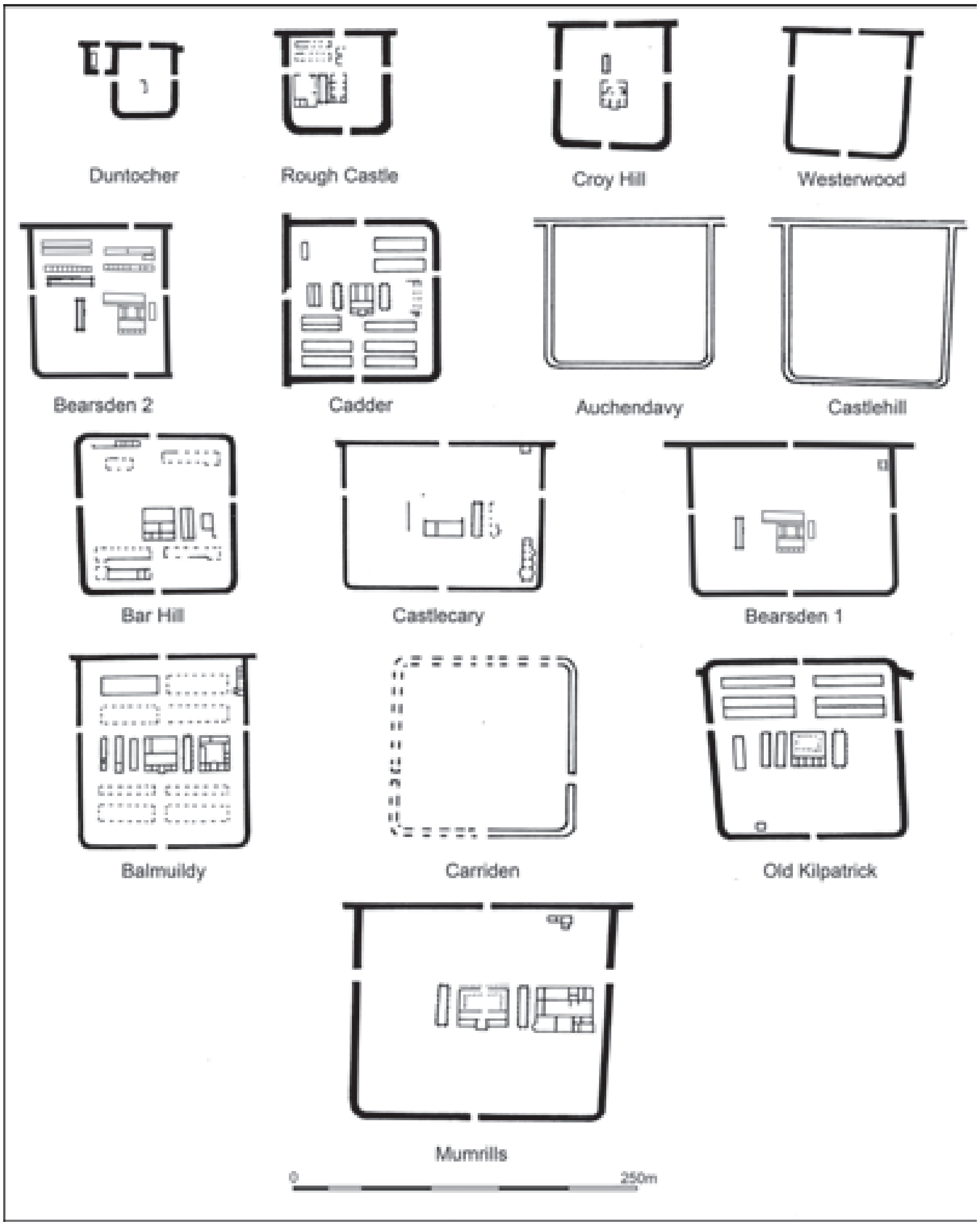


Illustration 21.13
Plans of forts on the Antonine Wall.

as at Mumrills, would offer the house similar space to that at Balmuildy.

While there is little evidence available from building 10, it does seem unlikely that this was the commander's house. If, however, the southern east–west line of posts is accepted as the southern side of the north range a house, a width of about 4m can be allowed for the range (interpolating from the presumed width of the north range of the adjacent headquarters building). This is similar in size to the 3.8m wide south range of the timber commander's house at Cadder and the east and west ranges of the stone house at Balmuildy which have an internal measurement of 3.5m and an external dimension of 4.5m; the north and south ranges were wider (Clarke 1933: 45; Miller 1922: 29). There was, however, no evidence for an eastern range at Bearsden, only one post having been recorded in this area. In short, there was no positive evidence for the existence of a

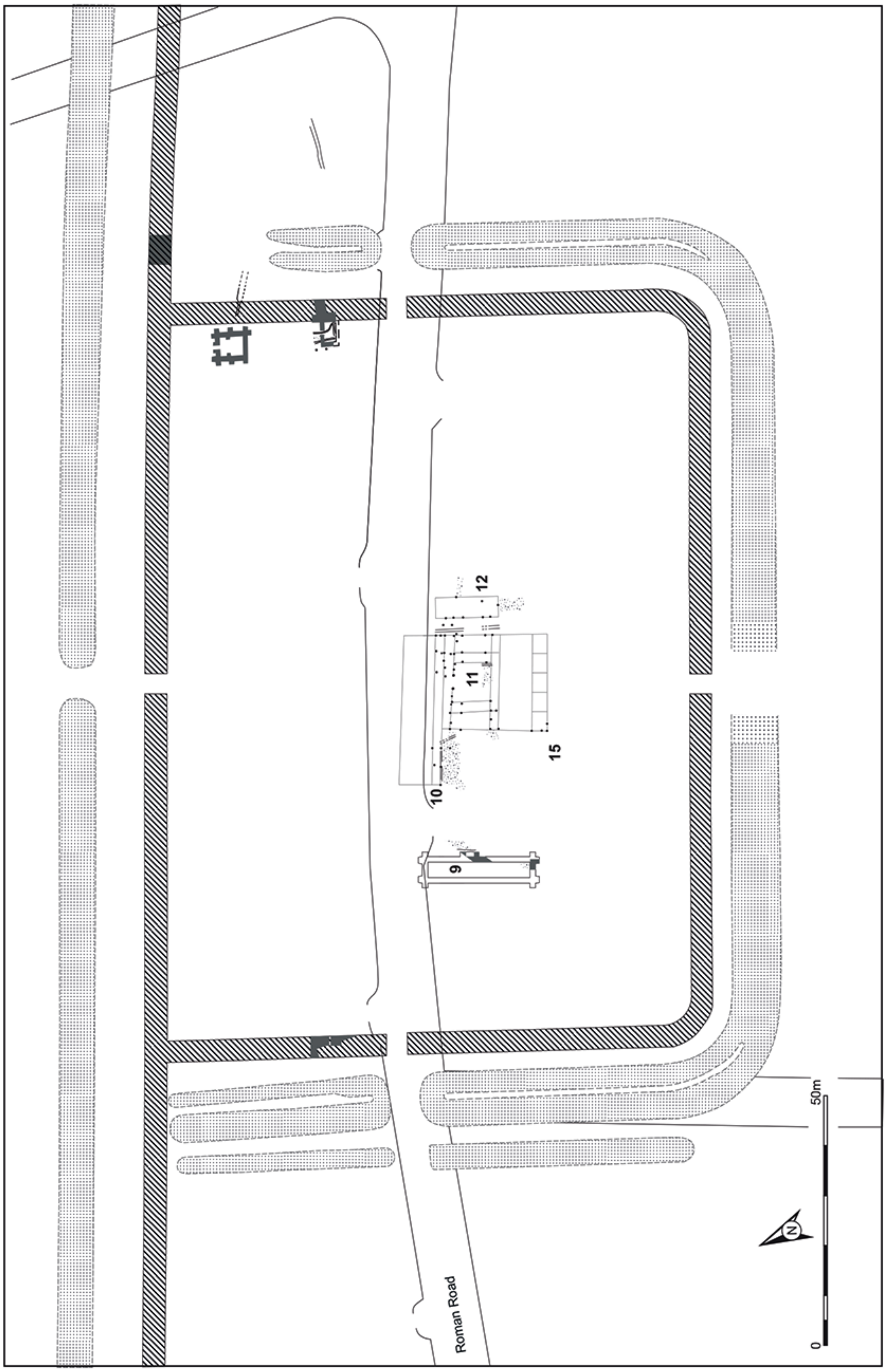


Illustration 21.14
(a) Plan of Bearsden 1.

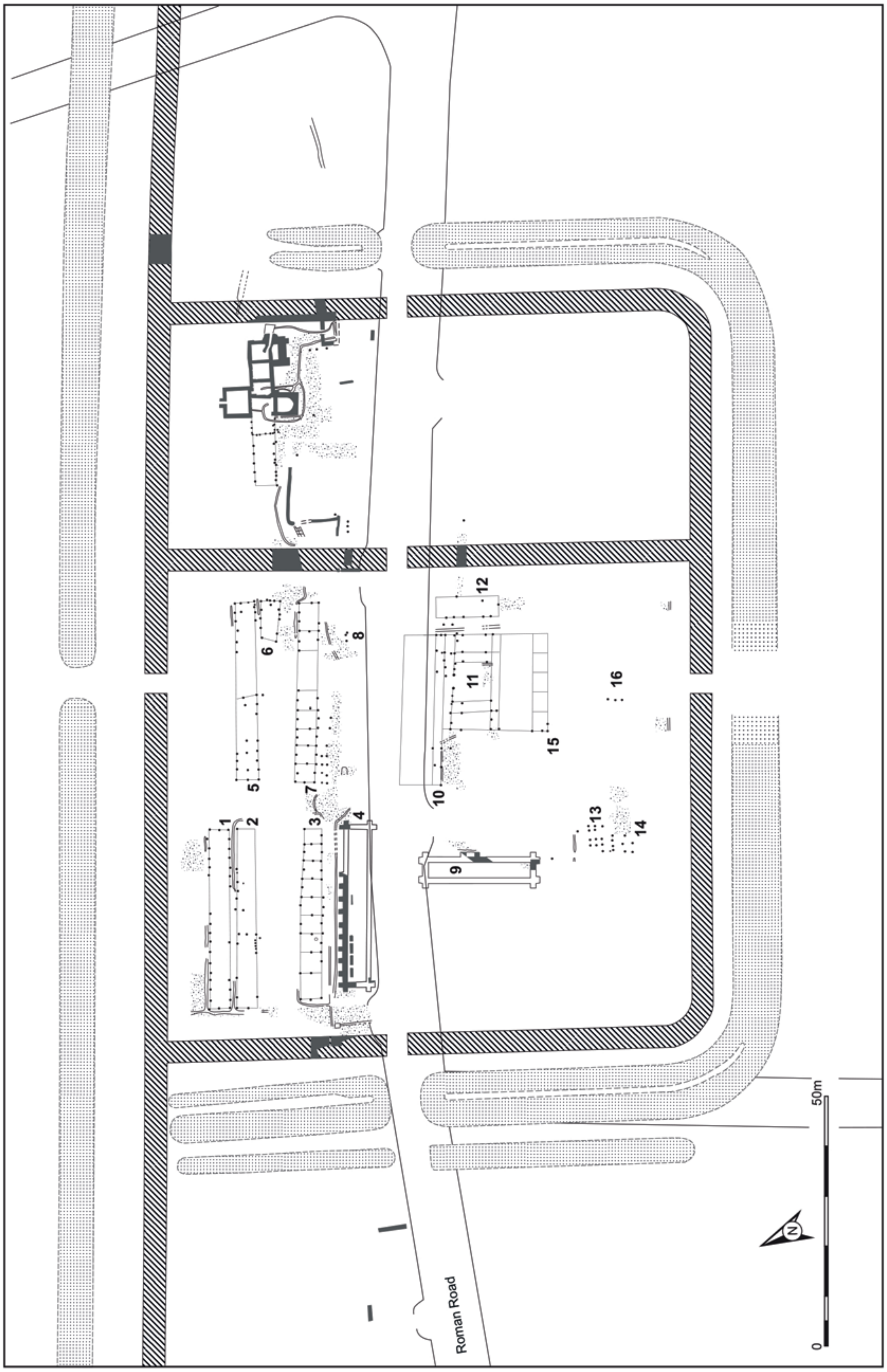


Illustration 21.14
(b) plan of Bearsden 2.

commander's house between the headquarters building and the granary.

The plans of other forts on the Wall are not much help in view of the unusual layout of Bearsden, but at Mumrills, Rough Castle, Castlecary, Cadder, Balmuildy and probably also Bar Hill and Old Kilpatrick a granary intervened between the headquarters building and the commanding officer's house (illus 21.13). If the same situation had pertained at Bearsden, it is conceivable that the commanding officer's house occupied the western end of the central range, that is beyond the granary.

A further possibility is that the commanding officer's house was eccentrically placed in the rear part of the fort. Here, again, the available space is similar, but this would be a most unusual location for this period (the house in a similar location at South Shields dates to the fourth century). yet another possibility is that the commanding officer's house lay at Castlehill, but this seems unlikely in view of the presence of the headquarters building, if such it is, (and the granaries) at Bearsden.

The location of the second stone granary at Bearsden in the northern part of the fort requires consideration. Why was it placed here? Only one other fort on the Antonine Wall had a granary in its forward area, Croy Hill, but here it was aligned north–south and was much smaller. If the post-holes forming 'building' 10 were part of a forehall, and the commanding officer's house occupied the western end of the central range, it might have led to insufficient space available for a second granary in the central range which was therefore placed in the northern part of the fort. Accordingly, to turn the argument around, we may here have supporting evidence for the existence of a forehall.

The only other building(s) which might have occupied the central range is a storehouse, such as found at Cadder and Balmuildy, or one or more timber granaries as at Old Kilpatrick, but we already have two stone granaries at Bearsden and two probably storehouses, while the posts forming 'building' 10 do not give the appearance of forming part of a granary.

To review the central range of the fort. To the extreme east end lay a small building best interpreted as a storehouse. Beside it lay the headquarters building probable fronted by a forehall. To its left was a stone granary. The commanding officer's house is therefore likely to have been located at the western end of the central range. This arrangement offers the explanation for the location of the second granary in the northern part of the fort: there was insufficient space for it in the central range. yet there was space to place one granary here. This may imply that the granary in the central range was built when it was intended that the fort would occupy the whole of the larger enclosure, otherwise it might have seemed more sensible to place both granaries to the north leaving more space for a commanding officer's house in its prime location. This argument, however, rests on the presumed existence of an undiscovered building, the commanding officer's house.

Finally, in this discussion, we may note that the unusual placing of the granary in the northern part of the fort and the presumed location of the commanding officer's house at the western end of the central range, imply that the forehall, built for the larger fort, was retained in its smaller successor. If the forehall had been demolished, we may assume that a granary or the house would have been built immediately to the west of the headquarters building.

We can conclude that the intention of those who planned Bearsden 1 was to create a normal arrangement with the headquarters building in the centre of the enclosure, one granary to each side and a house for the commanding officer to the right. This is the arrangement at Mumrills, Cadder, Balmuildy and probably Old Kilpatrick, while at Castlecary and Bar Hill a granary is known to one side of the headquarters. The other building in Bearsden 1 was the partially built bath-house which was to have been inside and parallel to the east wall. Other Antonine Wall forts had interior bath-houses in similar locations, such as Mumrills, Bar Hill and Balmuildy.

The decision to divide Bearsden 1 into a smaller fort and an annexe was clearly taken after the headquarters building and its putative forehall were constructed and a start made on building the bath-house. It seems possible that the granary in the central range had also been built (the storehouse may also belong to this phase). Once the decision was taken to divide this enclosure into a fort and an annexe, the headquarters building and granary were retained but the remainder of the fort laid out in a relatively normal way, with the central cross road, the *via principalis*/Military Way, retained and two new roads leading north (the *via praetoria*) and south (the *via decumana*) from it. Buildings were arranged to each side of the *via praetoria*, the two unusual elements being the placing of a granary in the northern part of the fort, for reasons already discussed, and the existence of two depressions immediately north of the *via principalis* to the east of the granary. While the depressions appear to have lain in a slight valley running westwards into the site, it would have been possible to fill this in. So, the depressions were retained or excavated for a particular reason and that may be for the collection and retention of water. The intention may have been to collect water for the horses.

The next problem is: where were the north and south gates? The assumption during the excavation was that these two gates lay in the centre of the north and south ramparts of the fort. Excavation of the ditches opposite such gates, however, failed to find evidence for causeways. Following the end of the excavation geophysical survey was undertaken on the line of the south ditch, today occupied by several large trees which had prevented excavation. This revealed the possible site of a causeway in the middle of the south defences. This underlines the possibility, indeed probability, that the south and the north gates to the fort were located in the centre of the larger enclosure and were not moved. This would account for the lack of causeways in the areas where they were sought. By the time that it was discovered that there had been a change during the building programme, the centre of the north side of the enclosure was not available for excavation as it was being built on. One further possible piece of evidence may be offered for the north gate remaining in its presumed original location, the extensive space north of building 5. This may have been left to allow for movement in the area. The asymmetrical placing of fort gates is not unusual on the Antonine Wall. The south gate of Rough Castle and the north gate of Cadder both lie a little distance from their appropriate locations (Robertson 2015: 72 and 101).

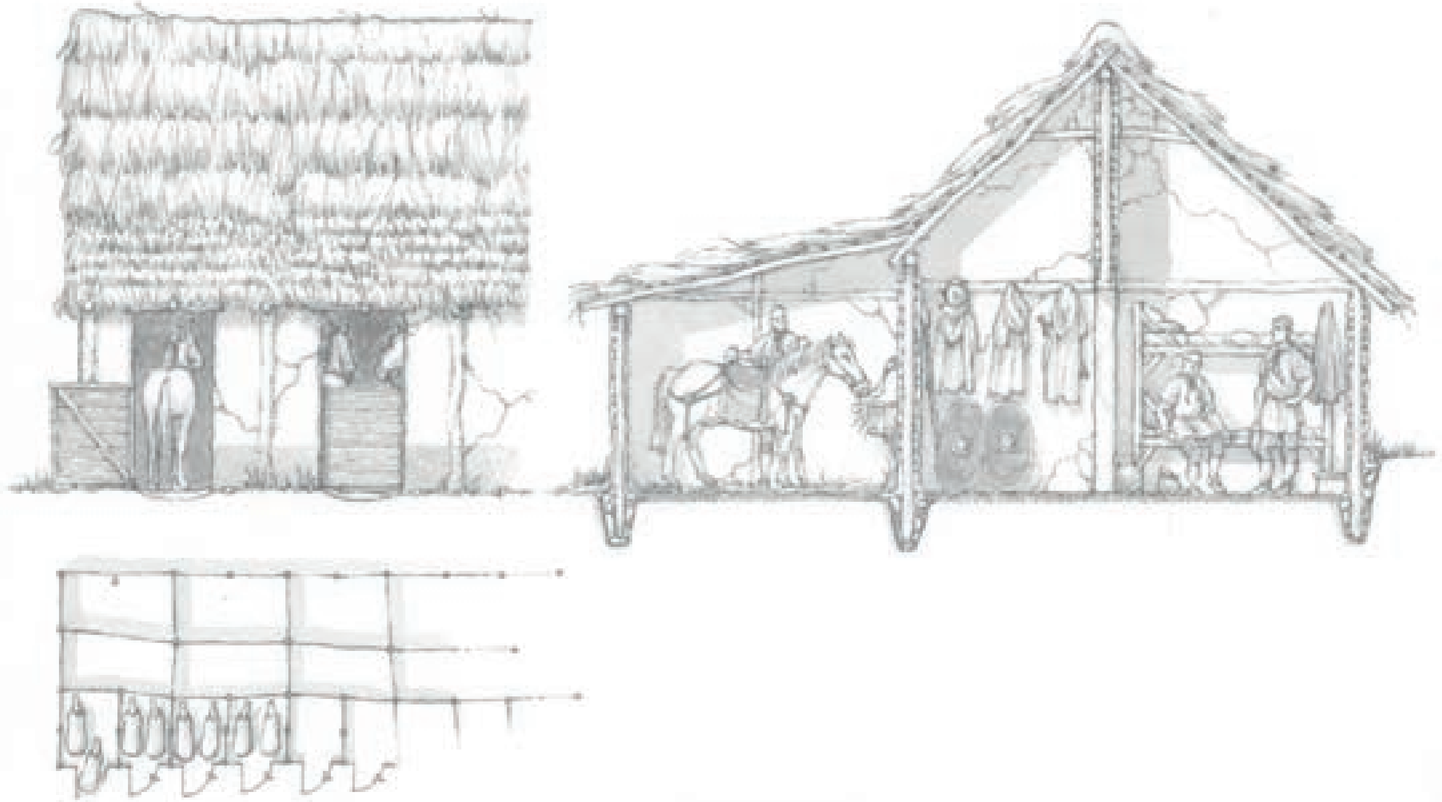


Illustration 21.15
A possible reconstruction of building 7. This interprets the building as incorporating both barrack-rooms and stables on the lines of buildings on Hadrian's Wall and the German frontier. This interpretation could explain the grouping and close spacing of the surviving post-holes in the southern third of the building. The elevation and section show how such a combined building might have looked with stabling to the front, a tack-room for harness, armour and weapons in the centre and barrack-room with bunks to the rear. Drawn and described by Michael J Moore.

The gaps within the fort have already been mentioned. While it has been argued that those in the northern part of the fort may relate to the steep slope, it is possible that they, and the apparent lack of buildings in the south-east corner of the fort, were due to the full complement of buildings not having been provided. Keppie has reviewed the evidence available for the forts along the Wall and suggested that it was lightly held (Keppie 2009a). At Bar Hill, he argued, perhaps only four barrack-blocks were erected when six were required for the full complement of each of the units attested there; at Cadder no buildings were found by the excavator in the *praetentura*; while at other sites, Balmuildy, Rough Castle, Old Kilpatrick and Castlecary, the presence of barrack-blocks is inferred and at Croy Hill and Duntocher the space available for any such buildings was very limited (Keppie 2009a: 1138–9). Keppie's conclusion was that the army of Britain did not have enough troops to occupy all the known forts and fortlets at the same time (Keppie 2009a: 1141).

This discussion of the planning of the fort has concentrated on Bearsden 2 and the headquarters building of its larger predecessor. There was, however, another building within the first fort, the bath-house. This, as we have seen, was placed in a normal location for bath-houses in Antonine Wall forts, parallel to one of the ramparts (Bailey 1994: 301). The division of the large enclosure and the decision to rebuild the bath-house resulted in a location which can be paralleled most closely at Rough Castle but also to an extent at Balmuildy. Its new location, however, had no impact on the planning of the smaller fort as it lay outside it.

21.6 THE UNIT BASED AT BEARSDEN

In the northern part of the fort, five long narrow timber buildings were recognised and planned, together with a short sixth. Four of the five are all the same length – the fifth is about 1.6m shorter – and about the same width. Two of the buildings, 3 and 7, are recognisable as barrack-blocks. Each contained eight rooms, identified either through excavation or interpolation, and a larger room at the rampart end, the normal location of the officer's quarters. The location of the gulley close to the north walls of both barrack-blocks together with the greater distance of the gulley from the south wall suggest that the two buildings faced south. If the additional row of posts to the south of the eastern end of building 7 supported a verandah, this would be additional support for the building facing south (illus 21.15).

No evidence for partitions was found in building 1 in spite of extensive investigation of the building. The arrangement of the internal divisions in buildings 2 and 5 was not the same as in the barrack-blocks. In building 2, two post-holes were recorded within the building, but neither was placed at the normal intervals pertaining in buildings 3 and 7. Equally, the post-holes recorded in building 5 would not permit an arrangement of rooms similar to those of the barrack-blocks. Analysis of the distribution of pottery underlines the differences between buildings 1, 2 and 5 on the one hand and 3 and 7 on the other (section 21.11.6). In brief, the presence of at least one fragment of a mortaria and cooking pot in nearly every one of the rooms of 3 and 5 and the different distribution of such vessels in the other three buildings supports their interpretation as barrack-blocks.

Before turning to analysis of these buildings, building 6 must be considered. No firm statement can be made about its function. There are several possibilities:

- a storehouse;
- an open compound for, say, fodder;
- it may have formed part of the officer's quarters of building 5, divided by a corridor;
- additional accommodation for horses (see below);
- it was not completed; its west end is not symmetrical and one possibility is that it was the eastern end of a barrack-block which was partially built, then demolished and moved a little to the north.

The crucial point is that building 6 cannot sensibly be taken into any discussion about the arrangement of the fort.

The literary evidence for the arrangement of men within barrack-blocks is non-existent. The nearest and indeed only useful source of information lies in the pages of a book on Roman fortifications by an anonymous writer usually known as Pseudo-Hyginus who described the arrangements for an army on campaign; unfortunately his work has been variously dated to the late first century or the second half of the second century (Frere 1980; Birley 1982). Birley acknowledged that the book contained material of different dates, and suggested that, while it may have been composed in the fourth century, part of it was certainly a description of the army of about the time of the Antonine Wall. Pseudo-Hyginus stated that an infantry century contained 80 men. He goes on to say (1–2) that in a century one tent was provided for the centurion and eight for the soldiers, eight men being assigned to each tent, with two tent groups on duty at any one time, taking over the accommodation of their comrades when they changed duties. This might seem a little strange to modern thought, but in fact beds were also shared in the British army of the eighteenth century when soldiers slept two or three to a bed. The equipment of the soldiers was placed in the space immediately in front of each tent.

Roman barrack-blocks erected for auxiliary soldiers such as those believed to have occupied Bearsden could contain any number of rooms between six and ten. Most, however, contained either eight or ten and were subdivided into a front and a back room (Johnson 1983: 166–76).

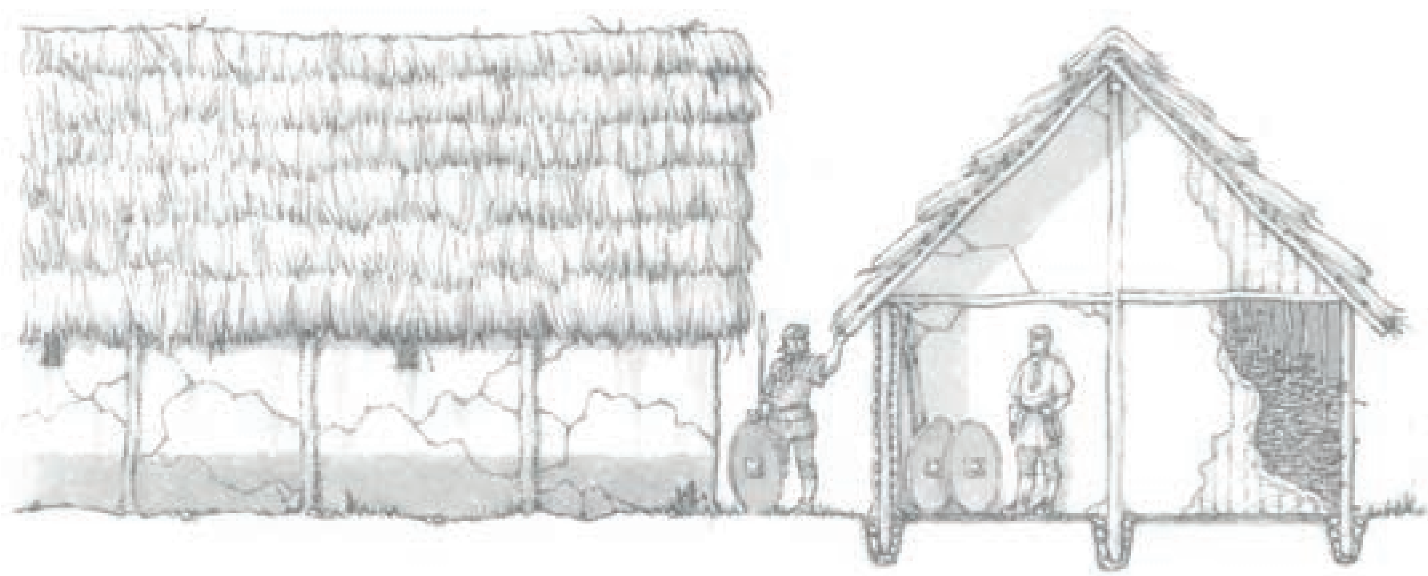


Illustration 21.16

A restored section and elevation of a timber building. The irregular setting out, variations in post-hole spacing, slight scantling of vertical posts and poor flooring all indicate that the majority of the forts buildings were 'jerry built'. This would suggest poor thatching, poor daubing, and possibly poor maintenance. The part elevation and section show the probable appearance of most buildings within a month or so of completion. Despite the poorly finished thatch and prominent cracking of the daub the buildings would be reasonably weather-tight. They may have been lime-washed on completion and provided with a contrasting ochre or dull red splash-band at the foot of their external wall faces. The wavering walls would make their conventional painting to represent the mortar lines of stonework an unlikely further decoration. Drawn and described by Michael J Moore.

On the basis of the description of Pseudo-Hyginus it is normally assumed that barrack-blocks with ten rooms were built for an infantry century of 80 men, eight soldiers occupying a double barrack-room, while barrack-blocks with eight rooms were occupied by two cavalry troops of 32 men in each, the 64 men being divided up again eight per room. The relationship between the two types of barracks can be seen at Corbridge where a barrack-block of ten rooms was replaced by one of eight when the regiment based there was changed (Bishop & Dore 1988: figs 72 and 73), and at Elginhaugh where the fort contained barrack-blocks with ten rooms and another apparently with eight (Hanson 2007: fig 12.3). It is also assumed that where double rooms occur, the rear room was used for sleeping and the front for storing equipment on the basis of the statement by Pseudo-Hyginus that the equipment was placed in front of the tent.

It is unclear where the two senior officers (and possibly others) immediately below the centurion and decurion lived. There is no evidence for separate accommodation (Breeze 1969), but it may seem unlikely that they shared the barrack-rooms of the ordinary soldiers. As a result, it has been suggested that they shared the accommodation of the centurion/decurion (Hodgson and Bidwell 2004: 134).

A further problem is the size of the troop. The literary evidence may be briefly stated.

- Arrian, governor of Cappodocia under Hadrian and therefore close in date to the building of Bearsden and author of three books about military affairs, refers to 64 riders and 128 riders thereby indicating a strength of 32 for each troop, while a subsequent passage suggests that the *duplicarius* and *sesquiplicarius* were part of the 32 (*Tactical Handbook* 18; 42);
- Vegetius (2.14), writing in the fourth century but using earlier material, stated each legionary cavalry troop contained 32 men;
- Psuedo-Hyginus is more complicated, indicating troops of different sizes for the 1,000-strong cavalry unit and the 500-strong unit, the latter, through simply arithmetic, being calculated as 31 strong, though the author does not specifically state that, while elsewhere he gives the figure of 240 cavalrymen in a larger mixed unit, which suggests troops 30 strong (16; 27).

The documentary evidence is more difficult to use as it is clear that Roman units could often operate below strength (Breeze 1984b: 264–8; Tomlin 1998: 46–8; Hodgson 2003: 86–90). Finally, Hodgson and Bildwell argued that the size of the troop was 30, on the basis of the archaeological evidence at Wallsend and South Shields, where three horses could have been accommodated in each of the nine rooms of the stable-barracks, a figure supported by the survival of three mangers in each of the stables at Gasr Bshir in Jordan; they placed the junior officers with the decurion (Hodgson & Bidwell 2004: 134; Kennedy & Riley 1990: 177). The major difficulty with this proposition is that even a troop 30 strong would have required space for 35 horses as the decurion and his two senior officers were assigned four remounts (Pseudo-Hyginus 16).

The difference in size between 32 and 30 is not that great to affect the discussion of the barrack-blocks at Bearsden and therefore will not be considered further. Here, the testimony of Arrian and Vegetius is preferred and it will be assumed that each troop consisted of 32 men, including the *duplicarius* and *sesquiplicarius*, and one officer.

At Bearsden the unusual feature is that the rooms in the barrack-blocks are so small. The average measurement in building 3 is 4.2m × 3.6m, that is an area of 14.4m^2, and in building 7 3.7m × 3.6m, an area of 13.3m^2. On the Antonine Wall, only Bar Hill is available for comparison and here the single barrack-room recorded in a timber building measured 7.4m × 3.6m and contained 26.6m^2; that is, it was about twice the size of an average barrack-room at Bearsden. The room at Bar Hill, however, had probably been subdivided into a front and back room. The barrack-rooms in the contemporary fortlet at Barburgh Mill varied in size but on average were 50% larger than those at Bearsden (Breeze 1974b). The barrack-blocks on Hadrian's Wall tended to offer more spacious accommodation than those on the Antonine Wall, as is demonstrated by the figures for Housesteads (illus 21.21). It seems possible therefore that only four soldiers, together with their equipment, occupied each barrack-room at Bearsden rather than the normal eight, and that each block was assigned to a single cavalry troop of 32 men, a total of 64 therefore being accommodated in the two certain barrack-blocks in the northern part of the fort.

Table 21.3
Antonine barrack-blocks, room sizes

Bearsden (average) B3	4.2m × 3.6m	14.4m^2
B	3.7m × 3.6m	13.3m^2
Bar Hill (only one known)	7.4m × 3.6m	27m^2
Barburgh Mill fortlet	6.5m × 3.4m	22m^2

Turning to the other buildings in the forward half of the fort, there are three long narrow buildings, similar in size to the barrack-blocks, but, as we have seen, without the same internal arrangements. Long narrow buildings are frequently, simply out of our ignorance, considered to be storehouses, but the most one might expect in a fort of this size is two, not four. If the interpretation of the barrack-blocks is correct, then stabling would be required somewhere. It should be noted, however, that any fort might be expected to include stables to house the pack animals whose existence is recorded by Roman writers (Caesar, *Gallic War*, 8, 45; Josephus, *The Jewish War*, 5, 4; Pseudo-Hyginus 1; Breeze 1988: 584), as well as other horses such as the commander's mount.

At Bearsden, no mucking-out drains, which might indicate their function, were found in any buildings (Hodgson & Bidwell 2004). Nor were they found outside. It might have been expected that drains would have been placed on the down-side of stables, but none existed, nor were pits of the type found at South Shields (Hodgson & Bidwell 2004: 136). As has been discussed,

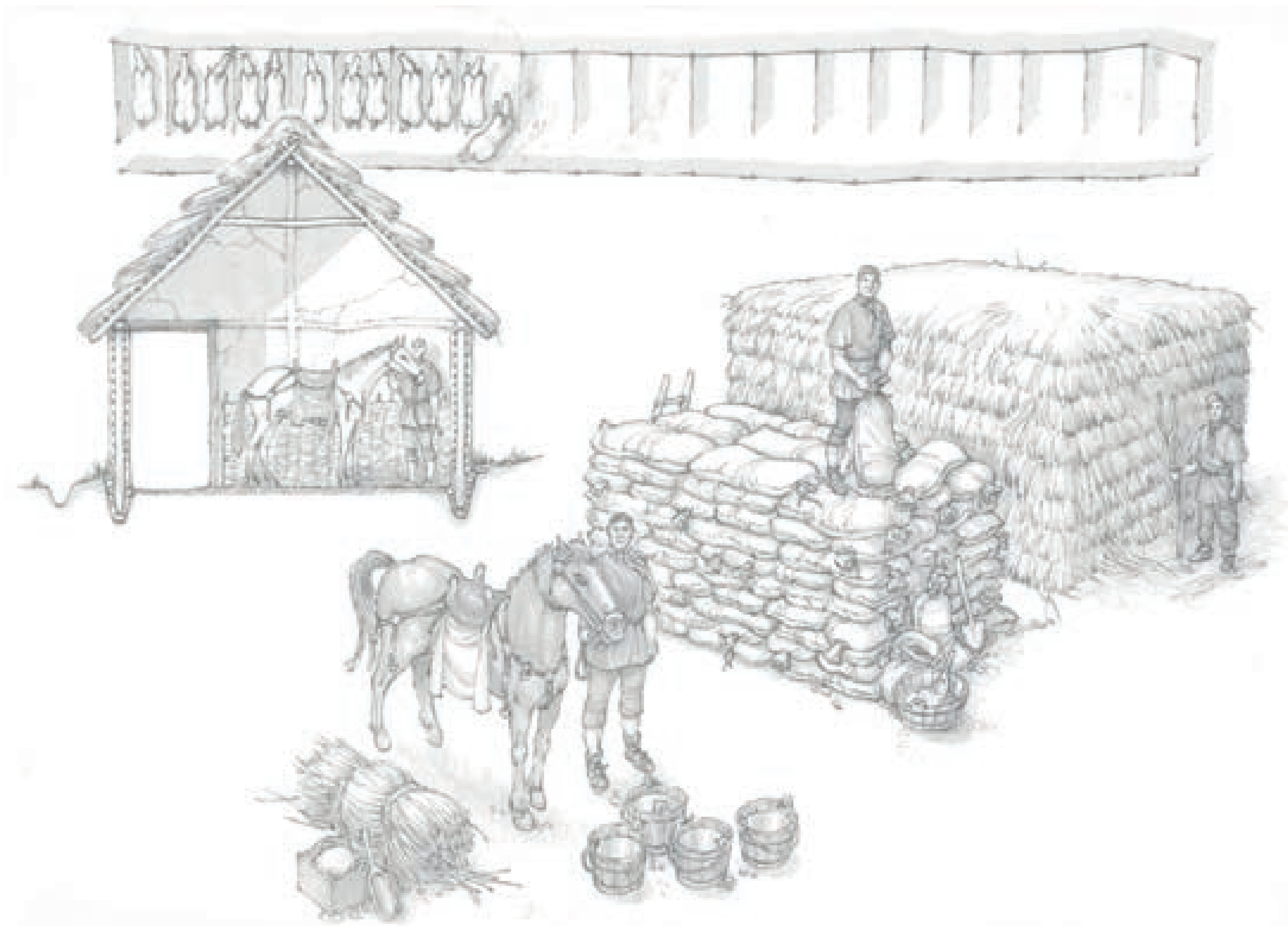


Illustration 21.17
Stabling and pony food. Roman cavalry mounts, small agile animals less than 1.5m high at the withers, would be considered ponies rather than horses in modern equine parlance. The plan and section depicts one building reconstructed as a stable for some 35 ponies. They are shown in single or double stalls to reduce kicking and to help with feeding and mucking out, although evidence for partitioning within any of the putative stables is slight. The doors to the stable, one at each end, are shown on the down-slope end of each gable. The pony in the foreground is shown with hay, grain and water for one day. The stacks behind him show the grain (in sacks) and hay required to feed seventy or so ponies for one week. Watering the stabled ponies at least twice a day would be a major logistical exercise. There are several contemporary representations of civilian carts and wagons carrying very large barrels. Possibly the Roman army has its equivalent of the Victorian army's standard water carts for garrison use. Drawn and described by Michael J Moore.

the area of these buildings was sampled in the hope that high phosphate readings would result, or micro fossils might indicate, the presence of horses, but the work proved to be inconclusive. The outer east ditch, however, did yield one type of beetle which was associated with horse dung, though a link with cow dung is also possible, and there is no certainty that the beetle came from within the fort. There were also beetles in the ditch associated with mouldering hay and straw, and remnants of hay were found in the fort, but that is not proof of the presence of horses. Nor is a single horse shoe in itself indicative of the presence of cavalry as it may be modern and, if Roman, used to shoe a mule rather than a cavalry horse (11.3.5.222).

The size of the horses determines how many might fit into a stable. Unfortunately, there is no firm agreement on the size of Roman cavalry horses, the figures ranging from 12.7 to 14.9 hands (Hyland 1990: 68–9). One statement of army regulations stipulates that if the horses are picketed without partitions separating them, they should be 1.5m apart; if divided by partitions they could be as little as 1m apart (Regulations of the 9th Virginia Cavalry). Hodgson and Bidwell (2004: 133), citing Roman parallels in North Africa, suggested that 1.2m would be required for horses of 12.7 to 14.9 hands. Hodgson has also noted the width of the doors into the stables at the fort at Gasr Bshir in Jordan can be as narrow as 1m (Hodgson 2003,

Illustration 21.18
The mucking-out logistics. A working pony produces about 65.5 litres of waste, (solids, urine and spoiled bedding) each day, the equivalent of eight large bucketfuls. Each week 70 or so ponies would together produce about 35 cubic metres of stall-waste, when neatly stacked a mound of the size shown in the middle distance. The same 70 ponies would require some 20 cubic metres of replacement bedding each week, a stack of the size of that beyond the waste mound. Feeding, watering and the disposal of stable waste would be a major and continuing task for the soldiers. As elsewhere in the Empire, civilians may have been employed to assist with this work. The use of manure in farming was already understood and this by-product of a cavalry garrison may have been traded within the local agricultural community, who must have provided much of the fodder and bedding required by the garrison's ponies. Drawn and described by Michael J Moore.

90, citing Kennedy and Riley 1990: 177). Thus, at Bearsden, a building 35.5m long could accommodate 23 horses if 1.5m apart, 29 if 1.2m apart or 35 if only 1m apart. If the last measurement is correct, the horses of a single troop could occupy one building at Bearsden, though without the full complement of four remounts; if the second is appropriate, then the number is close to that argued by Hodgson and Bidwell. In this way the four main buildings in the northern part of the fort could accommodate two troops and their horses.

There is another way of looking at the barrack accommodation (illus 21.19 and 21.20). It is puzzling that the barrack-blocks do not correspond to the norm where each barrack-room is divided into two, the back room presumably used for sleeping and corresponding to the tent on campaign and the front room used for the storage of equipment and corresponding to the area in front of the tent assigned to that purpose by Pseudo-Hyginus (1). No traces of internal partitions were found; nor were they at Bar Hill and Barburgh Mill (Macdonald & Park 1905; Breeze 1974b). In seeking a solution, evidence by analogy, that is evidence from elsewhere in the Roman empire, may come to our aid.

The barrack-blocks at Bearsden are the equivalent, in timber, of the narrow stone barracks at Birrens. At Birrens the buildings are placed back-to-back (as buildings 1 and 2 at Bearsden), but it

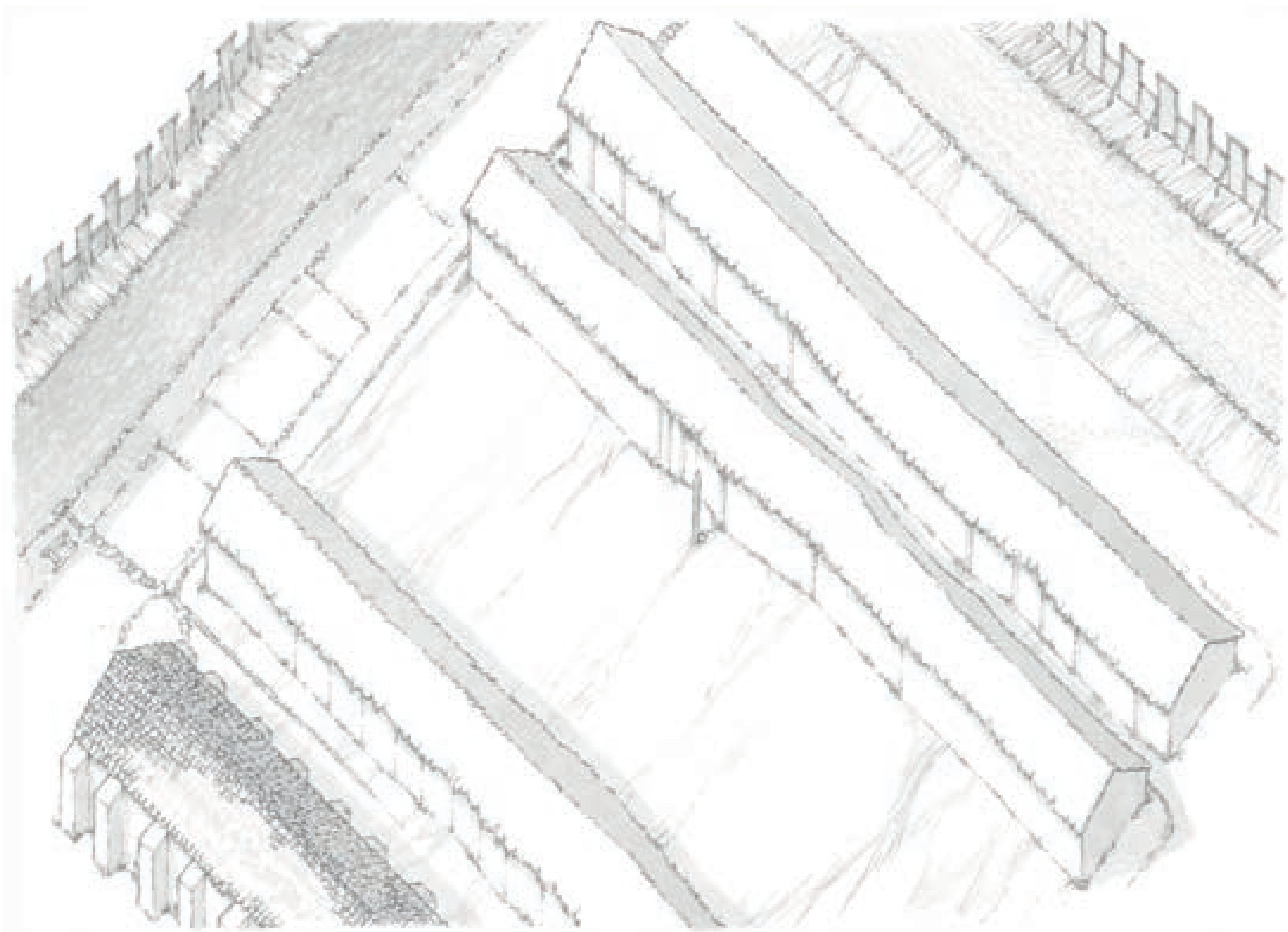


Illustration 21.19

A reconstruction of the buildings in the north-west area of the fort. In this illustration the buildings are shown in simple block form to emphasise their poor setting out, irregular post spacing and consequently rough and ready appearance. Despite the steep fall from north to south, there was little evidence of the extensive terracing that buildings of this size would ideally require. Consequently the ridge line of the timber and daub buildings snake across the site. No doors or fenestrations are shown in this view since there is no evidence of their type or position and the actual use of the buildings is conjectural. In contrast, the granary, partly visible in the foreground, is accurately set out and well built in rough-dressed stone. Conventionally it might be expected to have been roofed in stone slates or terracotta tiles. There was some evidence for tiles, but it remains possible that it and its smaller companion in the south-west quadrant were roofed with shingles. Drawn and described by Michael J Moore.

seems possible that these two buildings together did not form one complete barrack, divided by an eavesdrip, but rather the unit was formed of two buildings facing each other across a street, the sleeping quarters lying on one side of the street, and the equipment in the rooms on the other (illus 21.21).

Is it possible that the same arrangement pertained at Bearsden? Could the buildings be paired together, 2 and 3, 5 and 7? While the internal arrangements, so far as they are known, in buildings 2 and 5 suggest that they are not barrack-blocks, idiosyncratically placed internal partitions may be of less concern in the case of equipment rooms. The planning of the buildings might suggest that they were intended to function together, as both pairs measure half an *actus* across their outer walls. There are, however, two difficulties. First, the two buildings lie at different levels: for example, building 7 lay 1m lower down the slope than building 5. Building 3 lay 2m downhill from building 2. Whether this is significant or not is difficult to say. Second, both buildings 3 and 7 appear to have been orientated in the wrong direction for them to articulate with their putative pairs.

Nevertheless, these two pairs of buildings may have been associated and if so each room in buildings 3 and 7 would have held eight men and therefore each barrack-block will have held two troops of 32 men, a total of 128 in the northern part of the fort.

Apart from the difficulties already discussed, the accommodation for the two decurions in charge of the two troops in each barrack-block would appear to be unusually small.

One final problem is that while barrack-blocks containing eight rooms are usually associated with cavalry, some forts appear to have provided accommodation only for those soldiers permanently based there, ignoring those men in the unit who were based elsewhere (see Breeze 1977c: 459 for the suggestion of a similar arrangement at Birrens). Sometimes these outposted soldiers appear to have been a single century, while some detachments were drawn from different centuries and troops (Breeze 1977a). Accordingly, it is not impossible that if the unit based at Bearsden provided soldiers for service on outpost duty, accommodation was not provided for them at the fort and this might account for smaller barrack-blocks occupied by parts of infantry centuries rather than cavalry troops.

In summary, there are at least four ways of interpreting the buildings in the northern half of the fort:

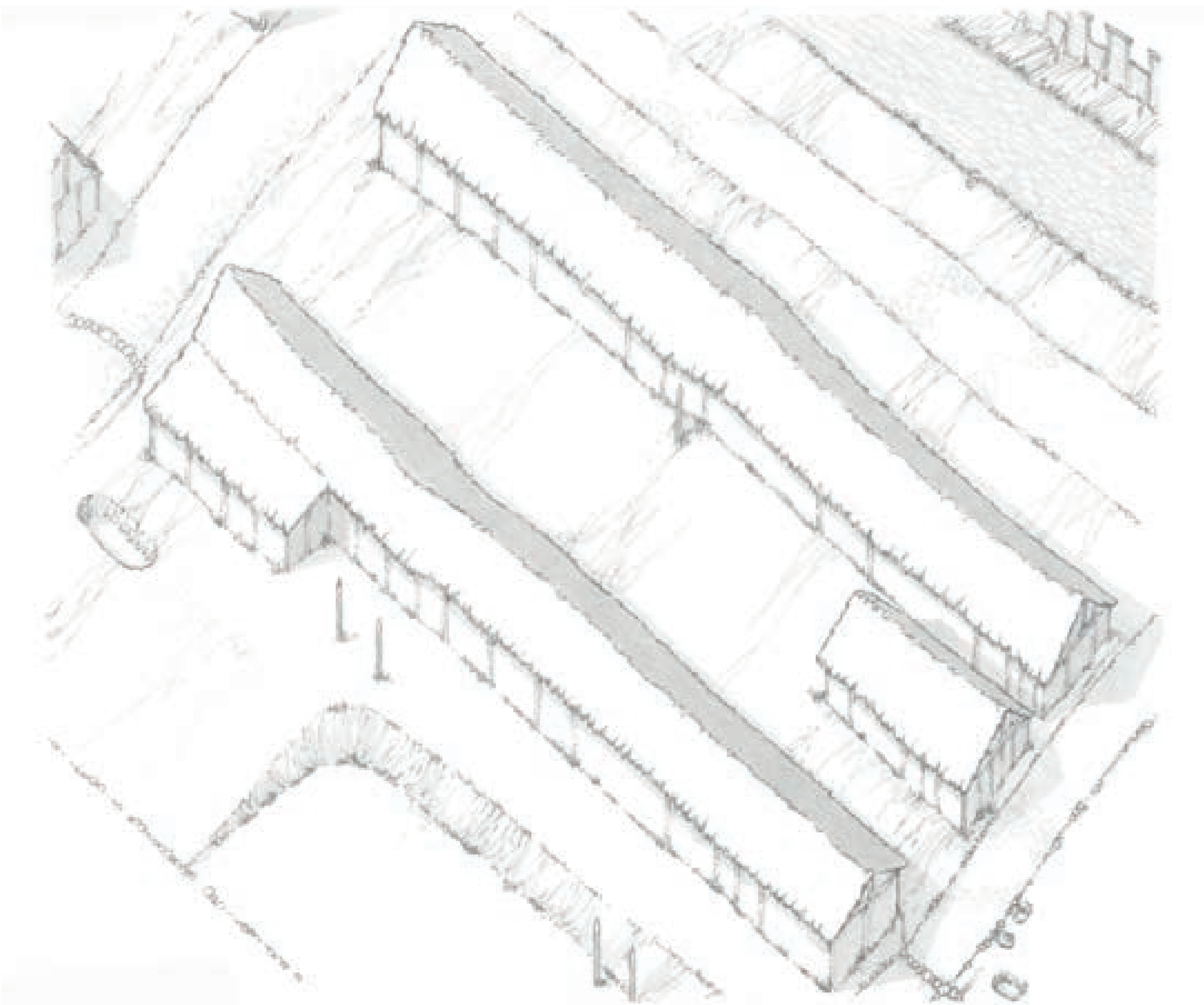


Illustration 21.20

A reconstruction of the buildings in the north-east area of the fort. As with the view of the north-west quadrant, these buildings are represented in simple block form without fenestration or doors. Again the poor setting out, irregular post spacing and undulating ridge lines are evident. The post-holes of the building in the foreground, possibly a barrack-block, are open to several interpretations. Here the building is shown with a lean-to extension at its western end, one possible explanation for the complex arrangement of post-holes found there. Several free-standing posts (of indeterminate purpose) are shown occupying post-holes which do not align with, or apparently form part of, the buildings shown. Drawn and described by Michael J Moore.

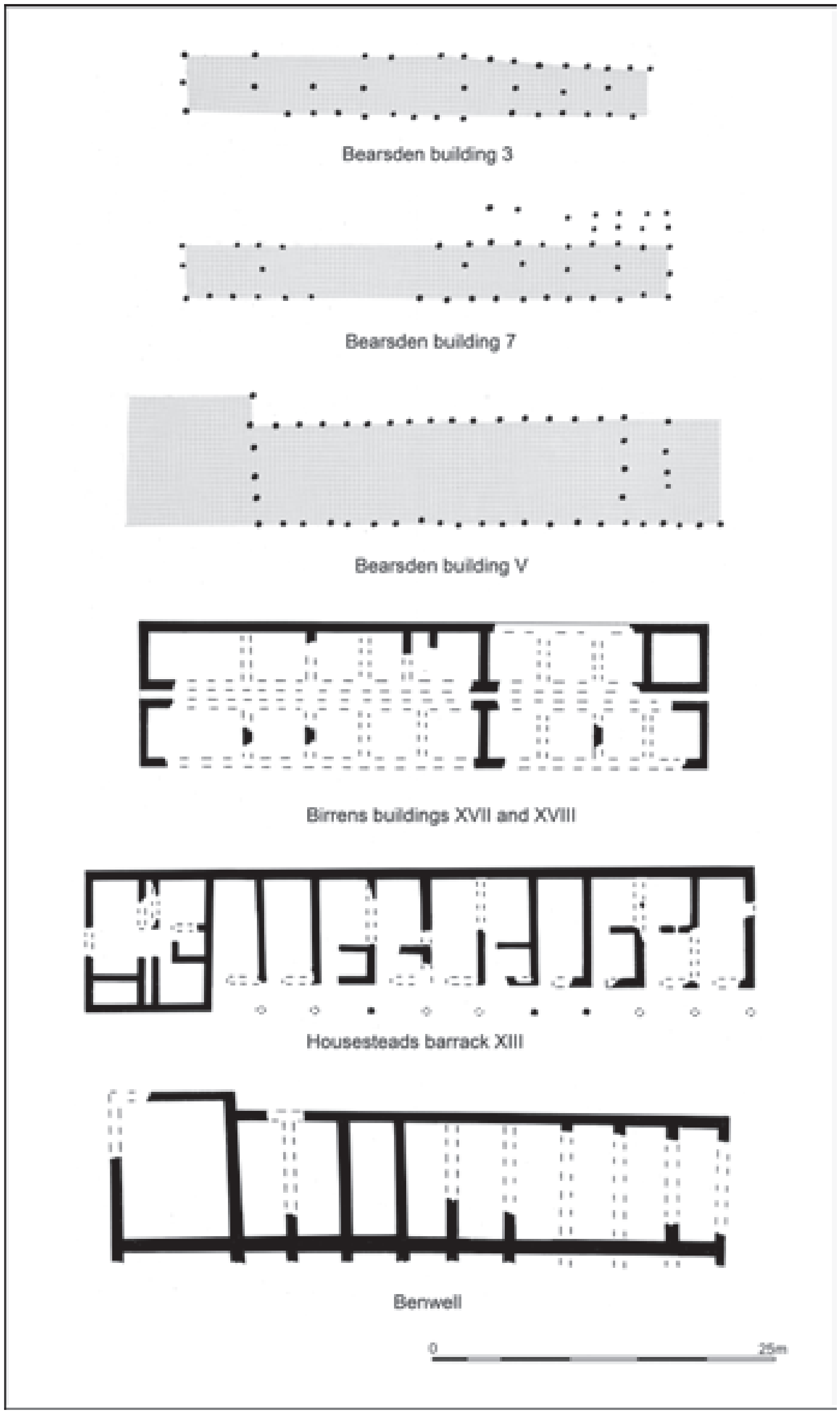


Illustration 21.21
Plans of barrack-blocks.

- there were two barrack-blocks, 3 and 7, each for 32 soldiers, the decurion and their equipment, with accommodation for most of the horses in buildings 2 and 5, a total of 64 men;
- each barrack-block consisted of two separate parts separated by an open space, with men in one and their equipment in the other thereby providing accommodation for four troops, a total of 128 men, plus four decurions, but with the horses stabled elsewhere;
- it is possible, if unlikely that building 2 was a barrack-block and therefore there were barrack-blocks for three troops, a total of 96 men;
- the barrack-blocks held parts of centuries from which men had been detached for outpost duty.

The preferred conclusion is the first: buildings 3 and 7 were barrack-blocks, each occupied by one troop of 32 men with their mounts in buildings 2 and 5. Space would have been required for fodder and hay; this could have been stored in the putative stables or in building 1.

It is unfortunate that so little can be said about the southern part of the fort. A close spacing of post-holes is usually interpreted as indicating a granary. There are, however, two stone granaries at Bearsden and a third and possible fourth might be thought not only superfluous but also strange to be in timber rather than stone, though there is a precedent at Old Kilpatrick where one stone granary and three timber granaries lie in the central range (Miller 1928; Robertson 2015: 118). The spacing of the post-holes in building 13 at Bearsden is similar to that in building Ix at Old Kilpatrick, about 1m, while the post-holes in building 14 and in buildings x and x I at Old Kilpatrick are rather more widely placed. But there the similarities end. At Bearsden, building 13 appears to be very short while the spacing in building 14 is the same as in building 5. The function of these two buildings must remain uncertain.

The lack of pottery in this area of the fort is striking and may be considered to mitigate against soldiers being accommodated here. In the areas of buildings 13, 14, 15 and 16, there were no mortaria, bowls, dishes or lids, only one fragment of a plate and two of cooking pots beside building 14 and eight in building 16. There were six fragments of cooking pots, bowls and dishes just to the south of building 9, the granary. The intervallum south of building 16 was more productive with five fragments of cooking pots and two of bowls and two sherds of samian. This paucity of pottery is in contrast to the northern part of the fort. Drawing together the above evidence, the linking of eight rooms in a barrack-block with cavalry is so strong that it is likely that the buildings at Bearsden were occupied by such soldiers rather than the rumps of infantry centuries. No barrack-blocks other than 3 and 7 can be securely recognised and it seems likely that 2 and 5 contained the horses for these two troops. It is difficult to see where other soldiers might have been quartered in the fort. Although there is space in the south-west corner, neither building 13 nor 14 convinces as a barrack-block.

There seems to be an over provision of granaries for such a small number of men. The two buildings on present theories would hold sufficient food for nearly 400 men (Manning 1975b: 115; Gentry 1976: 25). However, there are so many imponderables concerning the arrangements within granaries that it may not be wise to press this discrepancy between the proposed number of men in the fort and the granary capacity too far. It is possible that one granary held the fodder for the horses. It might be argued that if some of the buildings in the northern part of the fort were stables then the northern granary was carefully placed to hold fodder, but this seems unlikely in view of the discussion of the building of the fort and the likelihood that the granary was placed here simply because there was insufficient space in the central range.

The smallest appropriate unit in the Roman army was the smaller mixed infantry and cavalry unit, nominally 500 strong, but containing 480 infantry and 128 cavalry. The preferred interpretation of the buildings would only allow for 64 cavalry, leaving 544 men to be stationed elsewhere. It is possible that some of these were outposted to some of the fortlets on the Wall. It also seems possible that at the time Bearsden was amended and the other secondary forts were added to the Wall, the fortlets had changed their function by having their buildings removed (Breeze 2006: 94–5). They would therefore not be available for more than a handful of men. Nor are there any other fortlets known in the vicinity of Bearsden. The outposting of soldiers from Bearsden to fortlets, with a consequent impact on barrack accommodation, therefore seems unlikely. Even if mile fortlets were still occupied to each side of Bearsden, they would still only contain a maximum of 64 soldiers and possibly as few as 12. It is more likely that Bearsden had a special relationship with one or other of the forts to east and west along the Wall. No inscription has survived to indicate the nature of the unit at Balmuildy 4.5km to the east of Bearsden, though the plan of the fort suggests that it may have held a complete unit (Miller 1922). The reverse is the situation at Castlehill 2.5km west of Bearsden. An inscription found here records the Fourth Unit of Gauls, a 500-strong mixed infantry and cavalry unit (*RIB* 2195). The size of the fort is known from aerial photograph to be about 1.4ha, though no excavation has been carried out (Keppie 1980). A fort of this size would be too small to hold the Gauls. It is therefore possible that the unit was divided between Bearsden and Castlehill, and the presence of cavalry barracks at Bearsden would fit with this interpretation. If this was the case, it would appear that Bearsden served as the main base for the unit in view of the presence here of two granaries and, it has been argued, the headquarters building.

The division of units between forts is common in the Antonine period. Rough Castle on the Antonine Wall is too small to have held the whole of the Sixth Cohort of Nervians attested there (*RIB* 2144 and 2145), and it seems probably that as many as four of the six centuries of the cohort were outposted, some probably to the fortlets of Watling Lodge and Seabegs to each side of the fort. A similar situation existed in south-west Scotland, where the units stationed at both Birrens and Crawford had many men outposted to the fortlets of the Annan, Nith and Clyde Valleys (Breeze 1974b: 147–9 and 1977b, 459). Cavalry are not well represented on the Antonine Wall. The only 500-strong cavalry unit was based at Mumrills, close to the road leading north through the Wall past Camelon and to the north

(*RIB* 2142) . The remaining cavalry formed part of the 1,000-strong mixed unit of infantry and cavalry based at Castlecary, a fort placed on the watershed between the Forth and the Clyde basins, and the 500-strong mixed unit at Castlehill (*RIB* 2149 and 2195). The lack of cavalry may reflect the nature of the terrain, the broad valley to the north of the Wall flooding easily even today (Breeze & Dobson 1970). Bearsden, however, lay west of the Kelvin Valley in a very different landscape more suitable for cavalry.

Can anything be said about the unit which would have occupied Bearsden 1? This measured 150m × 113m over the ramparts and covered 1.69ha. As we have seen, this places it among one of the larger forts on the Wall, being similar in size to the primary forts of Castlecary, Balmuildy and Old Kilpatrick, and larger than any other secondary fort. A cavalry component in this fort therefore seems to be not impossible. The other crucial piece of evidence is the putative forehall to the headquarters building. A case has been made for this structure having been constructed as part of the original large enclosure with the forehall an integral part of the building. On the other hand, it might be expected that the radical reappraisal of the fort plan would reflect a significant change in the nature of the force based there.

The construction of forehalls has been related to the presence of cavalry. Johnson noted that 'of thirty-one forehalls known over half can be shown to have been connected with cavalry units, either *alae* or *cohorts equitatae*' while only one was associated with an infantry cohort (Johnson 1983: 125). This, however, may simply reflect the fact that about half the units in the Roman army contained cavalry. The reference to the cavalry drill hall at Netherby, occupied by a part-mounted cohort at the time, is usually taken to relate to the forehall in front of the headquarters building, though this building has not been examined archaeologically (*RIB* 978). Further, the discovery of a basilica of forehall type at Birdoswald in a different location from the headquarters has complicated the issue, though as the excavator noted, a 'comparative discussion of this building is hardly possible, as it is so far unique in auxiliary forts' (Wilmott 1997: 95).

In reviewing the evidence for forehalls in his Wallsend report Hodgson has suggested that the 'embracing of both granary and loading functions and the street joining in front of the *principia* [headquarters building] by the Wallsend Forehall suggest that the building served to give shelter to those conducting business at the doors of the granaries and to religious or ceremonial congregations of troops in front of the *principia* (perhaps gathering in the same way that a religious audience congregated before and not within a classical temple)' (Hodgson 2003: 182). In this he echoed the suggestion the forehalls were 'roofed places where soldiers could fall in' (Schönberger 1969: 169), and were not specifically related to the presence of cavalry.

The putative forehall at Bearsden, 30m × 11.2m, would be narrower that the size recommended by the British Horse Society for a cavalry exercise hall (Batty-Smith 2008: 410–11). This body suggests that one suitable for beginners should measure 30m × 20m while one for general teaching and the schooling of horse would need to be 40m × 20m in order to be the appropriate size for the British Horse Society examinations (larger halls, up to 90m × 30m, would be required for competition work and then can be divided into two for lessons). The lengths match between antiquity and the present day, but not the widths. This may reflect the smaller size of Roman horses (Hyland 1990: 68–9), or count against the Bearsden forehall being used by cavalry.

Forehalls are common in Germany, but rare in Britain. The only known examples are at Brecon Gaer in Wales, Ribchester in northern England, Newstead in Scotland and Halton Chesters and Wallsend on Hadrian's Wall (Johnson 1983: 120 and 314, n 61; Hodgson 2003: 178–82). Cavalry are attested at all these forts, though a direct link between the presence of the cavalry and the construction of the forehall cannot always be demonstrated. It should be noted, however, that in all forts apart from Wallsend a 500-strong cavalry unit is attested rather than the mixed infantry and cavalry unit which had a smaller cavalry component (*RIB* 403, 583, 586, 2121, 1299 and 1433). This fact, together with the evidence cited by Johnson, demonstrates that the link between the forehall and cavalry remains strong and we may accept that the appearance of a forehall at Bearsden is likely to indicate the presence of cavalry. Both forts may therefore have held cavalry.

21.7 THE BUILDING OF THE FORT AND ANNEXE

The relationship of the fort and annexe to a framework based upon a 5 × 4 *actus* grid has already been discussed. The execution of the plan based on the grid was not perfect and the result was that the framework of the fort and annexe was not square but a parallelogram. I discussed how this might have happened with Oswald Dilke, but he was unable to offer an explanation.

The presumption is that the west and east ramparts were constructed first and then the intermediate line drawn dividing an original large enclosure into fort and annexe rather than that the fort was extended to encompass an annexe. The crucial points of junction were not available for investigation, so this assumption is based upon the position of the presumed headquarters building, the rebuilding of the bath-house and the different widths of the ramparts. The west rampart of the fort and the east rampart of the annexe were both 4.5m wide. The rampart between the two enclosures, however, varied in width from 4.2 to 4.35m. The most straightforward conclusion is that the wider ramparts were constructed at the same time but the intermediate structure was of a different, and therefore later, date.

The bath-house would appear to have been amended after the construction of only one room (though possibly other parts of the structure were so effectively removed that they were not found) when it was decided to build the bath-house in a slightly different location. This entailed demolishing a room already roofed, though not finished internally and constructing a completely new building. It is difficult to be certain exactly why this occurred. Bath-houses are found in both forts and annexes on the Antonine Wall, so if the intention had been to divide an original large fort into two there would appear to have been no reason why the bath-house could not have stayed where it was. Possibly, the intention was to make better use of the site. It would appear that the original plan had been to build the bath-house north–south and presumably it was considered that better use

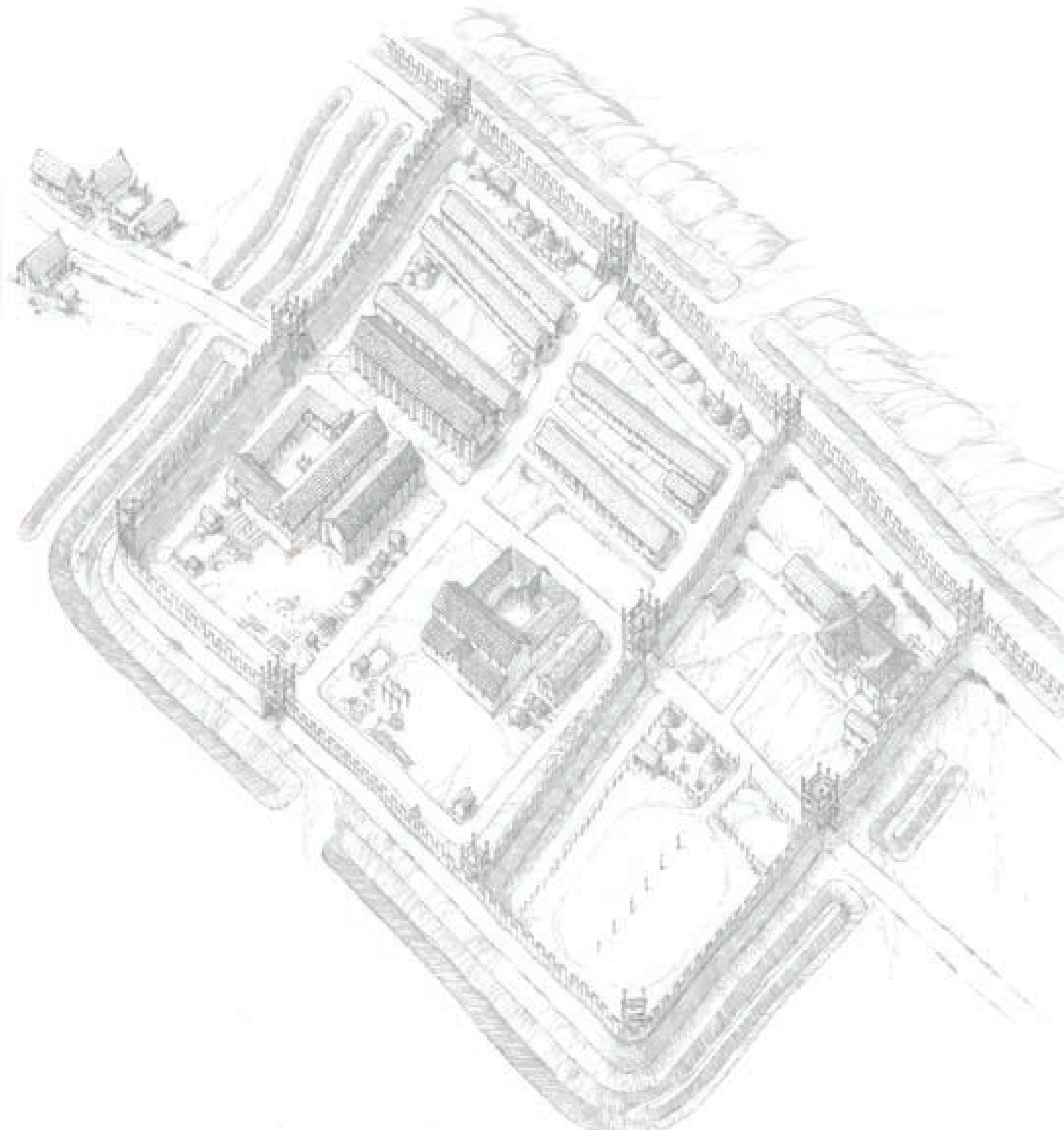


Illustration 21.22

An overview of the fort as it may have appeared in use. The awkward site, which slopes sharply from north to south and east to west, presumably affected the details of the layout. In the northern half of the fort a range of timber buildings straggle across the site. To their north, in the lee of the Antonine rampart, are postulated a kiln or oven, various sheds and several haystacks providing convenient supplies of hay for the garrison's ponies. The headquarters building shown here is typical of those found in the forts on the Antonine Wall with its clear-storied cross-hall and offices ranged round a small courtyard. Preparatory work for the construction of further buildings, perhaps feed-stores or more barracks has begun. The commanding officer's house has been provided with a two-storey residential range and its own vegetable garden, poultry and animals pens to the south. The bath-house and latrine occupy the northern half of the annexe. The southern half is shown as being used as a cavalry training ground with a central row of stakes for practising sword cuts at the gallop. Two small paddocks separate the exercise ground from the east–west road, one serving as a rick-yard. This interpretation is speculative; the area might also have been used for grazing, to provide space for the pitching of tents of units moving along the military way, or may have eventually been used for barns or store-houses. Beyond the fort's western gate can be seen a few small buildings and roadside stalls. Drawn and described by Michael J Moore.

could be made of the configuration of the ground if it was turned through 90°. Certainly the change required some effort, and a catalyst. The most ready catalyst might be thought to be a change in plan for the whole site.

The headquarters building, as we have seen, did not lie in the centre of Bearsden 2, but in the centre of Bearsden 1. The implication is that this building, together with the bath-house and the latrine, was one of the first buildings to be erected in the fort; possibly this was a normal procedure.

The lack of causeways outside the positions of the north and south gates of Bearsden 2, and the anomaly in the centre of the south side of the larger enclosure, combine to suggest that undug causeways were left in the centre of the north and south sides of Bearsden 1. In view of the planning of Bearsden 2, it seems likely that the locations of the north and south gates were moved to relate to the smaller fort. The site of either possible position for the north gate lay under 33 Roman Road and any traces of its remains are likely to have been removed. Nor was the ditch at the central point of the Bearsden 1 available for investigation. Macdonald (1934: 325) had recorded the uprooting of the south rampart yet excavations at both possible locations for the south gate were considered worth-while for post-holes might have survived such. In the event, no remains were discovered at either place.

The change in plan appears to have come early in the building programme. Work had begun on the bath-house, but only one room appears to have been built and that not completed. At the same time, the headquarters building had been or was being erected. A case has been made above for the granary in the central range also forming part of the plan for the larger fort. These three buildings, and possibly the storehouse to the right of the headquarters, related to Bearsden 1, while all other known buildings in the fort related to Bearsden 2.

In drawing up the plans of the fort, the existence of only three sections across the rampart between the fort and the annexe proved to be a handicap. Earlier plans show the rampart between the fort and annexe parallel to the west and east ramparts of the large enclosure, but on a plan prepared in 1982 it is at an angle. This resulted from too much weight being placed on the narrowing of the rampart north of Roman Road from 4.35m to 4.2m in one area as well as the paucity of fixed points. South of Roman Road, only one trench crossed the rampart. Here, the rampart appeared to be parallel to the adjacent building 12. In 2002 Gu ARD examined the rampart a little to the south, thus providing an alignment for the rampart south of the road, and confirming the alignment recorded during the 1973–82 excavations (Duncan & Leslie 2003).

Support for the presumed order of building comes from two points, one general and one particular. At all other forts on the Antonine Wall where the location of the annexe is known, the fort is surrounded by its own ditches with the annexe clearly being a separate enclosure. The only exception to this is Duntocher: here the fort and annexe were enclosed within the same lines of ditches. There may be two contributory causes for this. Firstly, both fort and annexe were secondary being constructed on the site of the pre-existing fortlet. At no other fort on the Wall is the relationship between fort and fortlet as well as fort and annexe so intimate. Secondly, the fort is very small (0.2ha internally). It is, in fact, the smallest known fort on the Antonine Wall, being a third of the size of the next smallest, Croy Hill (0.6 ha) and is closer to the size of fortlets than forts. Neither point fully explains the unusual situation at Duntocher, but, crucially, Bearsden is not a parallel to Duntocher in either its size (Bearsden is nearly five times the size of Duntocher) or in the existence of an earlier fortlet (strenuous efforts were made to search for one at Bearsden, but in vain).

Finally, we may note a consequence of the rearrangement of the enclosure at Bearsden on a different level of importance. Mention has been made of the planning of Duntocher. Putting aside the existence of the fortlet, the arrangement is very similar to Bearsden in that the ditches sweep round the fort and the annexe with no ditches between the two enclosures. Bearsden may therefore have been the model for the arrangement at Duntocher. This pattern did not occur at other forts, presumably because each fort was already surrounded by ditches when the decision to create annexes was taken.

21.8 THE DATE OF OCCUPATION

Background

This is a fort which is primarily dated by the occupation of the Antonine Wall. The biographer of Antoninus Pius, writing 200 years later, stated that 'he conquered Britain through his legate Lollius Urbicus, and, having driven back the barbarians, built a new wall, this time of turf' (*Historia Augusta*, *Life of Antoninus* 5, 4). Victory was achieved by 1 August 142, the date of the first record of Antoninus being proclaimed *Imperator*, Conqueror, for the second time (*CIL* x 515 = *ILS* 340). and the event was celebrated by a coin issue in that year or early the next (*RIC* 742 = *BMC* 1637–9). Probably 142 was also the date of a speech given in the Senate by Cornelius Fronto, tutor to the prince Marcus Aurelius, and, in this year, consul. Fronto said, 'although he [Antoninus] had committed the conduct of the campaign to others while sitting at home himself in the Palace at Rome, yet like the helmsman at the tiller of a ship of war, the glory of the whole navigation and voyage belonged to him' (Fronto, *Speech on the War in Britain*). Our evidence is clear: the campaigning took place between the accession of Antoninus on 10 July 138 and 1 August 142. The date range can be narrowed even further. Inscriptions from Corbridge (*RIB* 1147 and 1148) record building work there in 139 and 140, probably in preparation for the campaign. An acclamation date of 1 August would place the end of campaigning before the traditional start of the season in May to allow time for the news to travel to Rome and the proclamation issued. Campaigning in Britain must therefore have ended in 141. It seems probable that campaigning was restricted to two years, 140 and 141, and possibly to the latter year only. Agricola appears to have dealt with the peoples of the Southern Uplands in just one season some 60 years before (*Agricola* 22) while we may note that the area had been under Roman surveillance since that date, so a single season of fighting may well have sufficed.

Finally, we should note the name of Lollius Urbicus on an inscription from Balmuildy (*RIB* 2191). This was one of the first series of forts to have been constructed on the Antonine Wall and the name of this governor appears at no other installation on the Wall, suggesting that he started the building programme but left the completion of the project to his successor (Gillam 1976a). This would be in accord with the usual term of office of a provincial governor, three years. The earliest date for the construction of Bearsden is therefore 142. The building sequence for the Antonine Wall proposed by John Gillam in 1976 was for a series of forts each pair about 13km apart with fortlets probably at just over 1 Roman mile intervals in between, the number of forts being increased during the construction of the Wall with the spacing between each pair reduced to about 3km (Gillam 1976a). Several fortlets were replaced by forts and, in some other cases, the use of the fortlet changed, buildings being demolished and the interior cobbled. Primary forts and fortlets were either contemporary with or constructed before the Antonine Wall rampart. The secondary forts were generally built later than the rampart, though Duntocher, clearly a secondary fort, was erected before the rampart arrived at the site. The construction of the rampart was marked by stones known as 'distance slabs'. It has been suggested that the 20 Roman mile stretch of the Wall from Castlehill eastwards to Seabegs, forming exactly half the total length of the Wall, was built first (Hassall 1983). Then, perhaps, the eastern sector was erected, and finally the western 4 Roman miles (about 6.5km) was constructed, being measured in feet rather than the paces used elsewhere, and this would account for the fortlet and the fort being built at Duntocher before the arrival of the rampart. Bearsden lies towards the western end of the presumed initial 20 Roman mile stretch. The primary forts at Castlecary and Balmuildy were provided with stone walls suggesting perhaps an intention to build the Antonine Wall in stone, and an early date for Balmuildy is supported by the discovery here of the inscription recording building during the governorship of Q. Lollius Urbicus (*RIB* 2191). But the sequence merely indicates that the Antonine Wall rampart at these two sites was later. It remains possible that the rampart in the area of Balmuildy – and Bearsden – was constructed weeks or months after the building of the fort at Balmuildy, which may have been as early as 142.

The evidence relating to the division of one large enclosure at Bearsden into a fort and annexe has already been noted (pp 344–6). In his discussion of the significance of this, Bailey argued that Bearsden was the first fort where the decision to create annexes can be seen (Bailey 1994). He dated the action by reference to Mumrills where the west ditches of the fort were backfilled in order to create an annexe, the pottery found in the outer ditch suggesting a date of about 155–60 for this action (Steer 1961: 91). This coincides with the date for the end of the first phase of occupation at Inveravon fort (Dunwell & Ralston 1991; Bailey 1994: 304). Subsequently, Bailey (pers comm) has revised his position, suggesting that the infilling of most of the ditches at Mumrills in order to construct the annexe was undertaken earlier, the infilling of the outer ditch being a later action. Bearsden remains the earliest fort where the decision to create annexes can be recognised.

Vivien Swan supported the chronology advanced by Bailey in 1994 by reference to the style of pottery found at some sites on the Antonine Wall, including Bearsden, which suggested cooking in an African manner (Swan 1999). She took up a suggestion of mine, which is that soldiers from the army of Britain might have taken part in the Moorish War of the Emperor Antoninus Pius in the late 140s, returning with changed habits of cooking, African wives or servants who prepared food in their native style, or having acquired local recruits who continued to cook in their own manner, though there is no firm evidence for soldiers from Britain taking part in this war. Several theories relating to the occupation of the Antonine Wall have come and gone since the start of the excavations at Bearsden. When the excavations began in 1973, it was still believed that there had been two phases of occupation of the Antonine Wall; indeed up to less than a decade before it was accepted that there were three (Steer 1964). The discovery that there was only one period at Bearsden was therefore a surprise. At the time, various reasons for the existence of one period were considered. These included the possibility that subsequent periods of Roman occupation had been removed by later cultivation; this was rejected as in certain areas the protection afforded to the Roman levels was such that the evidence for a second period would have survived if it had ever existed. There was also the possibility that the fort was occupied throughout both Antonine periods without a break, as appeared to have occurred at other forts. The new evidence from Bearsden (as well as my earlier excavation of the fortlet at Barburgh Mill) was amongst the pieces of the jigsaw mapping the Antonine occupation of Scotland which was reassembled by Nick Hodgson (1995). He argued, persuasively, that there is no way of determining whether the different phases in the forts on the Wall were contemporary, but in any case the forts with evidence for two periods – Mumrills, Castlecary, Bar Hill and Old Kilpatrick – were the first series to have been erected and the changes there related to the reorganisation which followed the decision to add more forts to the Wall line (Hodgson 1995: 33–5). This argument has now been generally accepted, though Hodgson has changed his views on the dating of these changes (Hodgson 2009; see p 379 below). The lack of a second period in Bearden 2, therefore, occasions no surprise for it follows the 'normal' pattern of secondary forts on the Wall.

To turn to the end of the occupation. No Roman authority stated when the Antonine Wall was abandoned. A lost inscription from Hadrian's Wall dating to 158 refers to the rebuilding (*refecit*) of the Wall (*RIB* 1389; Hodgson 2011). However, a worn coin of Lucilla, wife of the Emperor Marcus Aurelius, was found in the fort at Old Kilpatrick: it was minted in 164. While the evidence appears to be contradictory, it could be reconciled if it is assumed that the rebuilding (or the completion of the building: Breeze 2012) of Hadrian's Wall took some time to complete and the abandonment of the Antonine Wall some years to achieve.

Bearsden

At Bearsden, the primary evidence from the fort is provided by the coins. Ten coins were found, the latest (12.7) dated to 154–5, and is almost unworn (cf 12.9 of 153–4 or 154–5). This brings us close to the date of rebuilding work on Hadrian's Wall in 158.

So far as the samian ware is concerned, Brenda Dickinson concludes: 'the dating evidence provided by this group of samian comes almost entirely from a relatively small number of decorated bowls and stamped plain vessels'. There are two early second century survivals, but otherwise the samian is Antonine, that is dating to about 138 to 161. The stamps on the amphorae found at Bearsden also appear at the great waste-tip known as Monte Testaccio in Rome dated to between 146 and 161. The coarse pottery is also Antonine in date.

21.9 THE HISTORY OF THE SITE

Little can be said about the history of the fort following its completion. The second bath-house was possibly modified during construction by the addition of a hot dry room, while it has already been noted that two rooms were modified, the cold room and on two occasions the first warm room. No buildings within the fort show evidence of rebuilding, though building 7 may have been amended by the addition of some timber uprights. There are also random post-holes elsewhere which may indicate amendments to buildings. None of these changes can be dated. The life of the fort was too short to measure any difference in the vegetation in its vicinity, though analyses of the ditch fills show little change in the open vegetation during the occupation.

21.10 THE CIVIL SETTLEMENT

Areas east, west and south of the fort were investigated for traces of civil habitation. South of the fort no indication of occupation was found on the steep slope nor on the flat ground beyond, now occupied by Jubilee Gardens. East of the fort no structures were found, merely a gulley running east–west. West of the fort, two lengths of cobble foundations were located; a pivot stone lay at the south end of one. No other feature, neither stone nor timber, was associated with these. It seems possible that these foundations formed parts of buildings, presumably of lean-to construction, and it is likely that they are of Roman date, in view of the Roman pottery, including samian and cooking pots, recovered from this area and in spite of the small fragment of medieval pottery found on the surface of one section of cobbles.Assuming that these are the remains of civilian buildings, they form a very rare survival along the line of the Antonine Wall. Elsewhere, fields have been recorded outside the forts at Carriden, Rough Castle and Croy Hill, while tombstones at Shirva imply the presence of a civil community and an inscription from Carriden proves the existence of a self-governing civilian body there (Keppie 2009: 1140–1). The lack of evidence for civil settlements outside the forts of the Antonine Wall has been noted by Keppie and linked to his argument that the Wall was lightly held, though he also suggested that the close spacing of forts along the Wall rendered the presence of a civil settlement at each unnecessary (Keppie 2009a: 1141). The paucity of evidence from outside forts on the Wall may be compared to the extensive civil settlement and field systems recorded further east at Inveresk (Bishop 2002; 2004). Possibly the existence of a civilian community at Carriden, which lies at the eastern end of the Wall, related to supply, but Tatton-Brown has argued that Camelon, about 12km further west, may have played a more significant role in this respect (Tatton-Brown 1980).

While structural evidence may be slight, it is clear that civilians were living in the area and manufacturing pottery which was used by the soldiers in the fort. Unfortunately, it is not entirely clear whether the potters were based at Bearsden or at a nearby fort, though the existence of misfired pottery at Bearsden indicates the operation of potters there.

21.11 LIFE IN THE FORT

21.11.1 Introduction to the distribution of artefacts

The distribution of pottery and small finds within the fort was not even; in fact, it was noticeably unbalanced in several ways:

- little was recovered from the interior of buildings, whereas the gulleys surrounding them contained much material;
- the northern part of the fort produced signi cantly more material than the excavated areas to the south;
- the intervallum areas were artefact rich, with the east intervallum being particularly rich in pottery;
- the western area of the annexe between the fort/annexe rampart and the bath-house yielded considerable quantities of pottery;.
- the area to the east of the annexe was almost devoid of pottery, but some 20 sherds were recovered from west of the fort.

The lack of material in the interior of the buildings as opposed to the gulleys may relate to two factors: the buildings were kept clean and/or later ploughing may have removed the finds from the buildings but was not deep enough to penetrate the gulleys. The lack of floor surfaces in all fort buildings with but two small exceptions points to disturbance by the plough. Nevertheless, it might be expected that the pottery would have been disturbed but still remain in the brown soil between the Roman level and the topsoil. It seems likely therefore that there were actions to keep the interior of the buildings reasonably clean.

It is a reasonable assumption that some material would be discarded when the fort was abandoned. But would it be dumped in the gulleys? Could some of the material there have accumulated during the occupation of the fort? These questions are unanswerable.

The difference between the amount of pottery and small finds in the north part of the fort and the southern area may relate to the function of the buildings, as noted above, but in addition the topsoil was noticeably shallower to the south which was also a 'high' point within the fort and this may have resulted in the removal of material by the plough. The area with the highest quantities of pottery, and of all types, was that part of the annexe south-west of the bath-house. It would appear that it was used as a dump and this presumption is supported by the discovery here of parts of two vessels also retrieved from within the fort (7.2.3.139; 168). The next area producing the most pottery was the eastern intervallum. Here was recovered one quarter of all the mortaria from the site, nearly all products of Sarrius from at least eight vessels, with many misfired, strengthening the case for this area being used as a dump. Both areas were in lower ground and while it could be argued that the material in the annexe was infilling a hollow, this is unlikely to be the case within the fort, not least because the pottery was recovered from above the Roman levels. Further discussion is included in the section on cooking and eating.

There are two other instances of parts of the same vessel recovered from different parts of the site: fragments of a pot found at the east end of building 3 and at the east end of building 7 (7.2.3.60) and of a glass vessel found in the officer's quarters of building 3 and beyond the west ditches (9.2.33).In the following section the distribution patterns of different types of artefact are considered. This is preceded by a general review of the whole finds assemblage by Lindsay Allason-Jones and closed by analysis of the distribution of the artefacts at Bearsden in relationship to their distribution patterns in other forts by Rikke Giles.

21.11.2 The small finds assemblage

LINDSAY ALLASON-JONES

There is considerable diversity in the quantity and quality of the small finds which have been found through the excavation of forts in Scotland. Some of this diversity may be accounted for by the varying degrees of thoroughness with which these forts have been explored, as well as the date at which they were excavated. However, even taking these variables into consideration, it is noticeable that while the average fort in England, if such there be, will produce a reasonably predictable collection of objects in reasonably predictable amounts, depending on whereabouts in the fort the excavations are carried out, the forts in Scotland reveal no predictability at all. Indeed, Scottish forts tend to produce either a dearth or a glut of artefacts with no apparent happy medium. Sites which have produced large assemblages include Elginhaugh (Hanson 2007), Camelon (Maxfield forthcoming), Strageath (Frere & Wilkes 1989) and Newstead (Curle 1911) while the forts at, for example, Duntocher (Robertson 1957), Bar Hill (Robertson et al 1975), Carpow (Dore & Wilkes 1999) and the fortress at Inchtuthil (Pitts & St Joseph 1985) have produced hardly any small finds. This makes it very difficult to compare the assemblage from Bearsden with other Scottish forts of comparable date.

Scottish forts, whether they have large or small assemblages, often show a high number of vessels and vessel fittings (see for example Camelon (Maxfield forthcoming) and Strageath (Frere & Wilkes 1989) as well as Drumquassle (Masser et al 2004). These are noticeably missing from Bearsden but this is also reflected in the pottery assemblage which includes few drinking vessels. It is possible that flagons or tankards made solely of wood were used. The amphora assemblage indicates that some wine was being imported, albeit not in large quantities, so it is possible that the troops at Bearsden preferred quaffing beer rather than sipping wine.Also noticeable by its absence is any item of personal adornment, such as brooches, finger rings or bracelets, although there are two intaglios which are likely to have been worn in a finger ring. This group of objects is invariably found wherever the Roman army or civilians lived or gathered – even the Roman camp at Carronbridge produced a copper alloy trumpet brooch of first century date (Johnston 1995) – so this dearth at Bearsden is particularly noticeable. Scottish forts often show a preponderance of enamelled metalwork, no items of which were found at Bearsden. The use of enamelled bronze work may indicate a native element (see, for example, the enamelled harness fitting from Inchtuthil: Pitts and St Joseph 1985: pl x LV, fig 85) or reflect the flashy taste of the military (Allason-Jones 1991). Despite the conclusion that Bearsden appears to have held a cavalry unit at one stage in its occupation, there is nothing which can be firmly identified as harness equipment.

At Strageath, Camelon and Elginhaugh there is a bias towards the exotic, with griffin mounts at Strageath (Frere & Wilkes 1989: fig 74, no 50), panther-headed pins and mounts, openwork chapes, snake-headed finger rings at Camelon (Maxfield forthcoming) and a large Minerva head furniture mount, elaborately decorated harness pendants and a lead cherub lamp holder from Elginaugh (Hanson 2007). In comparison, the material from Bearsden leans more to the prosaic, such as agricultural tools and nails. The small finds assemblage at Bearsden provides little evidence to bring any of its individual occupants into clear focus. No items point to a known or suggested legionary or auxiliary unit; nor are there any artefacts which indicate the presence of women or children. The only artefact group at Bearsden that does stand out is that of weaponry. This preponderance of weapons is only shared in Scotland with the fort at Strageath, which produced a number of spears, although the Elginhaugh assemblage did include two pieces of ballista fittings. Bishop, in 2011, suggested there can be a 'measure of fuzziness' in the definition of military equipment and suggested three sub-sets: those that were definitely military, those that were equally definitely not, and those that might be depending on the context in which they were found (Bishop 2011: 115). In the case of the Bearsden weapons, all are unequivocally military with the possible exception of the 47 arrowheads, which may have been used for hunting purposes (11.3.1.15–61). The context in which they were found, however, plus the evidence that the diet of the soldiers at Bearsden was largely plant-based, suggests that the military personnel were not taking advantage of the hunting opportunities offered by the surrounding woodland to augment their diet with game and that these were for military use.Although the weapons stand out as a large group, it is important to note that it is still only a small assemblage given that the site was a fort and has been extensively investigated. It should be pointed out, however, that the average fort on Hadrian's Wall also produces few weapons and there are none at all from some excavations (Allason-Jones 2001). At Bearsden, its short lifespan may account for the small quantity of weapons. Soldiers would have been responsible for their own arms and armour and kit checks, such as that at Carlisle (Tomlin 1998: 57), and this would ensure that weapons were only discarded when no longer usable and then recycled if at all possible (Breeze 1976; Bishop 2011: 123). It must be presumed that the rest of the weaponry as well as the personal belongings of the soldiers, were taken away when the fort was abandoned and what can be seen in the assemblage represents those items that were accidentally lost or deliberately dumped when the occupying unit left the fort.

21.11.3 Weapons and clothing

The most important cache of weapons was found lying in the silt below the organic layer of the middle west ditch, where it may have been deposited on the abandonment of the fort. This group included six *pilum* heads and 47 arrowheads, mostly barbed (11.3.1.1–6; 15–61). The tips of the *pilum* heads, where they survive, are blunted or bent from use. On the other hand, the arrow heads showed no conclusive evidence for their use. They are an unusual find and Coulston has suggested that they were made locally for military purposes, or were for hunting (Coulston 1985).

Within the fort, four buildings yielded military equipment, the officer's quarters of building 7, room 1 of building 3 and building 13/14 each produced a spearhead while the hilt mounting of the pommel of a dagger was found in the northern range of the headquarters (11.3.1, 11–13; 7). All other items were retrieved from roads. The west intervallum produced two fragments of scabbard chapes of swords, part of the pommel of a dagger, a fragment of a spearhead and a shield boss (11.3.1.9; 10; 8; 14; 62). A second shield boss was found in the gulley beside building 2 (11.3.1. 63). Shield stiffeners were recorded on the west intervallum, between buildings 6 and 7, in a pit in building 16, and in the annexe (11.3.1.66–87). Seventeen fragments of leather footwear were found, all of the type of shoe known as the *calceus*. This adds support to the argument that this type of military shoe replaced the *caliga* during the Antonine period. Wear to the shoe led to hobnails being replaced, and many of these nails were found in the fort and the bath-house (11.3.6.224–34). Buildings 1, 3, 4, 5, 6 and 7 all yielded hobnails either within or immediately outside.

21.11.4 Tools

The tools found included an agricultural hoe and a reaping hook (11.3.2.88; 89). Wood-working tools were few; blades and chisels, a punch and an axe, all fragmentary, and a possible anvil (11.3.2.91–95; 97; 99; 90). Each intervallum area yielded one blade or chisel, while a fifth was found between buildings 6 and 7 and a sixth in a post-hole in building 16. The axe and possible anvil both came from the west intervallum.

21.11.5 Cooking, eating and drinking

The range of pottery vessels was largely normal for a fort. There are, however, some distinctive features, including a greater number of bowls, dishes and platters than might be expected and fewer flagons than are usual on contemporary military sites, though possibly larger jars served the same purpose. There were no Severn Valley ware tankards, but there is only one recorded on the Antonine Wall, at Old Kilpatrick, though there are two at Bothwellhaugh a few kilometres to the south in Clydesdale (Webster 1977: 168).

The distribution of various types of pottery has been plotted, and while there was no area with a preponderance of a particular type of pottery, the distribution patterns are still of interest (illus 21.23–21.29).

In her study of life in a Roman fort as indicated by the distribution of archaeological remains, Rikki Giles has noted that items relating to the kitchen and to food tend to be found in communal areas and buildings including roads, barracks, latrines, baths and the intervallum and not in places restricted by status or function such as the headquarters, commanding officer's house, the gates and the granaries (Giles 2012: 57). yet, within the areas related to cooking and eating there are differences. Eating took place within the barracks, 'while storage and food preparation seem to have been activities undertaken more often in the intervallum'. Jars found on 'roads may reflect tasks such as fetching water or other substances stored in jars (such as food from the granaries) . . . and the subsequent breakage along the roads between the barracks and the source of water or food' (Giles 2012: 57). She linked the presence of items relating to the preparation of food in the intervallum to the location there of fires and ovens. Granaries have a fairly high proportion of storage vessels.

One complication in relating the material remains at Bearsden to these overarching conclusions is the lack of ovens which are normally located in the intervallum (Bidwell 2007: 62). At Bearsden no ovens were found in spite of the intervallum being examined on all four sides of the fort in various locations. This might relate, at least in part, to the cooking in a North-African style recognised by Swan (1999), and discussed by Bidwell & Croom above (7.8). This style of cooking entailed the use of small braziers rather than large ovens and the debris would accordingly be more difficult to detect. Isolated post-holes were recorded by the south and east ramparts and cobbling inside the east rampart, which may indicate the presence of buildings or shelters in these areas.

The distribution pattern of pottery at Bearsden is also skewed by the considerably amount of mortaria recovered from the intervallum to the east of buildings 6, 7 and 8 and the eastern end of the path between buildings 6 and 7. While it might have been expected that this indicated that the intervallum was used for the preparation of food, supported by the discovery of a quern in both west and east intervallum areas (5.2.1; 4), the fact that many of the mortaria were misfired may suggest that this area was used a dump.

The distribution of mortaria within the buildings was significant (illus 21.23). Building 3 produced at least one sherd of mortaria from nearly every room while building 7 had a similar pattern. On the other hand, there were only two sherds of mortaria from building 1, and one each from both 2 and 5. This suggests a different function for these buildings. It also indicates the preparation of food in the barrack-blocks. The distribution of cooking pots in the barrack-blocks is similar to that of mortaria but generally has a wider spread across the fort, though neither has a strong presence in the intervallum spaces (illus 21.24).

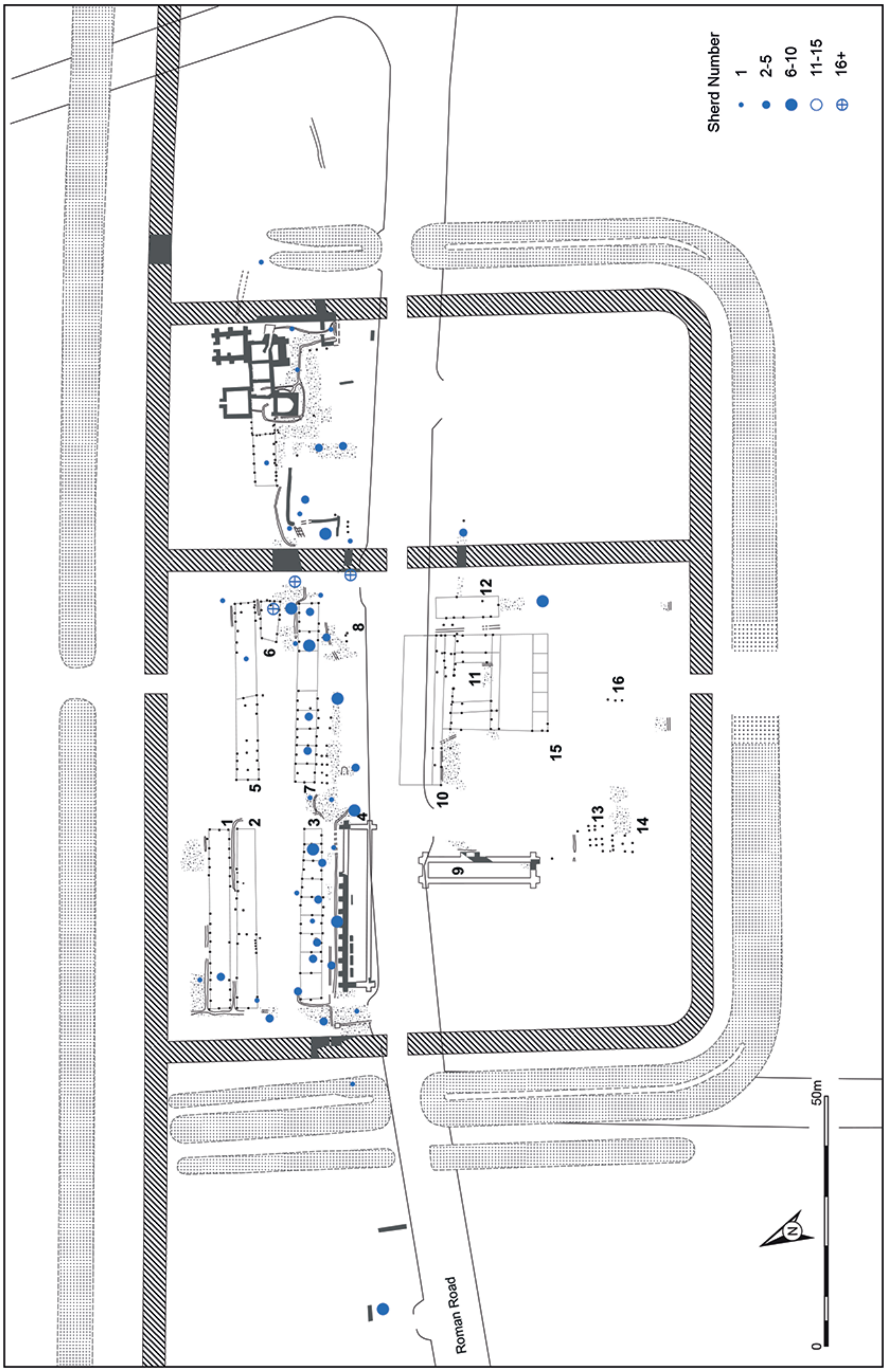


Illustration 21.23
The distribution of mortaria.

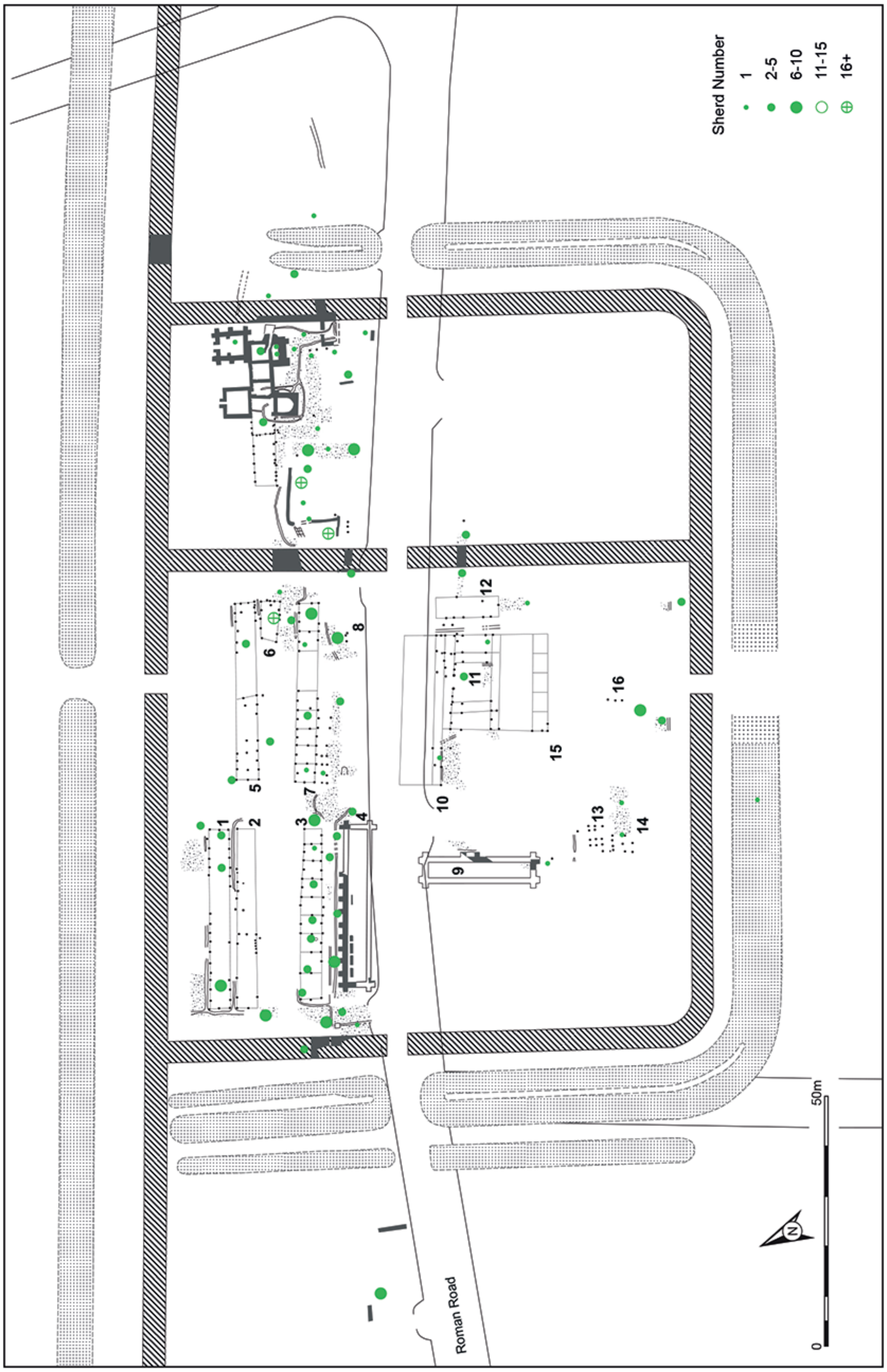


Illustration 21.24
The distribution of cooking pots.

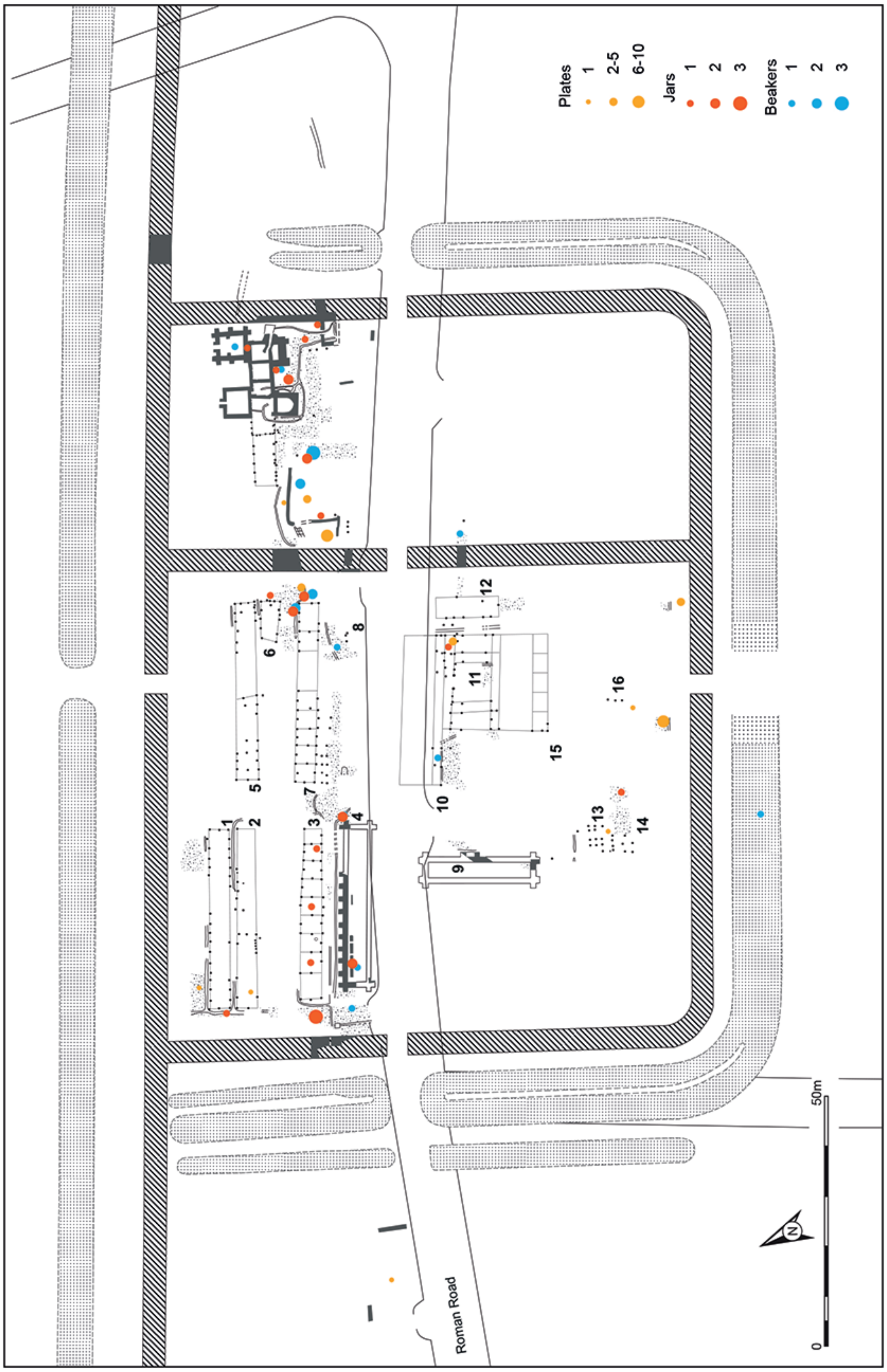


Illustration 21.25
The distribution of plates, jars and beakers.

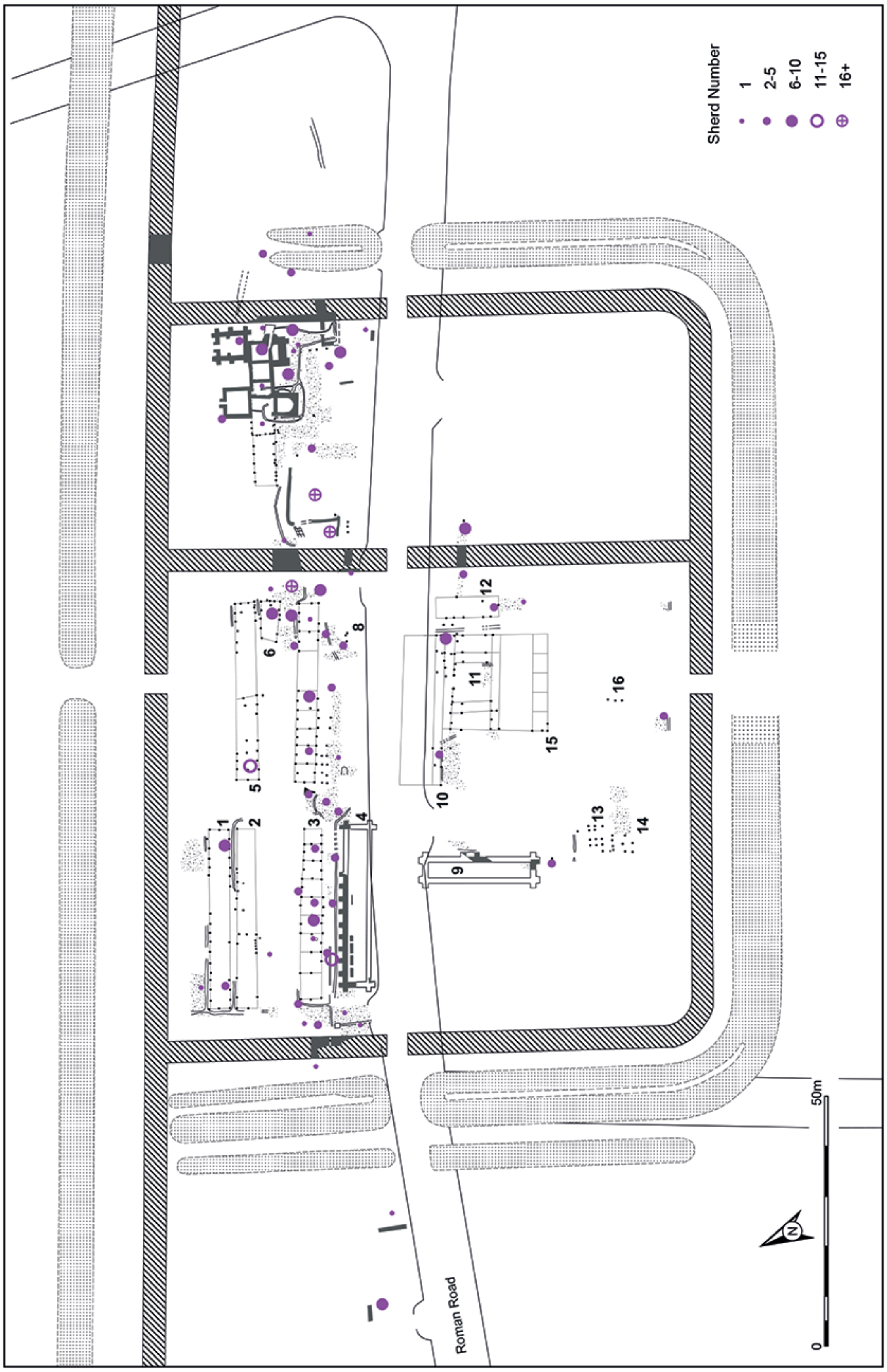


Illustration 21.26
The distribution of bowls and dishes.

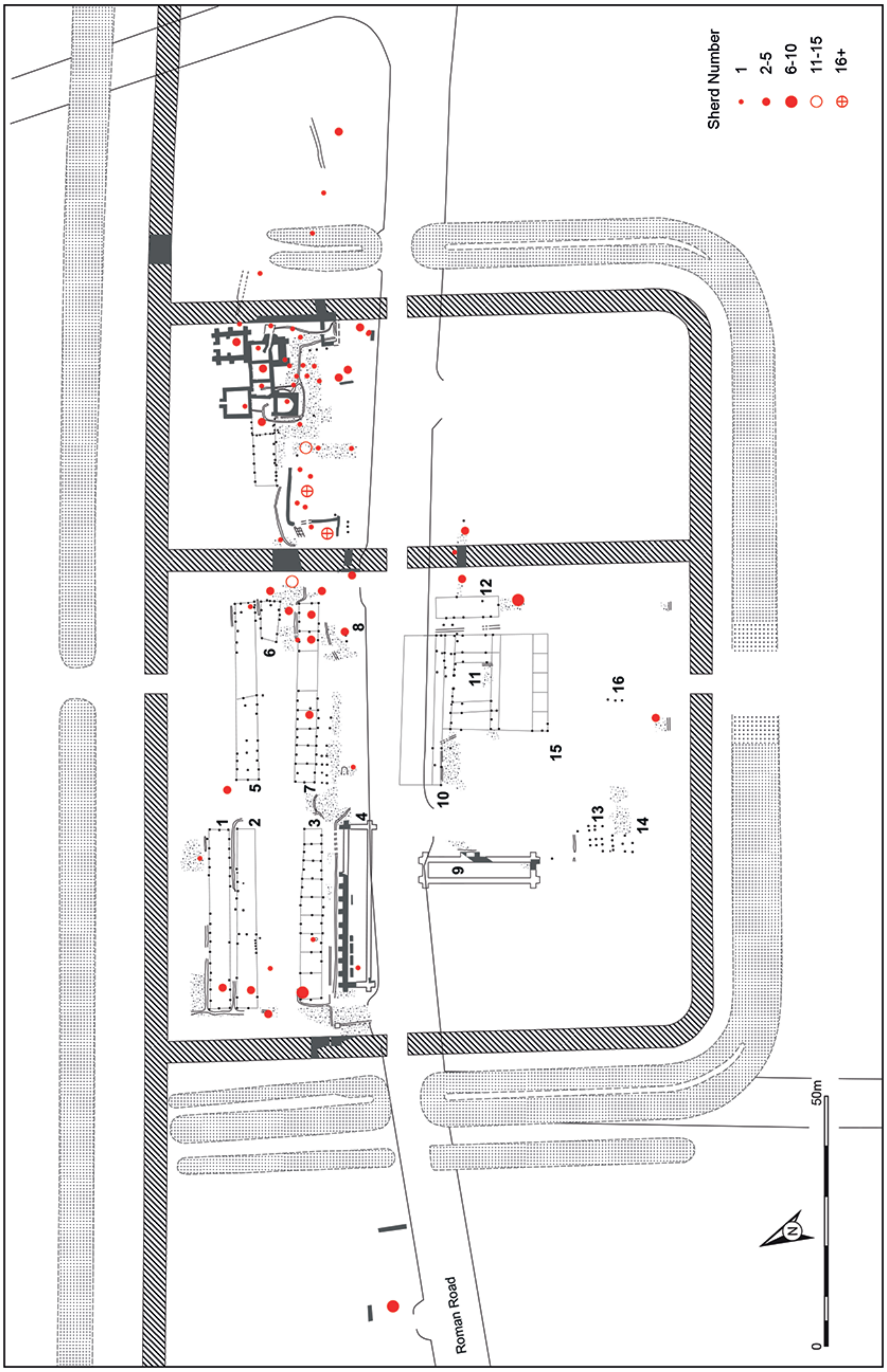


Illustration 21.27
The distribution of samian.

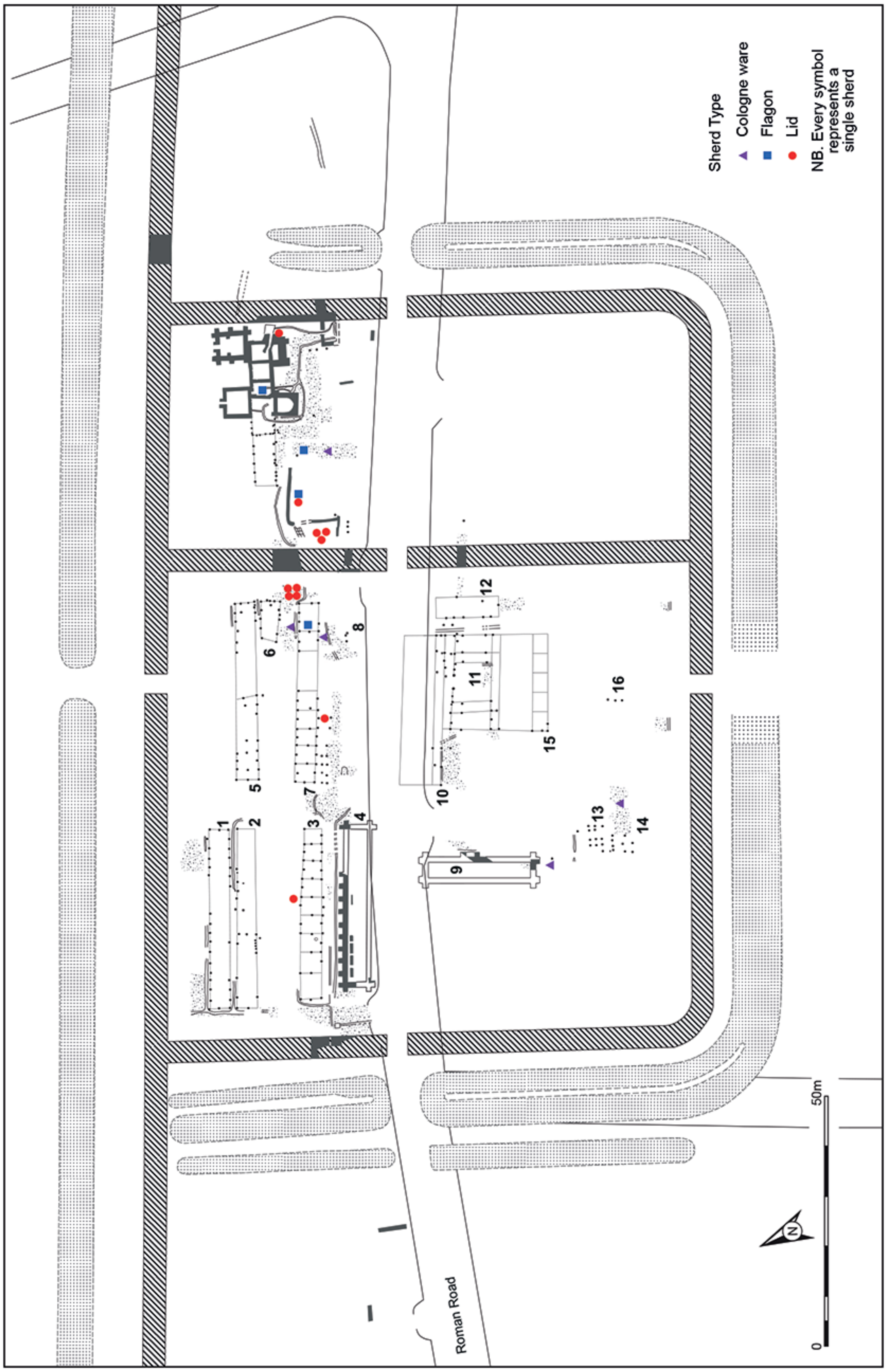


Illustration 21.28
The distributions of flagons, lids and Cologne ware.

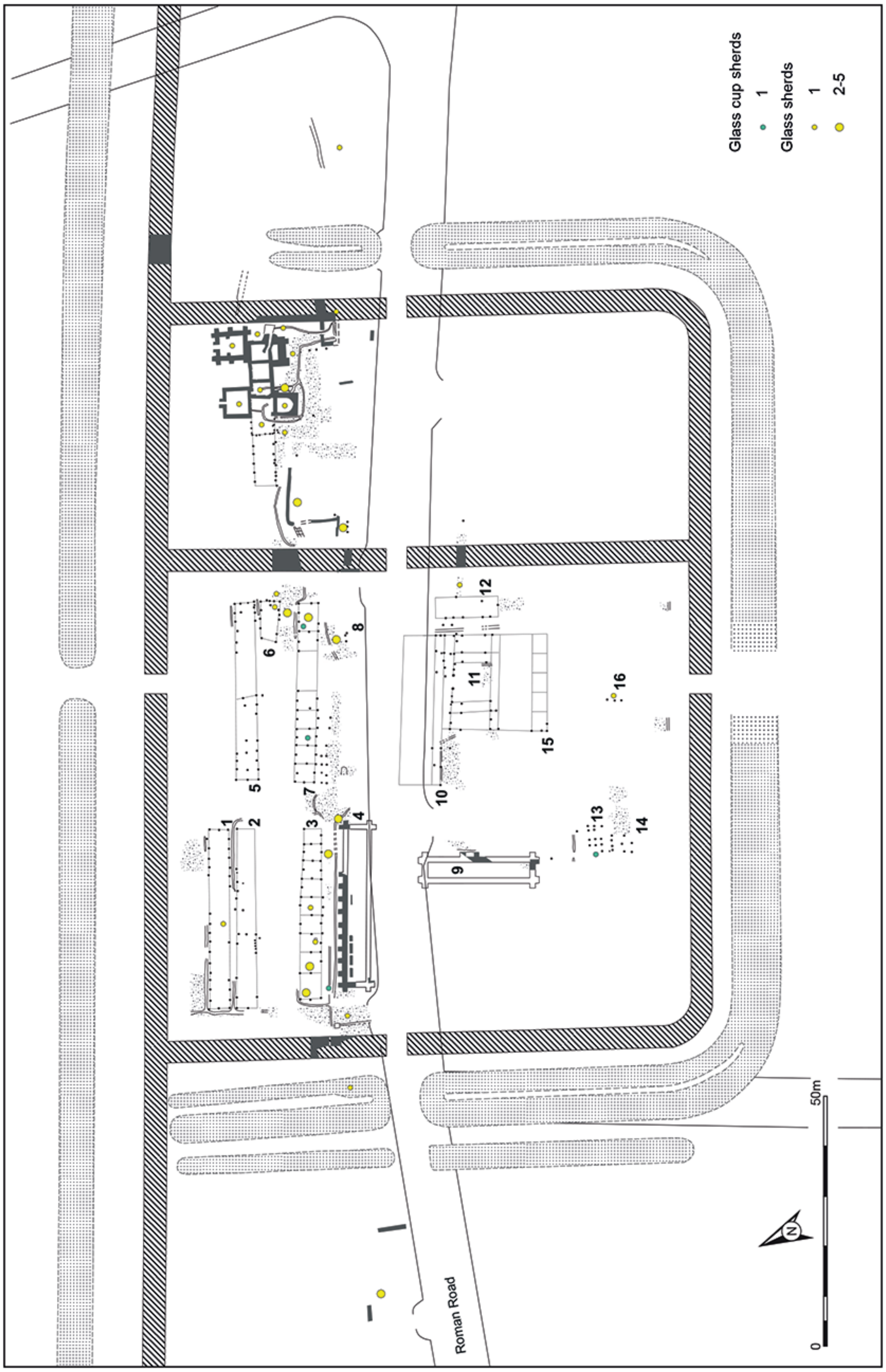


Illustration 21.29
The distribution of glass.

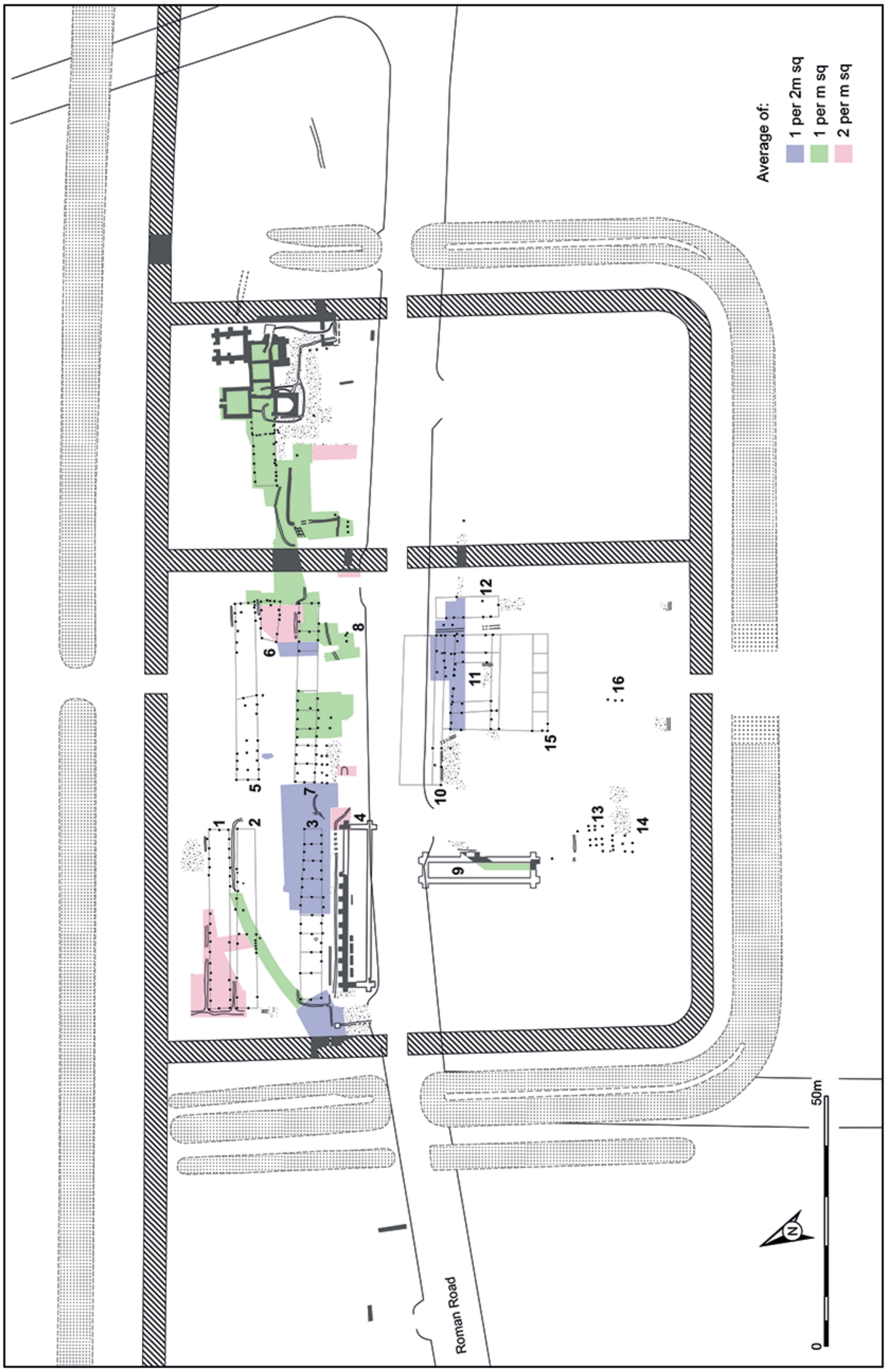


Illustration 21.30
The distribution of amphorae.

Bowls and dishes are also found in nearly every room in the two barrack-blocks, but in general show a wider distribution (illus 21.25). There are certainly significant numbers on the east and to a lesser extent the west intervallum, and others were found on the *via praetoria*, but every building in the fort has yielded at least one example, with the exception of 2 and 13/14. This may simply relate to their shapes for bowls and dishes could serve rather more purposes than a cooking pot. They are also found in quantity in the bath-house, as are samian bowls.

The distribution of three types of vessels are interesting, and support Giles' conclusions. Jars were preponderantly found on roads (illus 21.25). Two fragments were recovered from within the north granary and three from beside it. Building 3 produced three fragments and the headquarters one; the example from the bath-house was in the fill of the robber trench of the primary bath-house. The spread of beakers was similar with a fragment in the north granary, a second in the north range of the headquarters building, and a third in the primary bath-house, and all other examples on roads. Plates/platters are rarely found on Roman military sites. At Bearsden, buildings 1 and 12 each produce a single fragment, with two in the hot dry room (illus 21.25). The pattern was skewed by six examples on the south intervallum.

The pattern of mortaria, cooking pots and bowls/dishes in the barrack-blocks suggests the preparation of food, cooking and the consumption of food in both, but with the soldiers eating out of bowls/dishes rather than plates/platters. Drinking, however, is a problem. Each barrack-block yielded a fragment of one samian cup, but no beaker was found in any fort building (illus 21.25).

The distribution of vessels in a North African style is in contrast to the general distribution. Fragments of only 22 such vessels were recovered but, placing the seven from the annexe to one side, ten were found in the southern part of the fort (six beside the south intervallum) and only 5 to the north. Is this happenstance, or could it indicate different groups within the fort?

The querns are not as helpful as they might have been. The east and the west intervallum yielded one each, the topsoil above the granary a third, and the bath-house two, a distribution close to that identified by Giles, with the exception of the two bath-house examples. The final quern lay in the silt in the outer west ditch where it had presumably been dropped on the abandonment of the fort. Welfare has noted that the querns are few in number in comparison to other sites, but such forts were occupied for longer so the Bearsden assemblage may be a fair reflection of the number of querns in use in a fort with a short occupation (5.2.3). He has, however, also pointed out that some examples show considerable signs of wear being close to the end of their lives and therefore may have been abandoned at the end of the occupation of the fort with better items being taken away by the army.

Samian was recorded mainly in the western ends of building 1 and 3, the eastern ends of 5, 6 and 7 (though with two sherds elsewhere in the building) (illus 21.27). No samian was recovered from buildings 11 and 12, three sherds from 9, and two from 16. Turning to different samian vessels, the predominant forms were bowls (35 examples), dishes (31 examples) and cups (14 examples), together forming three-quarters of the samian assemblage. Twelve examples of cups (forms 27 and 33) were found within the fort while only one example was recovered from the bath-house. The pattern is different for the larger bowls (form 37) with six fragments from the fort and eight from the bath-house, and another eleven from the annexe. The representation of samian in the bath-house is particularly striking, with a fragment in every room, but a preponderance of bowls over cups. What were the bowls used for: quaffing large quantities of wine or beer, holding fruit or nuts (cf 13.9.7), or as chamber pots?

The Cologne ware (two sherds) was found outside the officer's quarters of building 7 and in three locations in the southern part of the fort (illus 21.28). A flagon sherd came from the officer's quarters of building 7. The only imported lamp was found in the officer's quarters of building 3; Bidwell & Croom have suggested that this may indicate the location of a shrine (p 177).

There was but a small quantity of glass at Bearsden and this had a limited range of vessels (illus 21.29). Nevertheless, it was found across most of the site, but in particular the annexe and the barrack-blocks. Fragments of a cup were found in the officer's quarters of building 7 and beside those of building 3, while a third was recovered from a room in building 7 and the fourth in area 13. The officer's quarters of building 7 and its vicinity yielded several fragments of flasks, as did the officer's quarters of building 3, but fragments of these vessels were spread more evenly through or beside this barrack-block. One sherd of glass was found in every part of the bath-house, while others were recovered from the area between this building and the fort/annexe rampart. There were no glass fragments in the headquarters building. The distribution of the higher quality pottery (samian, Cologne ware, and a flagon) and glass is weighted towards the officer's quarters of the barrack-blocks.

Amphorae were most numerous in buildings 1 and 6 (an average of two sherds per $1m^2$), with the next most popular areas being the west end of building 3, building 7, the eastern intervallum beside buildings 6 and 7, and the annexe (one sherd per $1m^2$) (illus 21.30). The least sherds of amphorae (one per $2m^2$) were in the men's rooms in building 3, the western intervallum beside building 3, and the headquarters building. One interpretation might be that amphorae were stored in building 1. The use of building 1 as a store may be supported by the quantities of cooking pots, bowls and dishes found there. Parts of amphorae were reused in, for example, hearths.

In summary, food preparation and consumption seems to have been focused on the barrack-blocks. The quarters of the officers yielded a higher quality of material culture (with two of the four coins from the fort being found close to the east end of building 7). Drinking vessels are rare in the barracks. At least one sherd of glass and fragments of samian and coarse ware bowls/dishes were found in every part of the bath-house, cooking pots were rare, only one sherd of mortarium (in the changing room) and of a jar and no plates suggesting that no food preparation took place here, though there was food consumption.

21.11.6 Comments on the distribution of artefacts

RIKKE D GILES

Introduction

My database of artefacts from 17 Roman forts in northern Britain includes about 33,000 artefacts and their details assigned by functional groups and location in a 'standardised' model of a Roman fort (Giles 2012). The artefacts found at Bearsden have been added to my database, thereby allowing analysis of their distribution and comparison to other forts in the database. It is hoped that this database will soon be available on the internet.

Methodology

Information about the type and location of the artefacts found at the 18 sites studied was transferred from published excavation reports to the database with as much data left as intact as possible. The artefacts were assigned 'sectors' and buildings/features in a standardised fort design of the first-second centuries according to their findspots (Giles 2012: 37–42). This allows the analysis of the

Table 21.4
Functional groups and their sub-groups used in this study; for more information on groups with sub-groups which are not featured in this study see Giles 2012

Functional groups and their sub-groups		
KF: Kitchen/Food	Food: food remains	grains, seeds, nuts, etc
	Prep: Preparation items	*mortaria*, cooking vessels, mixing bowls, querns, cheese presses, meat hooks, etc
	Stor: Storage items	*amphorae*, large jars, etc
	Eat: Items for eating	dishes, bowls, spoons, wood bowls, platters
	Drink: Items for drinking	cups, glasses, beakers, drinking bottles, small jugs, etc
	Knif: knives, blades	knives, whetstones, etc
HC: Health Care	Wash: items for cleaning	basins, strigils, jars for water, soap, bath flasks ...
	Body: grooming items	cosmetics, unguent jars, perfume jars/bottles, glass bottles, mirrors, brushes, combs, tweezers, ear picks, nail cutters, ligulae, etc
	Surg: surgical	surgical instruments, etc
	Bone	human bone (animal bone its own group)
UT: Utilitarian	Utilitarian items	sub-groups not used in this study
ANML: Animal	Animal remains	group and sub-groups not used in this study
TR: Travel	Items for carts/harnesses/etc	sub-groups not used in this study
CL: clothing	Clth: clothing	leather clothing, textile clothing, neckbands, etc
	Shoe: shoes	shoes, hobnails from shoes, etc
	Jewl: jewelery	rings, bangles, intaglios, hair ornaments, metal armlets, stone armlets, brooches, charms, inlays, hair pins
	Oth: other	leather ties, furs, toggles, purses, bags, satchels, belts, buckles, button-loop fasteners, identify tags, cloak fasteners, etc
ML: military	Items to do with the military	sub-groups not used in this study
DA: architecture	Items to do with buildings	group and sub-groups not used in this study
RG: Religious	Items to do with religion	sub-groups not used in this study
CO: commerce	Coins and commerce items	no sub-groups
Unassn: Unassignable	Items that are too corroded or destroyed to identify	group and sub-groups not used in this study

Table 21.5
Relative ranking of functional group percentage means for the all-period (AP) and Antonine composite forts and functional group percentages for Bearsden

Rank	*AP Composite Fort (13)*	*Antonine Composite Fort (8)*	*Bearsden (1)*
1	KF (Kitchen/Food), 80.5	KF (Kitchen/Food), 73.0	KF (Kitchen/Food), 63.2
2	UT (Utilitarian), 5.3	UT (Utilitarian), 8.5	ML (Military), 13.9
3	CO (Commerce), 4.2	CL (Clothing), 6.6	CL (Clothing), 10.6
4	ML (Military), 3.4	ML (Military), 3.9	HC (Health Care), 6.7
5	CL (Clothing), 2.7	CO (Commerce), 3.6	UT (Utilitarian), 3.5
6	HC (Health Care), 2.0	HC (Health Care), 2.5	CO (Commerce), 1.1
7	TR (Transport), 0.6	TR (Transport), 0.6	TR (Transport), 0.2
8	RG (Religion), 0.3	RG (Religion), 0.1	RG (Religion), 0.2

buildings and their contents as well as the creation of a 'composite' fort containing all artefacts studied. The composite fort forms a bench-mark against which information from actual forts can be compared. Next, all artefacts were assigned to functional groups (table 21.4) in an attempt to understand more about the differences in functions between the buildings and areas of the overall composite fort, or any individual fort under study, and the range of activities which took place in those buildings and areas (Giles 2012: 42–3). It is hoped that with the addition of enough data points the function(s) of a building, feature or area may be determined, in part, simply by the comparative percentages of different functional groups which form the artefact assemblage from a location, as well as by traditional methods.

The composite fort model was developed as a way of dealing with variations in the locations and extent of archaeological excavation at different forts. No Roman fort in Britain has been dug completely in modern times (Elginhaugh was published after the collection of the primary data: it is now being added to the data base). Putting the data from different archaeological excavations undertaken at different forts into one composite fort plan allows comparison between buildings and areas found (but not perhaps excavated) in those different forts and aids in smoothing out discrepancies created by individual and very real differences in the archaeological record, excavation techniques, artefact collection and analysis, and reporting for each fort (see Giles forthcoming).

Bearsden

In tables 21.5–21.9 the material from Bearsden is compared to that from the Antonine composite forts and the all-period composite forts. The former consist of Rough Castle, Birrens, Crawford, Castledykes, Strageath, Mumrills, Cramond and Bearsden, while the all-period composite fort contains the above with the addition of Newcastle, Carrawburgh, Housesteads, Bewcastle and Carpow; in all cases only forts with stratified assemblages are included in this analysis unless otherwise stated.

The addition of the data from Bearsden does not change the rankings for functional groups in the all-period composite fort from those determined in 2012. The addition of the data does slightly change the rankings for the Antonine composite fort from the 2012 determinations (Giles 2012: 48). With the addition of the Bearsden data the Military group switches ranks with the Commerce group to become fourth ranked in the Antonine composite fort. The Commerce group then becomes fifth ranked in the Antonine composite fort. None of the 2012 conclusions used above (21.11.5) in respect to the distribution of finds across the all-period composite fort have changed with the addition of the Bearsden data to that of the composite forts.

However, the ranking of functional groups for the Bearsden fort by itself is quite different from the rankings of those groups for the all-period and Antonine composite forts, even though the addition of the Bearsden data to the composite forts did not appreciably change the ranking of functional groups in those composite forts. The Health Care, Clothing and Military functional groups form a higher percentage of the overall artefact assemblage at Bearsden than at the composite forts. The Kitchen/Food group forms a correspondingly lower percentage of the overall assemblage at Bearsden than it does in the all-period and Antonine composite forts. These numbers reflect what is unique about Bearsden as known from current data. Bearsden produced more Military items (arrowheads, etc), more Health Care items (glass bottles) and more Clothing items (shoes/hobnails) than is generally to be expected from an Antonine fort. This may simply be a result of the areas examined by excavation (for example, many of the Military items come from the western ditch which had good preservation conditions for metals), or it might reflect actual differences in the activities at Bearsden, eg Health Care group items, or better recovery techniques.

BUILDINGS AND AREAS WITHIN THE FORT

Bearsden provides data from several of the buildings and areas which are normally found within a Roman fort, including barracks, granaries and roads. The buildings and areas selected for the tables are those which produced a reliable minimum number of artefacts or more, that is, ten or more artefacts in the assemblage from each location.

The composite barrack-blocks (table 21.6), both all-period and Antonine, do not differ in functional group rankings from each other. Their actual percentage means are generally similar, varying within a percentage point or two. The assemblage from the barracks at Bearsden also features the same functional groups ranked in the first three positions. Minor variations in percentage means change the rankings of the next five groups, although they are all within 1 to 3 percentage points of each other. What is interesting about the results from Bearsden's barrack-blocks (buildings 3 and 7) is that the percentages for the first three ranked functional groups are far different from the corresponding percentage means for the same ranked functional groups of the all-period and Antonine composite barracks. The percentage of the Kitchen/Food group from the barracks at Bearsden is notably smaller than the Kitchen/Food group percentage means from the all-period and Antonine composite forts. On the other hand, the Health Care group percentage of the assemblage from the barracks at Bearsden is far larger than its percentage means from the all-period and Antonine composite forts. The same is true, although the difference is not nearly as large, for the Utilitarian group percentage from the barracks at Bearsden and Utilitarian group percentage means from the barracks at the all-period and Antonine composite forts.

In the granaries/storehouses from the all-period and Antonine composite forts the assemblages have functional group rankings which are basically the same for ranks 1 to 4 (table 21.6). This is also true for the functional groups from the granaries/storehouses (buildings 1, 4, 9 and 12) at Bearsden. The lower rankings from the granaries/storehouses at the composite forts are slightly different, but as with the lower rankings in the barracks, the functional groups are all within a few percentage mean points of each other. When the functional group percentages from the Bearsden granaries/storehouses are compared to the corresponding percentage means from the granaries/storehouses of the composite fort, some differences become apparent. The Kitchen/Food group percentage from Bearsden's granaries/storehouses is much larger than the percentage means for the same group from the granaries/storehouses of the composite forts. Bearsden also has a smaller Military group percentage from the granaries/storehouses and surprisingly, given the results from the barracks, a smaller percentage for the Health Care group when compared to the percentage means for those groups from the granaries/storehouses at the composite forts.

The ranking of functional groups for the ditches (table 21.7) at Bearsden is far different from the ranking of the functional groups for the ditches at the all-period and Antonine composite forts. In both types of composite fort the Kitchen/Food group is ranked first by a fairly large margin. However, at Bearsden the Military group is ranked first. The percentage of the assemblage formed by the Military group is larger than all the other functional group percentages by a margin that is normally to be expected to belong to the Kitchen/Food group. The Kitchen/Food group percentage from the ditches at Bearsden is extremely small. The size of the assemblage of artefacts from the ditches at Bearsden was not huge and the majority of the artefacts in that assemblage were from a bundle of arrowheads (11.3.1), thereby skewing the percentages.

The ramparts (table 21.7) were an area at Bearsden which yielded a small number of artefacts. The percentages of the rampart assemblage belonging to the various functional groups are presented in this table along with the percentage means for ramparts from the all-period and Antonine composite forts. What is interesting about the results from the ramparts at Bearsden is the lack of Health Care group items. However, the

Table 21.6
Barracks and granaries/storehouses: relative ranking of functional group percentage means for the all-period (AP) and Antonine composite forts and functional group percentages for Bearsden

	Barracks			*Granaries/Storehouses*		
Rank	*AP (9)*	*Antonine (6)*	*Bearsden*	*AP (4)*	*Antonine (4)*	*Bearsden*
1	KF, 82.2	KF, 82.0	KF, 67.7	KF, 66.5	KF, 69.4	KF, 77.1
2	HC, 4.0	HC, 5.1	HC, 15.4	UT, 12.5	UT, 11.3	UT, 13.7
3	UT, 3.7	UT, 3.7	UT, 5.3	ML, 8.0	ML, 11.2	ML, 4.6
4	CO, 3.7	CO, 3.0	CL, 3.2	HC, 8.0	HC, 6.1	HC, 4.6
5	ML, 2.2	ML, 2.3	ML, 3.2	CL, 3.5	TR, 1.2	TR, 0.0
6	CL, 1.8	CL, 1.5	CO, 2.1	TR, 0.8	CL, 0.8	CL, 0.0
7	TR, 1.3	TR, 1.0	TR, 1.1	CO, 0.3	CO, 0.0	CO, 0.0
8	RG, 0.0	RG, 0.1	RG, 0.0	RG, 0.0	RG, 0.0	RG, 0.0

Table 21.7
Ditches, ramparts and roads: relative ranking of functional group percentage means for the all-period (AP) and Antonine composite forts and functional group percentages for Bearsden

	Ditches			Ramparts			Roads		
Rank	*AP (8)*	*Antonine (4)*	*Bearsden*	*AP (4)*	*Antonine (2)*	*Bearsden*	*AP (8)*	*Antonine (5)*	*Bearsden*
1	KF, 70.8	KF, 62.0	ML, 79.1	KF, 76.0	KF, 72.0	KF, 83.9	KF, 82.3	KF, 84.2	KF, 51.7
2	ML, 10.3	ML, 19.8	CL, 10.5	UT, 5.1	HC, 10.0	UT, 5.4	CL, 5.6	CL, 9.0	CL, 40.7
3	UT, 9.0	CL, 8.5	KF, 6.0	HC, 5.0	UT, 2.7	ML, 5.4	UT, 5.0	UT, 3.2	HC, 5.7
4	CL, 4.0	UT, 6.4	UT, 3.0	ML, 2.6	ML, 2.7	RG, 5.4	CO, 2.8	HC, 2.2	UT, 0.9
5	CO, 1.9	HC, 1.6	HC, 1.5	RG, 2.6	RG, 2.7	CO, 0.0	TR, 1.6	RG, 1.1	CO, 0.9
6	HC, 1.5	CO, 0.3	CO, 0.0	CL, 0.0	CL, 0.0	HC, 0.0	HC, 1.4	CO, 0.2	ML, 0.0
7	TR, 0.4	RG, 0.1	TR, 0.0	CO, 0.0	CO, 0.0	CL, 0.0	RG, 0.9	ML, 0.0	TR, 0.0
8	RG, 0.3	TR, 0.0	RG, 0.0	TR, 0.0	TR, 0.0	TR, 0.0	ML, 0.3	TR, 0.0	RG, 0.0

total assemblage from the ramparts was so small that this result must be treated with caution.

The roads (table 21.7) at Bearsden produced a slightly different functional group percentage ranking than the functional group percentage mean rankings from the all-period and Antonine composite forts roads. The most apparent difference in the ranking is that the Clothing group percentage of the road assemblage at Bearsden is four to eight times higher than the same group's percentage means from the composite forts. This is due to hobnails found on the intervallum road at Bearsden (11.3.6). Interestingly, although the actual percentage of the Clothing group from the roads at Bearden is greatly changed by the large amount of hobnails in the assemblage from the intervallum road, the general ranking of that group is not different from that group's ranking from the composite forts. The Kitchen/Food group is still the highest ranked functional group from the roads at Bearsden, as it is from the roads of the all-period and Antonine composite forts. The Health Care group percentage from the roads at Bearsden is larger, and higher ranked, than the percentage means of that group from the composite forts. This is not surprising, given the elevated percentage of the Health Care Body sub-group found at Bearsden (see below).

The ranking of functional group percentages for the intervallum assemblage (table 21.8) at Bearsden is broadly similar to the ranking of functional group percentage means for the intervallum assemblages of the composite forts. As usual the

Table 21.8
Intervallum and unknown/undetermined contexts: relative ranking of functional groups percentage means for the all-period (AP) and Antonine composite forts and functional group percentages for Bearsden

	Intervallum			Unknown/Undetermined		
Rank	*AP (9)*	*Antonine (6)*	*Bearsden*	*AP (6)*	*Antonine (4)*	*Bearsden*
1	KF, 81.8	KF, 80.5	KF, 77.4	KF, 82.7	KF, 76.8	KF, 80.8
2	UT, 8.5	UT, 11.3	ML, 8.5	CL, 4.3	CL, 8.1	ML, 9.0
3	ML, 3.7	ML, 2.4	UT, 3.6	CO, 4.3	UT, 5.1	HC, 5.6
4	HC, 2.2	HC, 1.4	HC, 2.4	ML, 3.7	CO, 4.4	UT, 2.3
5	CO, 1.2	CL, 1.4	CL, 1.2	UT, 2.6	ML, 2.3	CO, 1.1
6	CL, 1.0	CO, 1.0	CO, 0.0	HC, 1.3	HC, 1.7	CL, 1.1
7	TR, 0.3	RG, 0.4	TR, 0.0	RG, 0.1	TR, 0.0	TR, 0.0
8	RG, 0.2	TR, 0.0	RG, 0.0	TR, 0.0	RG, 0.0	RG, 0.0

Kitchen/Food group is the highest ranked, with the Military, Utilitarian and Health care groups all in the following three ranks. In Bearsden's intervallum assemblage the percentage of the Military group is larger than that group's percentage means in the intervallum of the all-period and Antonine composite forts. This reflects the overall higher percentage of the Military group from the assemblage at Bearsden than at many other forts.

Most reports on Romano-British forts include artefacts from areas between buildings or features whose usage is unknown, and are therefore of undetermined context for the purposes of this study; (identified as 'Unknown/Undetermined' in table 21.8); sometimes this is the result of poor recording. This is not the case at Bearsden, but the site has still generated a decently sized assemblage from areas between buildings and features, and hence called 'unknown'. As is normal for Bearsden, the rankings show that percentages of the Military and Health Care groups are higher than the percentage means of the corresponding groups in the composite forts. Bearsden's Kitchen/Food percentage from this area of the fort is on par with the percentage means of the Kitchen/Food group from the same area of the composite forts.

ANNEXES AND BATH-HOUSES

The excavations at Bearsden provided useful evidence relating to the fort's annexe. Only Cramond and Castledykes, amongst the 17 other forts studied, have such a wealth of information from their annexes (though the finds from the Cramond annexe may be post-Antonine); the only other annexe with artefacts from stratified contexts is Mumrills but their numbers are too small to be of much use (table 21.9).

Bearsden shows, as usual, a lower Kitchen/Food group percentage for the assemblage from the annexe than the percentage means of the Kitchen/Food group from the annexes at the all-period and Antonine composite forts. However, the Kitchen/Food group is still ranked first with the highest percentage of the assemblage from Bearsden's annexe by a wide margin. At Bearsden and the composite forts the Health Care group is ranked second. Bearsden unsurprisingly has a higher percentage of Military group items in its annexe assemblage, compared to the percentage means of the Military group from the annexes at the composite forts. Bearsden also has a higher percentage of Clothing group, and about the same percentage of Utilitarian group, although the latter is here ranked much lower than the group's percentage means are ranked for the composite sites. The higher percentage of both Military and Clothing items in the annexe at Bearsden may be the result of more favorable conditions for their preservation than in the fort.

There are not enough sites in the database with good reports from bath-houses in annexes to make any secure conclusions about the functional group percentage means from the assemblages from such buildings at the composite forts. The rankings of the functional groups for the Bearsden bath-house and the all-period and Antonine composite forts are offered here with little comment, not least because Bearsden's bath-house is the only Antonine annexe baths with an assemblage from stratified contexts. Bearsden's bath-house does have a far lower percentage of Utilitarian group items than the all-period composite fort. This may make Bearsden unique in regards to the Utilitarian group from the baths in the annexe, or it may be that the other annexe bath-house upon which the all-period composite fort percentage means is based, that at Cramond, is unique in having a higher Utilitarian group percentage than should be expected. It is impossible to determine which statement, if either, is true at this time. More study on bath-houses has to be done before it can be determined what is 'normal' for this building.

Functional sub-groups: teasing out the differences

Each excavation of a Roman fort is unique. Causes of variation include the habitation of the forts (different units, occupants, commanders, histories, martial skills, and so on), the aims, techniques, extent and areas of the fort excavated, differing

Table 21.9
Relative ranking of functional group percentage means for the all-period (AP) and Antonine composite fort annexes and functional group percentages for Bearsden's annexe

	Annexe			*Baths in the Annexe*		
Rank	*AP (4)*	*Antonine (4)*	*Bearsden*	*AP (2)*	*Antonine (1)*	*Bearsden*
1	KF, 83.5	KF, 88.8	KF, 77.4	KF, 56.6	KF, 60.9	KF, 60.9
2	HC, 4.2	HC, 2.8	HC, 6.2	UT, 11.8	CL, 10.3	CL, 10.3
3	UT, 3.6	UT, 2.6	ML, 6.0	CL, 9.1	HC, 9.7	HC, 9.7
4	ML, 2.7	ML, 2.0	CL, 5.5	HC, 5.6	RG, 2.9	RG, 2.9
5	CL, 2.4	CL, 1.9	UT, 2.5	CO, 3.7	CO, 2.6	CO, 2.6
6	CO, 0.7	RG, 0.5	RG, 1.5	ML, 2.4	UT, 1.5	UT, 1.5
7	TR, 0.4	TR, 0.2	TR, 0.0	TR, 2.3	TR, 1.5	TR, 1.5
8	RG, 0.4	CO, 0.1	CO, 0.0	RG, 1.5	RG, 0.0	RG, 0.0

artefact survival circumstances and more. As discussed above under methodology the variance in functional group percentages from the assemblages of the forts studied is minimised by taking the mean of those percentages to create a composite fort with an overall assemblage constituting the assemblages from each individual fort. By design, forming composite forts removes the variance between forts. Sometimes this variance is important as it may be caused by humans, by the way they inhabit and use their environment, or by various processes acting upon the archaeological record. Attributing cause to these variances can be difficult because many factors may create the same type of variance in percentages of functional groups, as noted above. However, determining possible reasons for variance in functional group percentages is important and should be attempted. The fort at Bearsden is ideal for such an attempt, as its assemblage has variations which definitely can be attributed to known factors; for example mortaria manufacture on site or nearby (7.3.5; 7.8).

The functional groups discussed above have various sub-groups, the number and types of which differ depending upon their parent group. Examination of these sub-groups and how their percentages of the total artefact assemblage and their parent group vary across a site, can tease out differences in artefact usage, storage and loss. For Bearsden, it is the Health Care Body and Kitchen/Food Preparation sub-groups which are especially interesting. These sub-groups, therefore, are examined in detail and compared to the same sub-groups from other Roman forts.

HEATHCARE BODY SUB-GROUP

Bearsden produced unusually large percentages of the Health Care Body sub-group, composed, in part, of glass bottles which were found in fairly large quantities in many of its buildings and areas. The bottles are mostly prismatic in shape, with some hexagonal and rectangular examples also present. Table 21.10 shows the percentages this sub-group form of the total artefact assemblage from various stratified Antonine contexts found at the forts of Bearsden and Crawford arranged by building or area.

Crawford (Maxwell 1972) produced a larger than expected percentage of Health Care Body sub-group items from Antonine period contexts. Unfortunately the total number of finds from Antonine period contexts at Crawford is quite small, and therefore the results from this site are tentative. Crawford, like Bearsden, produced a larger than expected percentage of Health Care Body sub-group items from the barrack-blocks. The Antonine headquarters building at Crawford also had a large percentage of Health Care Body sub-group items. Crawford had a Flavian occupation period as well as an Antonine one. It is interesting that the Flavian contexts at Crawford did not produce high percentages of Health Care Body sub-group items, in contrast to the high percentages produced by its Antonine contexts.

Amongst forts with non-Antonine contexts, that at Cramond (Rae & Rae 1974; Masser 2006; Holmes 2003) returned a high percentage of the total assemblage of Health Care Body sub-group artefacts from its annexe. Here the percentage of total assemblage made up by the Health Care Body sub-group in

Table 21.10
Health care body sub-group, percentages or percentage means of total assemblage from stratified Antonine contexts found at the Antonine composite fort, Barsden and Crawford

	Antonine composite fort	*Bearsden*	*Crawford*
Overall	2.5	6.7	6.8
Headquarters	5.9	–[1]	16.7
Barracks	5.1	15.4	7.7
Granaries/Storerooms	6.1	4.6	–
Workshops	3.8	–	0.0
Ditches	1.6	1.5	–
Roads	2.2	5.7	–
Intervallum	1.8	2.7	0.0
Unknown	1.7	7.5	–
Annexe	2.8	6.2	–
Baths in the Annexe	9.7	9.7	–

[1] The – mark, in this table and the tables that follow, indicates an area or building in a fort which was either not excavated, was not present in the fort, or if it was present and excavated, did not produce an assemblage of ten or more artefacts.

Table 21.11
Kitchen/food functional sub-groups: percentage means or percentage of the kitchen/food group from stratified contexts at the all-period (AP) and Antonine (Ant) composite forts and Bearsden (Bear)

	Drink			*Eat*			*Knife*			*Preparation*			*Storage*		
Location	*AP*	*Ant*	*Bear*	*AP*	*Ant*	*Bear*	*AP*	*Ant*	*Bear*	*AP*	*Ant*	*Bear*	*AP*	*Ant*	*Bear*
Overall	11.1	13.3	12.0	34.0	30.9	22.3	1.0	0.6	1.2	27.2	36.8	56.2	16.8	15.2	5.9
Barracks	8.9	11.6	14.1	42.0	42.9	29.0	0.3	0.4	0.0	28.4	27.6	47.5	17.2	16.1	6.3
Granaries	17.1	24.3	11.9	16.2	20.6	8.9	0.5	0.0	0.0	37.0	33.2	67.3	28.3	21.0	11.9
Roads	12.8	10.8	0.0	35.3	37.1	22.9	0.5	0.6	0.0	31.3	35.3	69.8	11.2	14.6	5.5
Intervallum	5.5	7.0	8.7	30.9	27.4	21.9	2.7	1.9	2.9	39.0	52.1	63.6	21.5	11.2	2.9
Unknown	8.9	14.7	20.9	34.4	28.0	17.4	1.9	0.3	1.4	24.5	22.3	47.7	24.0	21.0	11.2
Annexe	11.9	10.0	8.0	44.6	46.5	46.8	0.6	0.1	0.0	17.0	20.0	34.2	17.8	14.4	9.0
Baths in Annexe	18.5	15.7	15.7	40.2	53.1	53.1	1.5	0.0	0.0	19.6	23.9	23.9	20.3	7.2	7.2

the annexe is 8.6. Unfortunately the finds from the annexe at Cramond are generally only referred to as being of 'Roman' date in the excavation reports. The fort itself was occupied in both the Antonine and Severan periods and it is entirely possible the Health Care Body items found in the annexe here date to the Antonine period. The fort at Cramond had a very small amount of the Health Care Body sub-group; the sub-group is only 0.3% of the total assemblage excavated from the fort. The bath-house in the annexe at Cramond also had a very low percentage of health care body artefacts, the sub-group is 1.6% of the total assemblage from the building.

Wallsend (Hodgson 2003) provides useful figures, but as not all artefacts from the excavation were published the numbers are only indicative. The fort had a very large percentage of Health Care Body items from the artefact assemblages dating to certain periods of occupation. In Antonine period contexts, the Health Care Body sub-group composed 16.7% of all the items from the fort. The hospital, which produced most of the Antonine period artefacts found at Wallsend, 20% of its items as Health Care Body sub-group items. These items were almost all prismatic or hexagonal bottles, with one possible glass bath flask. In the late Antonine to Severan period the barracks at Wallsend produced a figure of 8.3% for the Health Care Body sub-group items, the figure for the hospital being 14.9%.

KITCHE N/FOOD SUB-GROUPS

The Kitchen/Food functional group is divided into several sub-groups; amongst these are the Drink, Eat, Knife, Preparation and Storage sub-groups. The percentages or percentage means of the Kitchen/Food group for these sub-groups are given in table 21.11. Within the Kitchen/Food group the domination of mortaria (Kitchen/Food Preparation sub-group) at Bearsden is clear. As discussed elsewhere in this report (sections 7.3 and 7.8) mortaria were being made at Bearsden, and the remains of this manufacture appear as large deposits on the intervallum road, and the area north and east of building 7, a barrack-block, and in smaller amounts in every location of the fort and its annexe (see also section 21.11.5). This manufacture and discard is reflected in the percentages which the Kitchen/Food Preparation sub-group forms of the Kitchen/Food group from the assemblages in the granaries/storehouses, roads and intervallum. In these areas those percentages are the highest of those from all the studied buildings and areas, with the Preparation sub-group generally forming 65–70% of the Kitchen/Food group. The Kitchen/Food Preparation sub-group percentage is also dominant in the two barrack-blocks at Bearsden in contrast to the barrack-blocks of the composite forts where the Eat sub-group percentage means are largest (table 21.11) and, although the Preparation sub-group percentage is lower in the annexe than almost every other area at Bearsden, it is still greater than the percentage means of the sub-group from the annexe at the composite forts. It is only from the bath-house that the Kitchen/Food Preparation sub-group percentage at Bearsden can be considered close to that sub-group's percentage mean in the all-period composite fort (note that the Antonine baths in the annexe is the Bearsden baths, so the percentages are the same for both 'baths in the annexe' at the Antonine composite fort and Bearsden).

Building 7, a barrack-block, was very close to the major deposition of mortaria and where mortaria may have been made. The remains of these mortaria were strewn across the road and intervallum near building 7. Building 7 has an assemblage with a large percentage of Kitchen/Food Preparation sub-group items, which makes up over 50% of the Kitchen/Food group in the building.

Despite being slightly removed from the place of manufacture of the mortaria at Bearsden, the barrack-block across the street, building 3, also had a high percentage of the Kitchen/Food Preparation sub-group. The Kitchen/Food Preparation sub-group is 41% of the Kitchen/Food group from building 3, higher than the typical percentage mean of 27.4% for the Kitchen/Food Preparation sub-group from the barracks of the Antonine composite fort.

Bearsden's Kitchen/Food Preparation sub-group percentages are generally the highest amongst the 18 forts in this study. This is because mortaria, which usually compose a vast amount of the Kitchen/Food Preparation sub-group, were being made at Bearsden, as discussed above. There are, however, other forts amongst the 18 studied which show relatively high percentages of the Kitchen/Food Preparation sub-group. All of these forts are Antonine or have Antonine periods of occupation. Unfortunately, none of them has seen large modern excavations, therefore, to obtain the fullest picture possible of their Kitchen/Food group percentages, the stratified and unstratified percentages of this sub-group are included in tables 21.12 and 21.13. As can be seen in table 21.12, every building and area excavated at Rough Castle (Buchanan et al 1905; Macdonald 1933; and MacIvor et al 1980) with the exception of the barracks, has a high percentage of the Kitchen/Food Preparation sub-group. When compared to the percentage means for the all-period composite fort and the Antonine composite fort in table 21.11, it is apparent that the Kitchen/Food Preparation sub-group is much higher from buildings and areas at Rough Castle than it is at the composite forts. We do not yet know the reason for this.

Crawford (Maxwell 1972) is another fort with an Antonine occupation period which shows high percentages of the Kitchen/Food Preparation sub-group. The percentages for Crawford's Kitchen/Food sub-groups are given in table 21.13. The overall number of artefacts produced by the excavations at Crawford is not large in comparison to excavations at the other forts included in this study and the percentages given in this table must be considered highly tentative.

The Kitchen/Food Preparation sub-group percentages at Crawford are quite high in every area/building except the barracks and the workshop. This is similar to the results from Rough Castle where the barracks also produced a low percentage of Kitchen/Food Preparation sub-group items. And it must be noted that despite the relatively high percentage of the Kitchen/Food Preparation sub-group in the barracks at Bearsden, that percentage is still lower than percentages for the sub-group from most other areas of the fort.

Items with a Flavian context at Crawford, which only number a small amount, do not produce Kitchen/Food sub-groups percentages which are dominated by the Preparation sub-group. This is contrary to the findings from Crawford for Antonine contexts. The overall numbers for the Flavian period at Crawford have the Kitchen/Food Preparation sub-group as 35.3% of the total Kitchen/Food group. The highest sub-group of the Kitchen/Food group was the Eat sub-group, at 41.2%. Flavian contexts from the barracks at Crawford, which only produced 11 items, are overwhelmingly Kitchen/Food Eat, with over 80% of the Kitchen/Food group belonging to that sub-group.

ANALYSIS OF SELECTED BUILDINGS

Percentages of artefact functional groups for buildings 1, 2, 5, 6 and the headquarters (buildings 11, 15 and 10) (table 21.14) were computed in an attempt to learn more about those buildings. The functional group percentages from Building 1 match most closely those of a storehouse or granary in the composite forts (tables 21.6, 21.11), with a fairly large percentage of the Kitchen/Food Storage sub-group. Buildings 2 and 5 produced very few items and their functional group percentages do not correspond closely to those of any known building type. They may have been used for storage. Building 6 has an interesting spread of functional group percentages with a high percentage of the Kitchen/Food Drink sub-group which, in this aspect alone, resembles the high percentages of Kitchen/Food Drink items found in ovens or cooking areas (Giles 2012: table 13). The functional group percentages which result from analysing the very limited number of finds from building(s) 11, 15 and 10 do not contradict their attribution as the headquarters of the fort.

Table 21.12
Rough Castle: kitchen/food sub-group percentages of the kitchen/food group assemblage from all contexts (stratified and unstratified) and stratified contexts

	Drink		*Eat*		*Knife*		*Preparation*		*Store*	
Location	*All*	*Strat*	*All*	*Strat*	*All*	*Strat*	*All*	*Strat*	*All*	*Strat*
Overall	13.1	17.6	36.1	32.2	1.3	0.0	40.1	42.9	8.4	7.3
Barracks	17.2	–	51.5	–	0.0	–	26.7	–	4.6	–
Ditches	8.0	–	28.0	–	0.0	–	56.0	–	8.0	–
Rampart	1.6	–	42.6	–	1.6	–	50.8	–	0.0	–
Roads	18.5	21.4	32.1	30.4	0.0	0.0	41.1	41.4	6.7	7.1
Intervallum	20.0	–	10.0	–	0.0	–	70.0	–	0.0	–
Unknown	13.8	–	27.6	–	3.5	–	37.1	–	17.2	–

Table 21.13
Crawford*: kitchen/food sub-group percentages of the kitchen/food group from all contexts (stratified and unstratified) and stratified Antonine contexts

	Drink		*Eat*		*Knife*		*Preparation*		*Storage*	
Location	*All*	*Strat*	*All*	*Strat*	*All*	*Strat*	*All*	*Strat*	*All*	*Strat*
Overall	11.5	12.0	36.8	40.0	0.0	0.0	44.8	46.0	6.9	2.0
HQ	12.5	0.0	25.0	40.0	0.0	0.0	50.0	60.0	12.5	0.0
Barracks	12.5	18.1	45.8	45.5	0.0	0.0	41.7	36.4	0.0	0.0
Granaries	20.0	–	26.7	–	0.0	–	40.0	–	13.3	–
Workshop	7.7	11.1	46.1	55.6	0.0	0.0	46.2	33.3	0.0	0.0
Ditches	14.2	20.0	28.6	20.0	0.0	0.0	28.6	60.0	28.6	0.0
Intervallum	0.0	0.0	35.3	35.7	0.0	0.0	64.7	64.3	0.0	0.0

* There were no reported items from unknown sectors from Crawford.

Conclusions

Of the 18 forts in the study, statistics from Rough Castle, Crawford and Bearsden show that high percentages of the Kitchen/Food group in their assemblages were formed by the Preparation sub-group (mortaria). These high percentages occur during the Antonine occupations and only one possibly non-Antonine fort, amongst the forts studied, produced a high percentage of Kitchen/Food Preparation items. That was Carrawburgh (Breeze 1972) on Hadrian's Wall. However, the few stratified remains from this fort all show normal percentages of the Kitchen/Food Prep sub-group, and the unstratified artefacts from undescribed/unknown contexts which show a high amount of Kitchen/Food Preparation (51% of the Kitchen/Food group) were dug before 1907 and probably all come from outside the fort (Budge 1907; Allason-Jones & MacKay 1985).

At Bearsden the high percentage the Kitchen/Food Preparation sub-group formed of the Kitchen/Food group is due to the fort being the site of mortaria manufacturing. At Rough Castle and Crawford the reasons the Kitchen/Food Preparation sub-group forms high percentages of those forts' Kitchen/Food

Table 21.14
Bearsden: functional group percentages from selected buildings and their immediate environs

Functional Group	*Building 1*		*Building 2*		*Building 5*	*Building 6*		*Headquarters (Buildings 11, 15 and 10)*	
CL					9.9%				
CO	6.25%					4.6%			
HC	6.25%		10.3%			4.6%			
KF	87.5%		58.8%		80.3%	90.7%		86.1%	
KF Drink		14.3%			12.3%		30.7%		16.3%
KF Eat		35.7%		17.5%	24.6%		20.5%		
KF Knife		7.1%							
KF Preparation		7.1%		47.4%	50.9%		36%		67.7%
KF Storage		28.6%					12.8%		
ML			10.3%					13.9%	
UT			20.6%		9.9%				

groups are unknown. The barracks at all three of these forts return smaller percentages of Kitchen/Food Preparation items than other areas of their respective forts. In the two sites without evidence of mortaria manufacture, Rough Castle and Crawford, the barracks have closer to normal percentages of mortaria. This may be because the barracks were kept cleaner than the other areas of these forts (section 21.11.1*)*, or perhaps the percentages of the Kitchen/Food Preparation sub-group from the barracks are lower because mortaria were not generally being stored in the barracks.

The case has been made for the manufacture of coarse wares as well as mortaria at or near Bearsden (section 7.8, see also Breeze 1986). The manufacture of these ceramics does not result in higher than normal percentages of various non-Preparation Kitchen/Food sub-groups; for instance the Drink, Eat or Store sub-groups, or higher than normal percentages of the Kitchen/Food group as a whole. Therefore, more mortaria were being made and/or stored and eventually discarded and lost at Bearsden, Rough Castle and Crawford than other coarse wares at those forts, for whatever reason(s).

As discussed above, Bearsden has greater than normal percentages from many areas and buildings for the Health Care Body sub-group. This sub-group in the Antonine period in northern Britain effectively consisted mostly of glass bottles. This high percentage of Health Care Body sub-group items is also found from Antonine contexts at Crawford. Another, possibly Antonine context which has a high percentage of the Health Care Body sub-group is the annexe at Cramond. However, the Antonine contexts from the fort at Cramond do not return a high percentage of this Health Care sub-group.

Bearsden, Crawford and Cramond may have been part of a trade or importation network for glass bottles in Antonine (or possibly Severan in the case of Cramond) Scotland.

One of the interesting points Bearsden, Rough Castle and Crawford share is that part of their garrisons were outposted (section 21.6; McIvor et al 1980: 278–83; Maxwell 1972: 175–80). Because the full unit was not in residence at these forts more room may have been left in each fort, even though all three forts were quite small, to store and protect trade items like mortaria and bottles. Rough Castle and Bearsden also had an annexe in which to store excess items. And, in the case of Bearsden, military weapons and shoes and their associated hobnails may have been stored and eventually lost or discarded as well.

At Bearsden and Rough Castle Roman occupation ended with systematic destruction by the occupiers of the forts as the Antonine Wall was abandoned. This may be the case with Crawford as well, which was not inhabited by the Romans beyond the Antonine period. The systematic destruction of the forts and their contents could account for many of the artefacts excavated from those forts, eg unusable or forgotten bundles of arrowheads tossed over the rampart into a ditch and items stored for use or reuse, such as hobnails, dumped in much the same manner in various locations. Any ceramics or bottles remaining could have been broken by the Romans upon their departure, or simply broken by the passage of time. As can be seen from this study, these assemblages, whether the result of actual use and discard, destruction at the end of occupation or something else, and the functional groups which form them, can reveal useful information about what happened at a fort, how it was used, and how its history and usage compares to other forts.

Artefact functional group analysis can be used to study what is normal amongst archaeological sites of the same culture, period and potential usage. The development of a composite site, such as the all-period and Antonine composite forts, allows the discovery of basic trends in artefact functional groups and their rankings. Variability amongst the sites forming the composite site can also be examined via this method, once a basic understanding of the composite site has been reached. Bearsden's buildings and areas, and the functional group percentages of the artefacts found within them, were examined in detail. Differences and similarities between Bearsden and other Antonine forts were discovered and are summarised above. Artefact functional group analysis was also used at Bearsden to reinforce conclusions about the usage of certain buildings based upon building typology, such as building 1 and the headquarters. The potential this type of analysis offers to archaeologists is great, especially in combination with traditional building typology and artefact distribution analysis (see sections 21.11.1–5) and should be explored further.

21.11.7 Diet

The regular taking of sample columns from the ditches and other deposits resulted in the location of the sewage from the latrine, as it happens, before the latrine itself was found. This sample was examined by Camilla Dickson and subsequently analysed biochemically by Brian Knights.

Within the sewage, fragments of hulled wheats, probably from both emmer and spelt wheat, were identified, together with bran fragments from either wheat or rye: the bran formed about half the organic part of the ditch infilling. Rye and oats also appear, but may have been merely weeds in a wheat crop. In addition, the sewage contained barley grain fragments which had been ground with the wheat and also fragments which had been processed in a similar manner to pearl barley and probably used for thickening broth. The bulk of the grain would appear to be emmer and spelt with a little barley. Emmer could have been used for porridge, whereas spelt was probably made into bread. Durum wheat found as a residue on pots could also have been used with other wheats to make brown bread, but it does not appear to have been part of a cereal mix and therefore may have been used to make porridge or pasta.

It seems likely that the wheat was imported to Bearsden rather than grown locally, a conclusion reinforced by the durum (Spanish) spelt wheat, and supported by the presence of grain beetles in the sewage. The grain beetles could have either entered the ditch by the dumping there of contaminated grain, or through the soldiers eating contaminated grain. Isolated fragments of grain beetles were found elsewhere on the site. Two reasons have been offered for this:

- their presence in the sewage was the result of their being eaten (Osborne 1983); Camilla Dickson suggested to me that they were eaten with the pearl barley used to thicken soup (pers comm; cf Dickson et al 1979: 51);

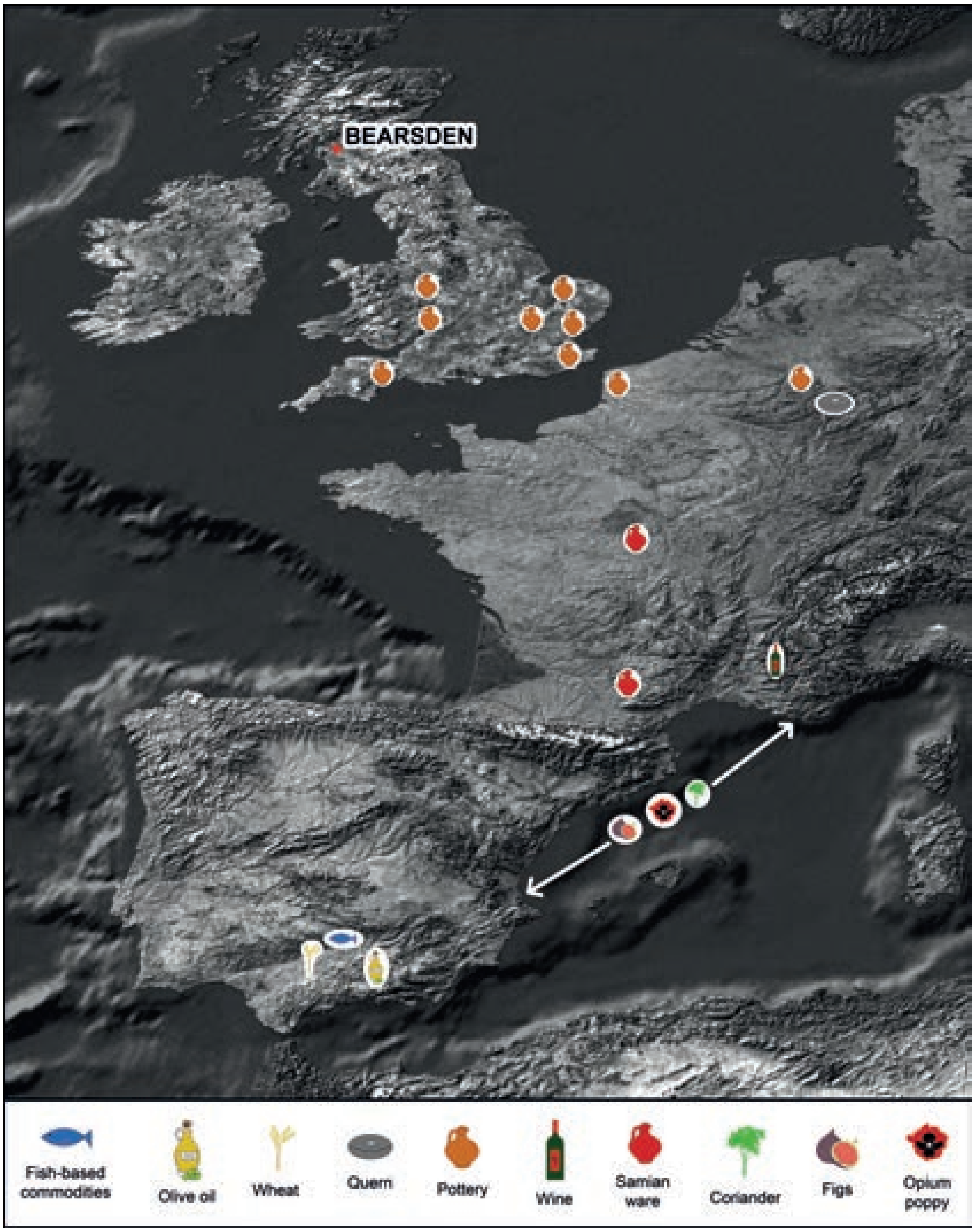


Illustration 21.31
The sources of supply.

- the beetles had been dumped in the ditch in order to dispose of damaged grain; perhaps the recording of four species of grain beetles may give some support to this proposal (17.2.1).

Other foods were found in the sewage. These include lentil, horse bean, linseed, fig, dill, coriander and opium poppy. Lentil may have been imported to Bearsden from southern Britain and fig, dill, coriander and opium poppy from the continent. Wild plants eaten at Bearsden include wild celery, wild turnip, wild or cultivated radish, common mallow, bilberry, wild strawberry, blackberry, raspberry, hazel nuts and purging flax. The flowering parts of common mallow were possibly eaten as a prophylactic, while celery was considered to have had medical properties. This diet was uniform with the evidence from elsewhere in Britain and indicates that items such as cereals, pulses, figs, spices and oil seeds were standard supplies. The various containers found at Bearsden indicate that olive oil, wine and fish-based products were also consumed. The biochemical analysis undertaken by Knights hinted that the soldiers had a mainly plant-based diet (Knights et al 1983). This work was particularly important because, while it is known that Roman soldiers ate meat (Davies 1971: 126), the balance of meat within the diet was unknown. The work of Knights demonstrates that the vegetarian part of the diet was more important that meat. Unfortunately, at Bearsden the combination of acidity and aeration (as indicated by worming) had dissolved the bones.

21.11.8 Hygiene and relaxation

The soldiers shared their environment with a variety of insects. Grain beetles were found in the west and east ditches as well as in building 7, a barrack-block. Aquatic beetles and waterside beetles lived in the main depression within the fort, while elsewhere there were beetles feeding on rotting hay, perhaps animal bedding, and on the dung of large herbivores, either horses or cows. The soldiers had worms. Examples of both *trichuris trichiura* (whipworm) and *ascaris* (roundworm) were present in the sewage, and it is possible that remains of these parasites were distributed across the fort. A single example of a human flea was also recovered from the sewage.

The latrine, as we have seen, could have been a health hazard, more so if there were wooden rather than stone seats, because the former are more difficult to clean. Sponges, commonly believed to have been used for personal cleaning would also have been dangerous, unless each soldier had his own, which seems unlikely. However, the discovery of moss in the sewage has led to the suggestion that this was used for cleaning and this would certainly have been more healthy if used only once.

There is little evidence to illustrate how soldiers passed their time at the fort, with the exception of the existence of the bath-house. Part of a gaming board was found in the north granary, and a possible counter in building 1 (5.2.5.82; 7.1.2.3). Bidwell & Croom have suggested the possibility of a shrine in the officer's quarters of building 3. Unfortunately, we do not know the name of any soldier based at Bearsden. The centurion Quin., recorded on a building stone, may not have been present with his men, while the names on the amphorae, AR, UMMID and VAG, may not have been of soldiers stationed at the fort. None of the artefacts relate to a known army unit, and none indicate the presence of civilians.

21.12 SUPPLY

The countryside around Bearsden provided a range of supplies for the soldiers. This included building materials: stone, turf, clay, timber and rushes for the buildings. The predominant stone was sandstone but of a type too common to identify locally. The vegetation of the area when the Roman army arrived was such that turf and rushes would be available locally. Alder, hazel and willow trees provided most of the timber found in the fort, with less oak and even less birch. Most of the wood, however, recovered was in the form of small branches used for wattles. Bracken and heather were gathered and peat bogs exploited for fuel. Grassland, marshes and fen would have provided meadow hay; there is some evidence for hay in the depression within the fort and in two of the ditches. Various items of food could have been obtained locally, as noted above. Water was presumably always available from the Manse Burn immediately to the north of the fort. The ground, as noted earlier, falls away to the north, east and south of the fort, but, after a level stretch of ground, it rise to the west. Water could have been drawn by means of a simple aqueduct from one of the streams flowing off this higher ground.

In addition, the purpose of the two depressions between building 7 and the *via principalis* may have been to collect water, perhaps for the horses. Care was taken in relation to the bath-house and the latrine to channel water downhill to flush the latter.

It would be too simple to assume that the collection of local supplies would have been carried out by the soldiers themselves. Much may have been undertaken by their slaves, or by local people who collected the produce on their land and sold it to the soldiers (Thorburn 2003 discusses the role of *calones*, probably slaves who undertook menial tasks such as collecting fire wood, foraging and transport, and the *lixae*, who appear to have been free merchants selling goods to the soldiers).

Clay was locally exploited to make pottery, notably by the potters of Sarrius who established a workshop in or near to Bearsden, using also local stone for the grits in his mortaria (7.4.2; 3; 4). Sarrius was a civilian and had his main workshop at the Mancetter-Hartshill complex in Warwickshire in the West Midlands, though he also had a subsidiary workshop further north at Rossington Bridge near Doncaster in South yorkshire and at an unlocated site in north-east England. It is probable that he sent one or more of his capable potters to work at Bearsden furnished with a copy of his most commonly used die. Other potters working locally may have included Mascello and Gica (or Cica), and possibly some from even further afield, Provence or North Africa, taking advantage of the disruption in supply occasioned by the move northwards of the frontier in the 140s and the abandonment of many forts in northern England to establish a market on the new frontier. Between them, they made a wide range of other pots; indeed about half of all the pottery used at Bearsden was locally made. It is unfortunate that it cannot be certain that the pottery was made at Bearsden itself, but the presence of misfired vessels, particularly in the dump in the annexe and in the intervallum area to the east of building 7, suggests that there were kilns close to the fort, or perhaps in the annexe (illus 21.32; 21.33). Analysis of the pottery from Bearsden, Bar Hill and Croy Hill has demonstrated that the products were not from the same kiln or workshop which also strengthens the case for a workshop at or close to Bearsden.

The mechanism which brought potters to work at or near Bearsden is not well understood. It could be argued that the army issued contracts to these potters to ensure a local supply of necessary vessels. In the early days of the occupation of a new area the army appears to have made its own pottery locally, at least up

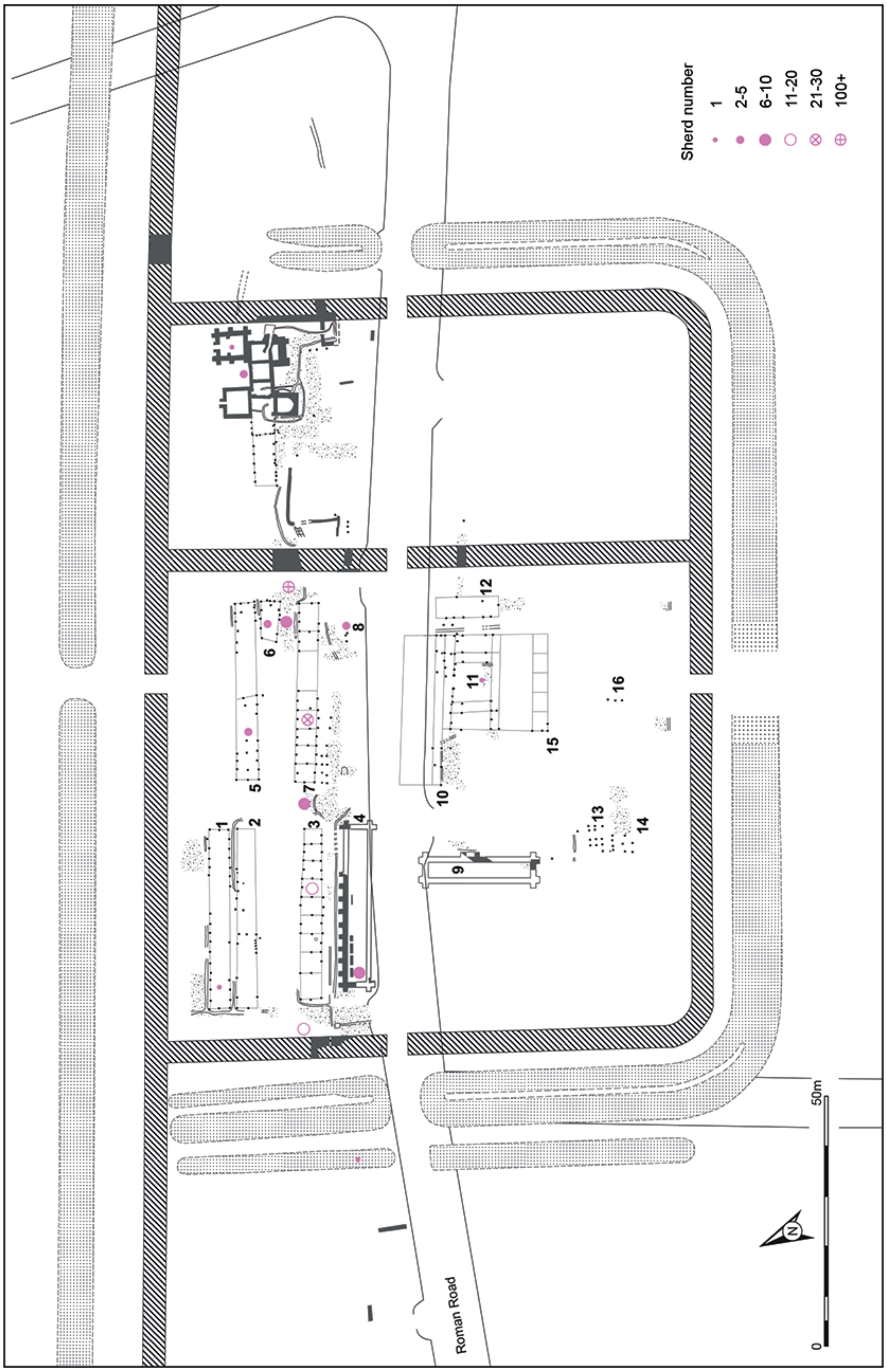


Illustration 21.32
The distribution of Sarrius' mortaria at Bearsden.

to the early second century; the arrangements at Bearsden could have been similar except that the military potters were replaced by civilian. The discovery of a fragment of a mortarium made by Sarrius in the burning around the hearth in the primary bath-house lends support to this hypothesis (cf p 139). On the other hand, there seems to be no reason why the process could not have been driven by market forces (Breeze 1977a), and this could equally account for the presence of potters at Bearsden at the time the fort was being constructed. It must be emphasised that no example of a contract issued by the state for the supply of pottery has been found.

The scale of the local production of pottery is one of the surprises of Bearsden. Local kilns provided 40% of the bowls, dishes and platters at the site, while mortaria were more numerous than usual in Roman forts presumably also due to local production. This implies a degree of specialisation, as can be demonstrated by analysis of the origin of other vessels. Only 24% of the cooking pots, for example, were made at Bearsden; the largest supplier, 44% of all cooking pots, was the industry producing black burnished ware 1 in Dorset, with the black burnished ware 2 kilns in Kent and the Colchester area furnishing 23%. The kilns in Kent and Essex, on the other hand, produced about 30% of the bowls, dishes and platters and Dorset 25%. The

Illustration 21.33
A mortarium bearing the name of Sarrius.

Illustration 21.34
Pottery vessels found at Bearsden. Upper row, left to right: cooking pot in BB1 from south-east Dorset (illus 7.5.120); mortarium made at Bearsden and stamped by Sarrius (illus 7.21.38); jar from northern Gaul (illus 7.8.219). Lower row: bowl in BB2, probably from Colchester, with rivet holes for a repair (illus 7.7.185) and another mortarium stamped by Sarrius (illus 7.18.12).

Illustration 21.35
Figs.

Severn Valley kilns provided over 75% of the narrow-mouthed storage jars.

The local kilns were therefore very important to the military community at Bearsden. Nor did they only make the basic pottery types of mortaria, bowls, dishes and platters, but examples of specialised items included triple vases, a spouted vessel and lamps, possibly for use in religious ceremonies.

Other pottery came from further afield. Samian came from two areas of Gaul, the kilns at La Graufesenque and Montans in western Provence and those at Lezoux and Les Marters-le-Veyre in the province of Aquitania, modern Averne. Kilns at Colchester supplied beakers.

This short review of the pottery emphasises that Bearsden, towards the western edge of the north-west frontier of the Roman Empire, was linked by supply lines to pottery kilns about 600km to the south and, as we will see, other points of production even further distant. In bringing the pottery to the fort, great use was made of sea transport. Black burnished 1 vessels and Severn Valley wares were shipped up the west coast, while black burnished 2 travelled up the east coast, then being transported across the isthmus to the western forts. As Gillam noted, the western end of the Antonine Wall is the only point where black burnished 2 vessels reached the west coast (Gillam 1976b: 58–9).

Some pottery vessels arrived at Bearsden as containers. These included amphorae. These large storage jars predominantly brought olive oil from the region of Seville, but also wine from southern France and fish-based products from southern Spain, all recognisable from the different forms of the containers. They also varied considerably in size: the olive oil amphorae contained about 70 litres, the wine about 31 litres while the fish-based products were carried in vessels only containing about 15 litres. Amphorae formed a higher proportion of the pottery at Bearsden than is usual at military sites in northern Britain dating to the second century. Several of the large olive oil amphorae were cut down and re-used.

It is possible that wine was also imported in wooden casks. Small pieces of silver fir found to the south of the forehall may be from such a barrel; an alternative explanation that they were from a writing tablet is unlikely owing to their thickness in spite of their location next to the headquarters building.

Glass vessels were also imported. Most were prismatic bottles, that is containers, so they presumably arrived at Bearsden with contents. One glass container had the inscription Gn. Asini(us) Martialis on the base, but the whereabouts of his workshop is not known. The fragmentary nature of the glass found during the excavations, and the lack of elements such as rims, has led Jenny Price to suggest that glass was recycled at the site, though where this occurred is not known.

Four quernstones for grinding the corn were manufactured in the Mayen area of the Eifel in western Germany while a fifth was from a quarry in Britain.

Wheat was almost certainly imported, presumably from southern Britain, and this is reinforced by the discovery of durum (macaroni) spelt wheat surviving as residue on pots. This type of wheat originates in Spain. While it might be thought that it was unlikely that grain was transported such a distance, in 44 the governor of the Spanish province of Baetica was expelled from the Senate for not sending grain to Mauretania across the Mediterranean, so export to Britain was not necessarily an impossible consideration (Dio 60, 24, 5; Erdkamp 2002a: 53). Lentils, too, were probably imported from beyond Britain. There is some pottery at Bearsden from East Anglia and this might have travelled north with British-grown grain. A jar from northern Gaul is another vessel which may have travelled with a cargo of supplies.

Amongst the various items of food surviving in the sewage are four which are not native to Britain: fig, dill, coriander and opium poppy; these may have travelled to Bearsden by ship from the Mediterranean. Also not native to Britain are rare finds of silver fir and spruce which may have been imported as artefacts. With the food came pests such as grain beetles and the golden spider beetle.

Swan (1999) suggested that soldiers cooking in a North-African style lived at Bearsden, possible having served in Mauretania during the war there in the late 140s, or recruited there, or having brought back African wives or slaves. Bidwell and Croom, however, have offered an alternative explanation for cooking in this manner, the move to Bearsden of potters from Gallia Narbonensis (modern Provence) who made vessels in the North African style. This may seem far-fetched, but wine came to Bearsden from the same area, and samian from the kilns a little distance to the west. Whichever interpretation is correct, it emphasises the wide-ranging links of Bearsden.

This is not the place for a wider discussion on the supply of Roman forts, but it may be noted that evidence suggests that soldiers could obtain their supplies in a variety of ways. Evidence from across the empire indicates that sometimes soldiers were sent to collect supplies, at times from a different province; others were delivered or purchased locally; while the families of soldiers could send items themselves (Davies 1974, 51–2; Breeze 1984b; Erdkcamp 2002a; Monfort 2002; *Tab. Vindol*. 343 is an example from the north of Britain). It is clear that at Bearsden food such as wild fruits were gathered locally, presumably by the soldiers or their servants; goods such as pottery were manufactured locally by civilians and either sold directly to the soldiers or, less likely in my view, purchased by the military authorities on behalf of the soldiers; other items came from considerable distances, including grain and olive oil, and in this case the arrangements presumably being made by the provincial governor or the procurator. On the basis of evidence from elsewhere, it is likely that the soldiers stationed at Bearsden themselves travelled some distance to collect particular items.

21.13 THE END OF THE FORT

Gulleys in the fort were found to be choked with burnt wattle and daub, with many fragments of pottery and pieces of metal. No post-hole, however, was found to have been disturbed by the removal of its contents, for example by rocking, nor was there any evidence for posts being burnt in situ, though often the position of a post-hole was betrayed by the occurrence of flecks of charcoal in its mouth. It would appear, therefore, that the wattle-and–daub panels of the buildings were pulled down and the whole fort set alight (illus 21.36). Half-burnt and demolished buildings were then abandoned by the army. The state of the artefacts recovered during the excavations suggests that material of value would have been taken away. This included querns and window panes.

The sequence of deposits immediately east of the northern section of the rampart between the fort and the annexe is revealing. Immediately over the cobbled path to the east of the rampart lay a burnt deposit up to 120mm thick containing willow, alder and hazel branches. Overlying this is a small amount of fallen turfwork. This is the order which is to be expected if the burnt material formed a timber breastwork thrown down and burnt when the fort was abandoned with some disturbed turf from the rampart subsequently falling onto it.

Although the timber breastwork appears to have been pulled down and burnt, it is not clear whether or not the ramparts were otherwise slighted: there was certainly no attempt to backfill the ditches. The collection of metalwork in the middle west ditch a little to the north of the presumed causeway leading to the west gate of the fort may have been dropped or dumped as the army abandoned the fort. There can be no doubt that the fort was destroyed by the Roman army on its evacuation. This was normal practice, and is recorded by the late first-century writer Josephus in relation to Roman camps (*The Jewish War* 3, 90).

Two coins dating to 154–5 (one possibly 153–4) are almost unworn (12.7 and 9), suggesting a date soon after that for the abandonment of the fort. No other material helps tighten the date.

The excavated ditches demonstrate that after the abandonment of the fort the vegetation developed resulting in their eventual overgrowth by trees. The 19th-century maps indicate that the fort was divided into fields, but presumably cultivation of the site had started much earlier. This would account for the fact that most of the finds from the site came from the depressions and intrusions, including the gulleys round the fort buildings. Here, they were protected from the aggression of the plough.

21.14 SUMMARY OF THE HISTORY OF THE FORT

Bearsden is believed on spacing grounds not to have been a primary fort; excavation failed to reveal any evidence for a fortlet (a possible location for a fortlet lies 150m to the east of the east ditches of the fort, in the middle of a straight stretch of Wall with a slight turn at either end – a characteristic of early structures on the Wall – on the centre of which the Military Way – the modern Roman Road – converges; today the road takes a northerly turn at this point as recorded on the first OS map).

Illustration 21.36
Burnt wattle and daub from building 3 surviving under the stone tumble of the adjacent granary.

A large fort was planned and work commenced. The timber headquarters building with a forehall was constructed and probably one stone granary while a start was made on the bath-house and either the latrine was constructed or its sewer drain laid down. This fort, Bearsden 1, was laid out to a grid of 5×4 *actus*. The relationship of the ditches to this framework suggests that the outer west ditch was an addition to the original plan, or was dug in order to strengthen the western defences where the ground was flat.

After the construction of these initial buildings Bearsden 1 was divided into a fort and annexe. The headquarters building was retained, but the fort was otherwise planned on 'normal' principles, though the creation of the annexe on the site where the commanding officer's house would normally have sat may have led to its relocation to the west of the headquarters building and the placing of one granary in the forward part of the fort rather than the central range. An inscription from this granary recorded work by the Twentieth legion.

Four buildings in Bearsden 2 are an *actus* long and two measured half-an *actus* across; this may imply that the same builders who worked on the first fort stayed to plan, if not build, the second. The barrack-blocks contained eight rooms for the men and were probably built for cavalry. There was insufficient space for a whole unit so it is possible that the unit was divided between Bearsden and Castlehill where the part-mounted Fourth Cohort of Gauls is attested. The bath-house was demolished and its successor erected at right angles within the new annexe.

The bath-house was modified on several occasions. The hot dry room appears to have been an addition, perhaps during construction. The floor of the first warm room of the bath-house was lifted, the basement filled in and a new floor laid; this may have occurred at the same time as the addition of the hot dry room immediately adjacent. Subsequently, a second floor was laid in the former first warm room. A new floor was laid in the changing room over a thin layer of burning. Some posts were replaced in the fort buildings. The buildings were demolished and burnt; the ramparts slighted, probably with the timber breastwork burnt. None of these actions can be dated. It has been argued that the division of Bearsden 1 into a fort and annexe may have occurred in the late 150s on the basis of the evidence from Mumrills and Inveravon (Swan 1999). In view of the suggestions above about the close relationship between Bearsden 1 and Bearsden 2 this seems unlikely as it would stretch out the initial phase of the building programme to over 17 years (see below). Rather, a continuous process of building through Bearsden 1 and Bearsden 2 is envisaged.

21.15 SOME WIDER IMPLICATIONS

The present view of the history of the Antonine Wall is as follows:

- Hadrian died on 10 July 138 to be succeeded by Antoninus Pius. It would have been too late to take action in Britain that year so the governor charged with the invasion of southern Scotland, Lollius Urbicus, presumably arrived in Britain in 139 when he was recorded building at Corbridge (*RIB* 1147). Invasion followed (*Historia Augusta, Life of Antoninus* 5, 4) and victory achieved by 1 August 142, the earliest attestation of Antoninus taking the title *Imperator*, Conquerer (*RMD* 264; 392). In view of the length of time that it would have taken the news to reach Rome, it is likely that the victory was won in 141. Urbicus is recorded building at Balmuildy, a primary fort (*RIB* 2191); we may presume that he started the task of building the Antonine Wall in either 141 or 142, at the end of a normal three-year term as governor;
- there are three stages in the building programme: the first was for a rampart and ditch from sea to sea with six forts and fortlets at roughly mile intervals in between; it seems likely that the first stretch to be built was the 20 Roman miles from Seabegs to Castlehill, with the sector to the east of that next and the western four miles last (Hassall 1983); before the rampart and ditch through the western 4 miles was completed about 11 new forts were added; some or all of these may have been part of the original plan but built later (Poulter 2009: 146); annexes were added to forts, both primary (Mumrills, Castlecary and Balmuildy) and secondary (Rough Castle), with the exception of Bearsden where the existing enclosure was divided (the situation is not clear at Duntocher: Swan 1999);
- the Wall was abandoned following 158, when three inscription from northern Britain indicate the rebuilding of Hadrian's Wall together with the forts at Birrens and Brough-on-Noe (*RIB* 1389, 2110 and 283), and, it would appear, after the dropping of a worn coin of Lucilla (minted in 164) in the granary at Old Kilpatrick, but by 170 at the latest according to the evidence of the samian ware (Hartley, B R 1972).

Illustrat on 21.37
A coin of Antoninus Pius.
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University of Glasgow

To turn to the evidence from Bearsden:

- the junctions of the ramparts had all been destroyed so it was not possible to determine the relationship between the fort and the Antonine Wall rampart;
- on spacing grounds it is presumed that Bearsden is a secondary fort;
- the annexe was created while Bearsden 1 was being built;
- the construction of Bearsden 1 within a framework of 5 × 4 *actus* and the use of the *actus* in measuring some of the buildings of Bearsden 2 suggests that the soldiers who worked on the first fort also laid out, and perhaps built, the second.

This is a relative chronology: there is no dating evidence from the site to create an absolute chronology, so it is worth exploring other evidence.

The date of the fort

Since the publication of Gillam's hypothesis relating to the building of the Antonine Wall it has been assumed that Bearsden is a secondary fort. As there is no structural evidence for this, its position in the building sequence depends entirely upon its spacing. It is not, however, in its theoretical position, but 1km to the west. Castlehill lies half way between Balmuildy and Old Kilpatrick and Duntocher about half-way between Castlehill and Old Kilpatrick, which emphasises the dislocation of Bearsden, noteworthy also on a frontier so carefully measured to less than a pace, though measuring is a different issue from location (cf *RIB* 2186, 2193 and 2194). The half-way point between Balmuildy and Castlehill lies just to the west of the present-day New Kilpatrick Cemetery. There would appear to be sufficient flat ground here for a fort of the size of Bearsden.

Moreover, view-shed analysis demonstrates that more can be seen from this location, including, from the height of a soldier standing on a tower, the forts at Castlehill and Balmuildy, neither of which are visible from Bearsden, and where the view to the north is restricted by higher ground (illus 21.38). There may, however, have been other considerations. David Woolliscroft has reminded me of the modern significance of the fort site. It lies between two roads north (A81 and A909) as well as an east–west route (A807 and A810) and beside the railway running north to Milngavie; Poulter (2009, 108) also suggested that the location of the fort was 'dictated by the need to cover this potentially twin route of penetration into Roman territory'. The A909 is a route of some antiquity for it appears on the map prepared by Roy who also remarked on its location in 'a sort of gorge or pass' (illus 2.2). Bearsden may therefore have been located in order to control ancient lines of communication.

Table 21.15
The building of the Antonine Wall

Phase	*Antonine Wall*	*Bearsden*
1	Primary forts and fortlets	not occupied
2	Secondary forts added Some fortlets modified	fort of 1.69ha started
3	Annexes added to forts, Some units changed?	annexe created by subdividing the fort, with implications for unit in residence

We should note that Bearsden 1 is large, being the largest secondary fort, and comparable in size to the primary forts at Castlecary and Balmuildy. It is also located in a strategic position being directly south of the Blane Gap which separates the Kilpatrick Hills from the Campsie Fells. Is it possible that Bearsden was a primary fort, placed in this significant position, or that its construction followed closely on the building of the primary forts for the same reason?

If so, it may not have been alone. There has long been doubt about which is the primary fort in the centre of the Wall, Auchendavy or Bar Hill. Gillam, in his identification of the two series of forts, could not decide between the two; his initial preference was for the former but, in discussion, I pressed on him the claims of the latter and so he offered both (Gillam 1976a: 52). The reasoning was and is straightforward; Bar Hill sits on the highest point of the Wall commanding views in all directions. However, geophysical survey at Auchendavy in recent years has provided some evidence to suggest that this fort is primary: the crucial evidence is the turn in the Antonine Wall rampart to east and west of the fort, a phenomenon only known at primary structures on the Wall (Jones, Leslie & Johnson 2006: 14). Even this is not entirely convincing for the fort lies at the very eastern end of the straight stretch of rampart whereas we might have expected it to sit in the centre.

Support for Bar Hill being a primary fort has been adduced. Twenty years ago, Nick Hodgson argued that the existence of two units in several Wall forts is not evidence for two periods of occupation in Scotland as a whole in the middle decades of the second century, but is a reflection of a change in the building plan for the Antonine Wall (Hodgson 1995: 32–5). The two units attested at Mumrills fall into this pattern for this was a primary fort. Castlecary is another a primary fort and there appear to be three units attested here, two thousand-strong auxiliary units, one with a cavalry component, and perhaps detachments of two legions. It has been argued that the legionaries were based at Castlecary in the period 175–90 (Mann 1963: 487–8), that is after the normally preferred date for the end of the Antonine Wall in the second half of the 160s. While this may have been the case, the greater point is the number of different troops based at the fort and the complicated military occupation of the fort. There are also two units recorded at Bar Hill, a 500-strong infantry unit was replaced by one of the same size. This would characterise it as a primary fort on Hodgson's 1995 criteria. The excavators working at Bar Hill over a hundred years ago recognised timber buildings, but of only one phase. Is it possible therefore that the change in unit took place at an early stage in fort building, as at Bearsden? It is therefore possible to argue that at two places along the Antonine Wall, Auchendavy/Bar Hill and Balmuildy/

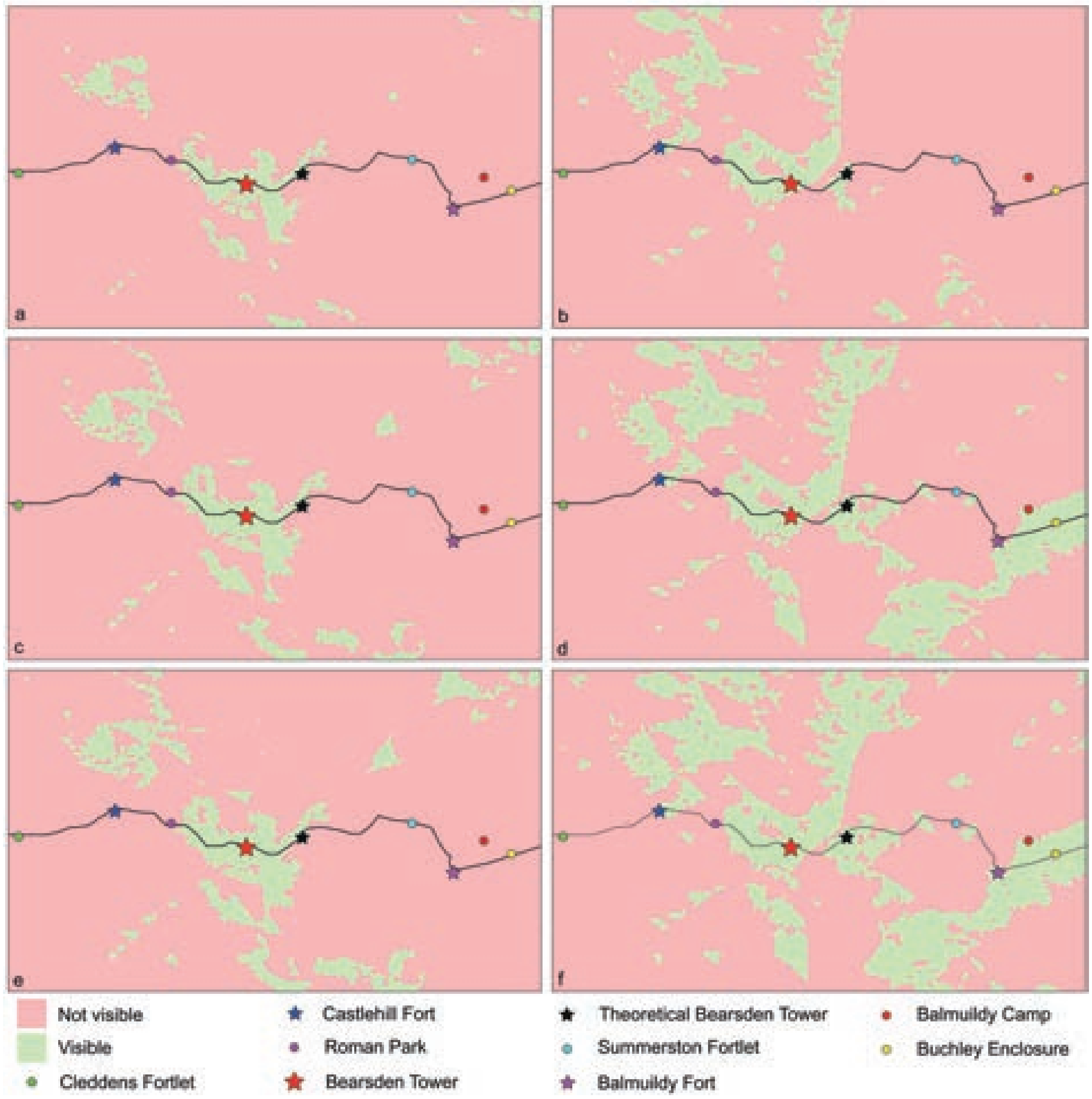

Illustration 21.38
View shed analysis from the fort at Bearsden and the theoretical location of the fort: (a) Bearsden 2m high person; (b) theoretical Bearsden 2m high person; (c) Bearsden 7m high tower; (d) theoretical Bearsden 7m high tower; (e) Bearsden 9m high tower; (f) theoretical Bearden 9m high tower.

Bearsden there were either two primary forts or two forts added quickly to the building programme, that is before the other secondary forts.

John Poulter has offered a different interpretation of the relationship of the forts to the Wall, arguing that the secondary forts were planned from the beginning but built later (Poulter 2009: 146). This does not necessarily affect the position of Bearsden in the building programme, but merely suggests that the fort was planned from the beginning.

The date of the annexe

Vivien Swan argued that the introduction of cooking in a North African style at Bearsden and elsewhere on the Antonine Wall was the result of soldiers of the army of Britain returning from service in the Mauretanian War of the late 140s, though acknowledging that there was no evidence for such service (Swan 1999). She linked it to the annexe decision primarily on the basis of the date of the infilling of the west ditches at Mumrills to create the annexe, the material including a coin of 154–5 and pottery of the second half of the 150s (Steer 1960). The result of her argument was to date Bearsden 2 to the late 150s. New factors have cast doubt on Swan's hypothesis. It has been assumed that all the west ditches at Mumrills were filled when the annexe was created, but Bailey (pers comm) has suggested that the outer west ditch may have been filled at a different time from the others; this area was in any case badly disturbed (Steer 1961: 90–1). Bidwell has offered an alternative reason for the presence of cooking in a North African style, the migration from Provence of potters who made vessels in this style (7.8). The argument that Bearsden 2 followed Bearsden 1 seamlessly further makes it unlikely that the annexe was not created until the 150s. Other factors might be thought to argue against the creation of the annexe at Bearsden to the late 150s. Such a date would require that work stopped on building the Wall for perhaps ten years from the mid-140s to the late 150s which would have resulted in the western end of the curtain being uncomplete for that time, while several forts show evidence for changes, particularly in their bath-houses, which would seem difficult to squeeze into a short occupation restricted to the years from the late 150s to the abandonment of the Wall. It therefore seems preferable to stay with an early date for the addition of annexes to the forts.

The implications for the building of the Antonine Wall

The reduction in size from Bearsden 1 to Bearsden 2 presumably had an impact on the number of men stationed at the site; this may relate to a wider change of plan for the Wall. Hodgson subsequently retracted his explanation of the existence of two units at these Wall forts, suggesting that the impetus for the change in units was the return to Hadrian's Wall in 158 which may have been a protracted operation (Hodgson 2009: 190). It seems to me that the earlier proposal has more to be said in its favour than its successor. The addition of as many as 11 new forts to the existing six is an event which might have had consequences for the existing forts. It might also seem unlikely that the army would change units in some forts in the late 150s, at time when it was known that all forts on the Wall were to be abandoned.

The evidence from Bearsden, that the original plan for the fort was changed during construction, would appear to support the earlier Hodgson proposal. It might have been expected that when the fort was constructed the original plan for the site was followed through. Instead, there was a significant change, the reduction in the size of the fort and therefore, we must presume, the number of men to be stationed there; in other words a change in military deployment. If this could have happened at one fort, then presumably it could have happened at others, including the primary forts of Mumrills and Castlecary.

To return to the construction of the fort at Bearsden. There are two interesting points: the placing of a large fort here and its apparent occupation by cavalry. The placing of a large fort, larger than any other secondary fort, at Bearsden raises a question: why? In topographical terms its position is of some importance as it lies to the west side of the Blane Gap, the pass through the Campsie Fells and Kilpatrick Hills. It could be argued that it had a particular role in supporting Balmuildy in guarding this gap. In this case, the placing of a unit containing cavalry at Bearsden may be significant.

The reduction in size of the fort cannot in itself be explained, though the apparent retention of cavalry is noteworthy. It is worth reminding ourselves of the rarity of cavalry on the Antonine Wall, with only one cavalry unit, at Mumrills, and two mixed infantry and cavalry units, including that at Castlehill (*RIB* 2142, 2149 and 2195). All other known units were infantry. The appearance of cavalry at Bearsden is therefore noteworthy.

There are, therefore, a number of possibilities:

- Bearsden 1 was a primary fort;
- Bearsden 1 was a secondary fort but an early addition to the primary forts;
- Bearsden 2 was a secondary fort.

In seeking to determine which is likely to be correct the three crucial factors are:

- annexes are additions, not just to the primary forts, but also to at least one secondary fort;
- the creation of the annexe at Bearsden was during the building programme;
- Bearsden 2 would appear to have been planned and possibly constructed by the same team as Bearsden 1.

In the light of these factors, it is unlikely that Bearsden 1 is a primary fort or an early addition to the Wall because its construction would have preceded the addition of the secondary fort at Rough Castle, to which was later added an annexe; if Bearsden 1 was primary, we would expect Rough Castle to have been built with an annexe. Accordingly Bearsden 1 should be a secondary fort, with the change in the number of troops based at the fort relating not only to the creation of the annexe but a more widespread reorganisation of units on the Antonine Wall. The large size of the fort may still have related to a function of guarding the Blane Gap.

If an attempt is made to add dates, and accepting victory in Scotland in 141, then work will have begun on the Wall in that year or the next, with the first phase perhaps stretching over two seasons and Bearsden being added and amended the following year, 143 or 144.

Illustration 22.1
The bath-house following consolidation.

Chapter 22

CONCLUSIONS

The excavations at Bearsden were not undertaken under optimal conditions. The work started in a very different archaeological world from today. Inspectors of Ancient Monuments still existed and still excavated; there were no commercial units; the Central Excavation Unit for Scotland had not yet been established. The excavations took place each summer as part of my duties as an Inspector. As noted above, this had an advantage in allowing time for reflection between each season. The lack of stratigraphy also aided the work, allowing substantial areas to be examined each season, though their size was always restricted by the nature of the site, and they were mainly directed to answering problems thrown up in previous seasons. In spite of these difficulties, the investigation of Bearsden was the most substantial excavation of a Roman fort on the Antonine Wall since the 1930s. The excavation and post-excavation work produced significant results.

One aim of the excavation had been to elucidate the plan of the fort and, with the exception of the south-west corner of the fort and the southern half of the annexe, this was largely achieved

Illustration 22.3
The latrine and bath-house following consolidation.

(subsequent work showed that the archaeological deposits in the latter area were substantially degraded). The plan proved to be eccentric, but based on a coherent framework, a grid measuring 5 × 4 *actus*, a considerable surprise. Clear evidence for a change in plan during construction has allowed Geoff Bailey to offer the suggestion that the addition of annexes to Antonine Wall forts began at Bearsden. Although the fort (and annexe?) was built by legionaries (or at least one stone building), the soldiers based here were presumably auxiliaries. The style of the barrack-blocks suggests that they were cavalry, and there may have been only 64 soldiers based at the fort. As this is less than the smallest known unit in the army of Britain, it suggests an association with another military installation in the area and the obvious link is with the neighbouring fort at Castlehill, a fort which has yielded an inscription of the Fourth Cohort of Gauls a mixed unit of infantry and cavalry. Bearsden yielded other surprises in the form of a timber headquarters building and, possibly, a timber forehall, both elements unique on the Antonine Wall.

A second aim was to elucidate the history of the site. This turned out to be very different from what was expected. First, there was only one period rather than the two which was considered usual at the time. Second, was the discovery that the enclosure mapped by Roy and others had been divided into a fort and annexe during construction and that it was possible to determine that some of the buildings within the fort had been erected for this fort (Bearsden 1). Their retention for use in the successor fort not only created an eccentric plan for Bearsden 2, but has led to a review of the evidence for the building of the Antonine Wall and a greater understanding of this process. The discovery that Roy's enclosure was divided into fort and annexe during construction also led to the possibility of an additional phase in the construction of the Wall with implications for military deployment on the Wall. The use of the *actus* in planning both forts implies that the construction of the first followed closely on the second, which casts severe doubt on Vivien Swan's 1991 suggestion of a significant break in the building programme

Illustration 22.2
The bath-house following consolidation from the west.

for the Wall. Two almost unworn coins of 153–5 indicate abandonment of the fort soon after that date.

The range of small finds and glass from the site is poor, but at least we have a collection which we can be sure represents the material in use at the site, though it is of course not possible to know how much was taken away when the fort was abandoned. The pottery is of considerable importance for it constitutes the largest collection of published Antonine pottery in Scotland, probably exceeding the sum total of the pottery from the other forts on the Wall. It has been studied to great advantage by Louise Hird, Vivien Swan, Paul Bidwell, Alex Croom, Kay Hartley and Brenda Dickinson. Of considerable importance is the evidence for much pottery being made locally, and some by Sarrius who already is known to have worked at Mancetter-Hartshill in Warwickshire and Rossington Bridge in yorkshire and appears to have established a workshop at Bearsden. He was probably but one potter who worked in the Bearsden area. There appear to be links with the potteries at Holt, near Chester, the base of the Twentieth Legion which is recorded building at Bearsden. The existence of mis-fired vessels in the annexe and fort, including many by Sarrius, suggests that there was a kiln(s) relatively close to the fort if not within the annexe. Analysis of the clay used to make the pottery and of the grits in the mortaria has strengthened the evidence for local manufacture (some of the vessels made by Sarrius were not used). Another industrial activity at Bearsden appears to have been the recycling of glass, as indicated by the fragmentary state of the surviving pieces.

Ovens were sought but not found. Their lack may be explained by the adoption, at least in part, of a different style of cooking, on a brazier, in a North African tradition, as supported by the discovery of fragments of braziers and pots with sagging bases for cooking on them. Swan argued that cooking in an African style indicated the presence of Africans at Bearsden, but Bidwell & Croom have suggested that this form of cooking, and therefore pottery manufacture, may have been brought to Bearsden by potters migrating from southern France. The appearance of the type of military boots known as *calceus* supports the evidence which suggests that this replaced the *caliga* during the Antonine period.

Plotting the distribution of pottery and glass across the site indicates food preparation and consumption in the barrack-blocks. Further, the different distribution of pottery in these buildings from others indicates different uses for the buildings as well as supporting the interpretation of those of a certain plan as barrack-blocks. The presence of a lamp in the officer's quarters of one barrack-block may point to the location of shrine. The quantity of amphora fragments in building 1 suggests its use as a store. There is a suggestion that the officers acquired a better class of pottery and glass. Bidwell & Croom have identified differences in the amounts of various types of vessels from other forts, there being more amphorae and mortaria but fewer flagons, other vessels perhaps serving the same purpose. Analysis of the distribution of the artefacts has benefited from the wider analysis of Roman forts in northern Britain undertaken by Rikke Giles, and in return I have been able to repay at least part of my debt by providing her with another site for her analytical technique. She has been able to identify the similarities and differences between Bearsden and other forts and the growth of her data base will help future researchers. In relation to Bearsden, her analysis has aided interpretation and understanding of individual buildings.

The botanical report prepared by the late Camilla Dickson is of singular importance. Camilla described the environment of the area in the pre-Roman period, but most importantly analysed the diet of the soldiers. Wheat formed a major part of the soldiers' diet, with emmer, spelt and durum (macaroni) wheat all being represented. A wide range of other foods were eaten, some gathered locally, others imported from the continent. The work of Brian Knights led to the suggestion that the soldiers had a mainly plant-based diet, a conclusion which has yet to be replicated elsewhere. The discovery of moss in the sewage led to the suggestion that the soldiers used this material for cleaning themselves, a proposal which is now firmly embedded in the literature relating to Roman latrines. Analysis of the sewage also revealed that the soldiers suffered from worms. Study of the beetles showed that Bearsden suffered from the same level of infestation as other forts in Britain and that the climate was similar to that of today.

Bearsden lay on the very edge of the Roman Empire, near the western end of its far north-west frontier, yet the requirements of its soldiers linked it to places very far away. Commodities came here from southern yorkshire, the English West Midlands, south-east and south-west Britain, northern and southern Gaul, southern Spain and elsewhere in the Mediterranean littoral. These included wine, fish-based products, figs and possibly wheat. Paul Bidwell has pointed out to me that the coincidence of different types of supplies from the same area suggests that the transport ships carried a variety of goods.

There is one important conclusion to be drawn from this discussion: the army built the Antonine Wall and its attendant structures and intended to stay. Supply chains were created; manufacturers and merchants came to service the army. Ironically, however, other aspects of life were absent. There were few items of domestic life found at Bearsden, material which is recovered from excavations in forts on Hadrian's Wall. This may relate to the poor evidence for a civilian community at Bearsden, though the two sections of clay and cobble foundations recorded west of the fort remain among the slight structural evidence for a civil settlement outside any fort on the Antonine Wall.

On several different levels, Bearsden has changed our view. The botanical evidence for the diet of the soldiers is of international significance. The strange plan of the fort not only reflects the pragmatic approach of the army, but also challenges those who believe that all Roman fort plans are the same and that nothing new can be learned from the study of Roman forts. The evidence relating to the creation of the annexe is important for our interpretation of the building of the Antonine Wall. The pottery, small finds and eco-artefacts aid understanding of life on the north-west frontier of the Roman empire and its links to the rest of the Roman Empire. Over all, we now have a report on extensive excavations within a fort and annexe on the Antonine Wall undertaken in a more scientific manner than in the past.

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ABBREVIATIONS

AE	*l'anneé épigraphique*
BMC	*British Museum Catalogue of Coins of the Roman Empire*
BMCRR	*Coins of the Roman Republic in the British Museum*
C	Carson, R A G 1990 *Coins of the Roman Empire*. London: Methuen
CIL	*Corpus Inscriptionum Latinarum*
Curle	vessel forms in Curle 1911
D	Figure-type in Déchelette 1904
Dr	Vessel forms in Dragendorff 1895
Rogers	Motif in Rogers 1974
ILS	*Inscriptiones Latinae Selectae*
O	Figure-type in Oswald, F 1936–37
RIB	*The Roman Inscriptions of Britain*
	I 1965 Collingwood, R G and Wright R P (eds). Oxford: Clarendon Press
	II 1990–1995 Frere S S et al (eds). Gloucester: Alan Sutton
	III 2009 Tomlin, R S O, Wright, R P and Hassall, M W C. Oxford and Oakville: Oxbow Books
RIC	Mattingly, H and Sydenham, E A 1923–67 *The Roman Imperial Coinage*, London: British Museum
Tab Vindol	*Tabulae Vindolandenses*
	II 1994 Bowman, A K and Thomas, J D, *The Vindolanda Writing Tablets*. London: The British Museum
	III 2003 Bowman, A K and Thomas, J D, *The Vindolanda Writing Tablets*. London: The British Museum
Walters	vessel forms in Walters 1908, pl x LIV, 79–81

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