

Some excavations on the line of the Antonine Wall, 1985–93

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ABSTRACT

The results of 21 excavations and watching briefs along the line of the Antonine Wall are presented, in due order from east to west, together with notification of some recent small finds. The alignment of the Wall and the position of fort defences were identified in several places. New information about the superstructure of the Wall, the soldiers' diet and the contemporary environment was obtained. The projects were financed by Historic Scotland, Falkirk Museums, the Hunterian Museum, Strathclyde Regional Council, and developers.

INTRODUCTION

This report is a continuation of earlier such compilations, the most recent of which covered the years 1980–5 (Keppie & Walker 1989). The opportunity is also taken to report briefly on some casual finds from the line of the Wall, and its vicinity (see Appendix 1). Preliminary reports of the work have appeared in the relevant issues of *Discovery & Excavation in Scotland* and in the annual survey contained within the academic journal *Britannia*. In the same time period, larger-scale work (not reported on here) was undertaken by G B Bailey at Callendar Park, Falkirk (Bailey, this volume); the Pleasance, Falkirk (Bailey, forthcoming 1); Dollhouse, Polmont; and the West Burn, Falkirk (Bailey, forthcoming 2); by L Keppie at Westerwood (Keppie 1994); by the Centre for Field Archaeology, University of Edinburgh, at Inveravon (Dunwell 1992; Dunwell & Ralston, this volume); and Glasgow Bridge (Dunwell, Coles & Mann forthcoming); and by D J Woolliscroft at Garnhall Farm (Burnham *et al* 1993, 279–80).

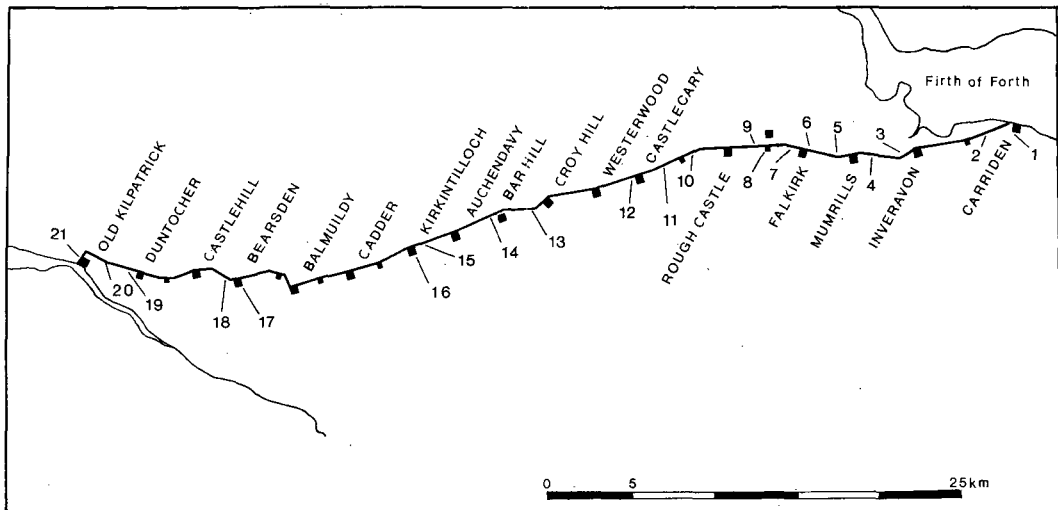
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ILLUS 1 Plan of the Antonine Wall, showing location of sites investigated 1985–93

1 CARRIDEN (NT 028807) (ILLUS 2)

A J Dunwell

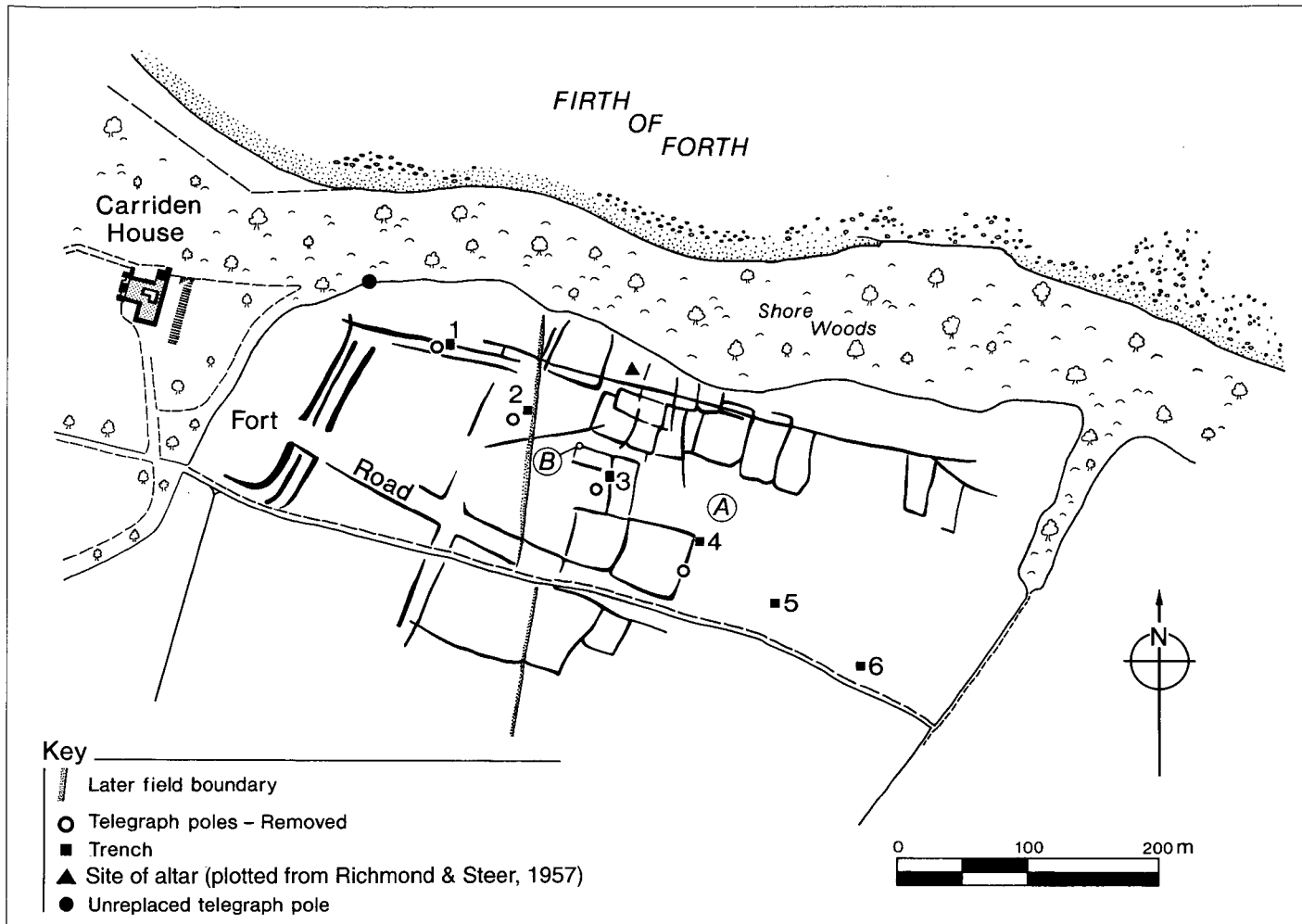
INTRODUCTION

The presence of the long-suspected Roman fort at Carriden was confirmed in 1945, when its eastern defensive ditches were identified by aerial reconnaissance east of Carriden House in near-level arable land at c 30 m OD, beside the upper edge of a steep wooded slope leading down to the Firth of Forth. Trial excavations in the following year located these ditches on the ground; their shallowness, and the absence of any trace of ramparts, suggested that the archaeological remains of the fort were heavily truncated (St Joseph 1949). Artefacts recovered both during these excavations and by subsequent fieldwalking (eg *Discovery Excav Scot* 1972, 45; 1974, 67, 69; 1976, 77) suggested a purely Antonine occupation.

The chance discovery in 1956 of an altar dedicated to 'Jupiter best and greatest' by the *vikani* residing at *castello Veluniate* provided unambiguous evidence for the presence of a previously unrecognized civilian settlement or *vicus* attached to the fort, and identified Carriden as the *Velunia* mentioned in the Ravenna Cosmography (Richmond & Steer 1957; Keppie 1983, 401). The altar was ploughed up c 140 m east of the fort (see illus 2), where an ordered system of small fields or plots, apparently co-ordinated with the road issuing from the east gate of the fort, was subsequently identified by aerial reconnaissance and generally accepted to be related to the civilian settlement (eg Hanson & Maxwell 1983b, 188–9).

DESCRIPTION

In November 1991 minor excavations took place within the scheduled field system east of Carriden fort, in advance of the replacement of an overhead power line (Dunwell 1991). Six trenches, each



ILLUS 2 Carriden: site plan, including position of trenches and the cropmarks of fort and field system (plotted from RCAHMS aerial photographs taken in 1979 and 1986). (Based on the Ordnance Survey map © Crown Copyright)

2 m by 2 m in area, were excavated where new telegraph poles were to be erected, in a line running NW/SE across the area of the field system, at intervals of c 80 m. In order to relate the positions of the six trenches to the cropmark features of the fort and field system, rectification of oblique aerial photographic imagery was undertaken (illus 2 supersedes a published plan transcribed directly from an oblique aerial photograph, *Discovery Excav Scot* 1992, 12). The available aerial coverage suggests that the field system does not extend substantially south or east of the plotted remains.

Highly truncated, negative archaeological features cut into the subsoil were encountered in Trenches 1–4. Any stratification that might have accrued, or positive features such as banks accompanying the identified ditches, have been totally removed by cultivation. This is not unexpected given the featureless surface of the arable field and St Joseph's observations (1949, 169). Roughly dressed sandstone blocks, attesting the former presence of stone-built structures, were found in two places within spreads of stone cleared from the field and tipped at its north edge.

Trench 1

A length of ditch ran across the north part of this trench approximately from east to west. Its full profile was not revealed; a width of 0.9 m was exposed, from which the full width is estimated to be c 2 m. The ditch survived to a depth of 0.5 m and contained a single pebble-rich fill of light brown sandy soil. This ditch appears to correspond to the plotted position of the more northerly of two parallel ditches, possibly flanking a trackway (see illus 2). Aerial photographs suggest that this double linear feature crosses both the fort defences towards their north-east angle and a possible road defining the west edge of the field system; a post-Roman origin appears likely, with the feature probably not related to the *vicus*.

Trench 2

Traces of at least four, and probably six, stake-holes were recorded. They formed no clear alignments or pattern, and were filled with a fine sand containing flecks and small lumps of charcoal. They were mostly around 0.08 m in diameter, and ranged in depth from 0.06 m to 0.22 m. This trench lies outwith the field system as it is presently recorded.

Trench 3

A length of ditch ran NE/SW across the east part of this trench. A full cross-section of this feature could not be obtained, but the exposed part was 0.6 m wide and 0.5 m deep, with a near-level base. Two fills were identified, the upper an orange to light brown clay loam and the lower a blue-grey clay containing abundant sandstone chips and fragments, many decayed. This ditch appears to equate to part of the field system associated with the *vicus* (illus 2). A hollow, 0.2 m deep and partly exposed within the south-west corner of the trench, may have been an archaeological feature, although of unknown function.

Trench 4

The terminus of a small possible ditch projected into the northern side of this trench. It was approximately 0.25 m wide and 0.25 m deep, and was filled with a distinctive fine orange-yellow sand. This ditch cannot be related with confidence to any cropmark feature, perhaps because of its small size and the fact that it was covered with 0.05 m of disturbed soil, although there are some ill-defined cropmarks in this area (illus 2, A).

A buried ploughsoil lay immediately below the current ploughsoil in each trench, as deep as 0.25 m in Trench 5, but discontinuous and only 0.04 m deep in Trench 2. Tile land-drains were discovered sealed beneath it in Trenches 4 and 6, suggesting that it is modern. In Trench 1 a third ploughsoil was stratified

beneath this. In Trench 3, and possibly also in Trenches 2 and 5, undulations trending NW/SW in the subsoil surface beneath the stratified ploughsoils are probably remains of the rig and furrow cultivation system visible on oblique aerial photographs.

FINDS

A total of 72 artefacts was recovered during excavation, mostly relatively modern, including glazed pottery, glass and clay pipe stems. The pottery included one sherd of definite Roman pottery, and a further nine of either Roman or medieval fabric (G Thomas, pers comm); the heavily abraded nature of the sherds precluded definite identifications. All the finds were recovered from the top two layers of ploughsoil.

DISCUSSION: THE NATURE OF THE VICUS

The combined evidence of the rectified aerial plot and the results of excavation have elucidated some interesting details of the plan of the fort and field system (illus 2). The roadway which issues from the east gate of the fort appears to meet a crossroads c 100 m east of the fort, with roads or tracks branching to the north-east and south-west. A system of three parallel roads, with the central one leading to the east gate of the fort, has previously been proposed by Sommer (1984, plate 11). While his north example appears to correspond to a gap within the field system to the north of Trench 3, which may have provided access between the fields, the south example appears to result from the misidentification of the southernmost field boundary on illus 2 as a roadside ditch.

The field system extends over c 6 ha, and appears to be confined to the north-east and south-east of the proposed road junction. The semi-regular arrangement of sub-rectangular ditched enclosures or plots is characterized by rounded angles and slightly offset junctions. Enough evidence of complexity is evident in the pattern of enclosures, particularly north of Trench 3, to suggest that more than a single phase of construction may be present. Towards the north edge of the field a linear feature running directly through the plots from east to west appears to be a secondary feature, as is the double-ditched feature intersecting the defences of the fort (see above, Trench 1). Aerial photographs appear to show a small annular feature incorporated within one of the field boundaries north-west of Trench 3 (illus 2, B).

Field systems of putatively Roman date have been identified beside a number of Roman forts in Scotland (Sommer 1984, 36–8; Thomas 1988, 164). The morphology and characteristics of the field system at Carriden are very similar to those recorded as cropmarks north-west of Castledykes fort (Maxwell & Wilson 1987, 30; NMRS records) and the fragment discovered by excavation east of the fort on the Antonine Wall at Croy Hill (Hanson 1979); the three undoubtedly represent the same phenomenon. The pattern of roads and fields at Carriden is also reminiscent of the more extensive system identified east of Brancaster fort in Norfolk (St Joseph 1977, 157). By contrast, the fields and enclosures south-east of Inveresk fort are generally larger in size and have more right-angled junctions (Hanson & Maxwell 1983b, 190, plate 9.5); such differences may reflect the varying uses of the fields. However, definition of these functions at Carriden and elsewhere, whether for cultivation or stock, must await more extensive excavation and, ideally, the analysis of any environmental material preserved at the bases of boundary ditches.

Traces of the field system are conspicuously absent on the aerial coverage from the area between the fort and the road which runs parallel to its south-east defences. Here Maxwell has suggested the presence of an annexe (1989, 175; table 14.1). Whilst this suggestion cannot be

discounted, this area appears to be no more than a 'blank area' defined by a ditch flanking a road or track. A more appropriate explanation would be as a parade-ground, originally proposed by Richmond & Steer on the assumption that the altar may have stood in such a location (1957, 3). Although we can now see that the altar was discovered within the area of the field system north-east of here (Keppie 1983, 401; see *illus 2*), there is no reason why the findspot of the altar should reflect its place of use, as it may have been deliberately discarded; therefore the presence of a parade-ground east of Carriden fort should not be dismissed. A similar divergence between the location of original use and archaeological context of recovery has been recently inferred for the Bridgeness tablet (Bailey & Devereux 1987).

The nature of the *vicus* settlement remains unclear. Thomas (1988, 164) has suggested that Carriden has a dispersed settlement pattern, possibly in the form of a ribbon development running beside the main road to the fort. However, the possibility of a small nucleated settlement sandwiched between the field system and the putative parade ground, where a scatter of stake-holes was identified in Trench 2, is an alternative possibility. Equally, as appears to have been the case at Croy Hill (Hanson 1979), it is quite possible that the *vicus* settlement lay apart from the field system, around the south and west sides of the fort. Here the currently wooded and landscaped land round Carriden House makes the detection of cropmark traces by aerial survey difficult. A putatively Roman surface discovered south-west of the fort, identical to an example found within the fort, may point to activity, be it annexe or *vicus*, in this area (NMRS records). Ditches defending a western annexe were located close to the south-west corner of the fort by G B Bailey (*pers comm*) in 1994.

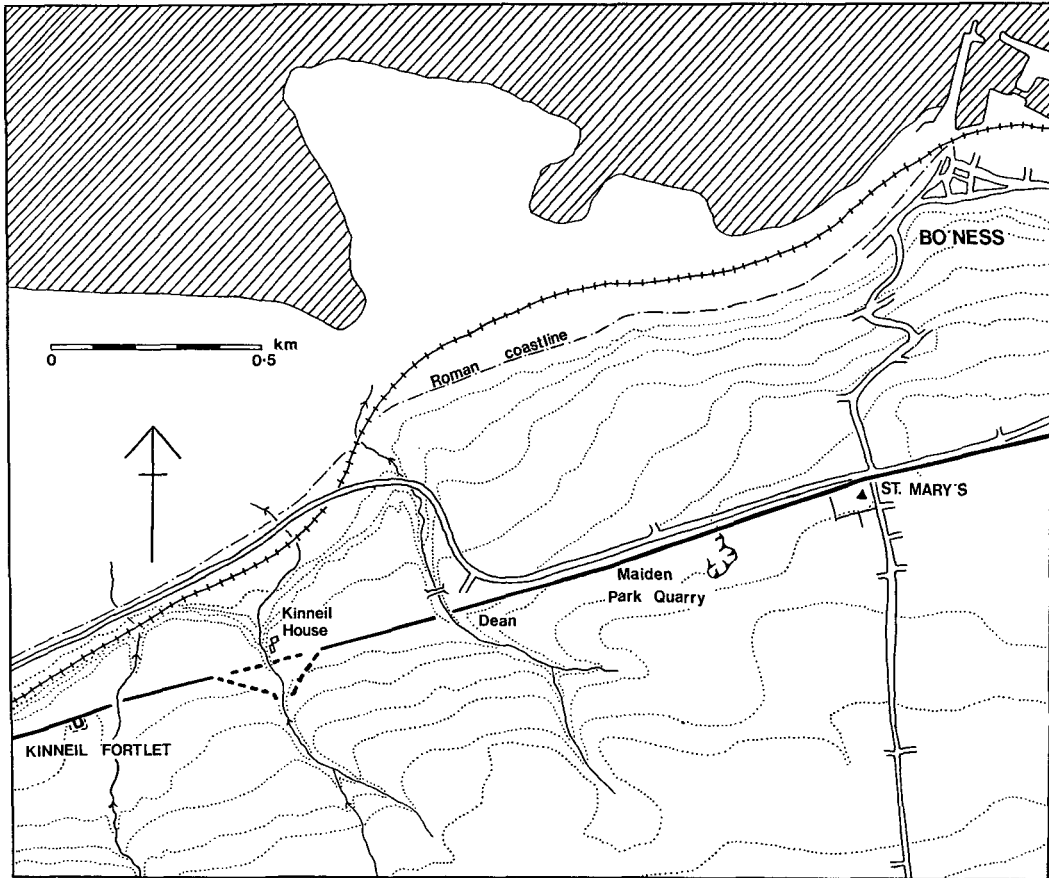
2 ST MARY'S CHURCH, BO'NESS (NS 996809) (*ILLUS 3-6*)

G B Bailey

INTRODUCTION

Until 1989 the line of the Antonine Wall as it skirted the southern suburbs of Bo'ness had been placed along Dean Road and Grahamsdyke Street as a result of historical references. In 1649 Borrowstouness was created as an independent parish, separate from that of Kinneil, with its southern boundary fixed on 'Grahame's Dyk'. Presumably the Ditch of the ancient frontier was still visible at that time and created a sufficient landmark to demarcate the area clearly, unless the name had already been applied to the road which still remains. At the Dean Burn the Ditch was located by Sir George Macdonald in 1915, and confirmed by Maxwell in 1960 (Steer 1961b). Although not completely sectioned, it was then found to be only 5.5 m (18 ft) across. Some 1.2 m (4 ft) of humus-rich earth had been dumped over it to level the ground for the building of Dean House. Projected east, the alignment thus ascertained placed the Ditch under the south half of Dean Road. It was on this premise that Macdonald trenched 'about 950 yards further east' immediately south of the road. Here he found 'forced soil' (Macdonald 1925, 279); he gives no further details, but we can be sure that it had a depth no greater than 4 ft. He also noted that there was no sign of any disturbance in the natural geological deposits in the east face of the quarry at Maiden Park, to the south of the road.

Further east the line of the Wall is indicated on Roy's map of c 1750 as more or less coincident with Grahamsdyke Road (Roy 1793, pl. xxxv). The antiquarian observations and the archaeological evidence thus confirmed the line suggested by the historical evidence.



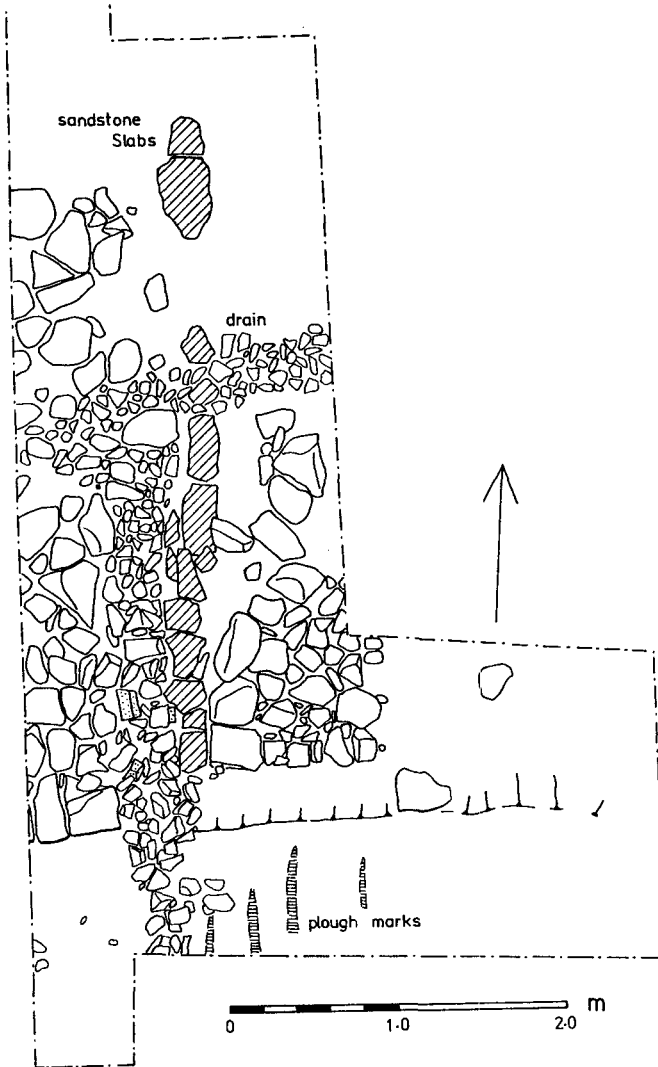
ILLUS 3 St Mary's Church site, Bo'ness (Based on the Ordnance Survey map © Crown Copyright)

DESCRIPTION

Today the whole of the south side of Dean Road/Grahamsdyke Road is built up except for a stretch from Maiden Park to Linlithgow Road. The demolition of St Mary's Church in February 1989 provided an opportunity to confirm the line on the ground before the new church building was erected later that year.

The site did not at first appear very promising. At the north-east corner an ironstone pit, Bo'ness no. 16, had operated in the middle decades of the last century, with a mineral line leaving the pithead towards the south-west to join the local railway network. The associated buildings lay to the west of the pit shaft along the Dean Road frontage and it seemed reasonable to assume that much of the neighbouring area would bear the heavy scars of an industrial landscape. Direct evidence for the lack of remains came from Macdonald's inability to locate any significant features in 1915.

Accordingly a north/south trench was placed along the west boundary of the church's land with the intention of proceeding east when any evidence was found. The trench



ILLUS 4 St Mary's Church, Bo'ness: stone base of Antonine Wall

successfully located what is now the easternmost section of the Wall known from excavation.

The Wall base was badly damaged, with no trace of any surviving superstructure. Indeed, a lead seal of perhaps 18th-century date and a copper disc representing a 19th-century coin were retrieved from the soil directly above and between the stones. Four of the south kerbstones were found *in situ* and a clear robbing trench marked the former alignment of the missing stones. The core of the base comprised the usual single layer of rounded cobbles, but even these petered away on the east side of the trench and all that remained was a slight hollow in the natural brown-orange silty-clay. The reason for the complete removal of the Wall base to the east was



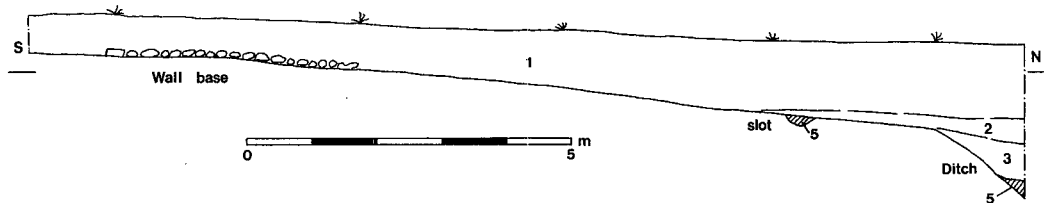
ILLUS 5 St Mary's Church, Bo'ness: stone base of Antonine Wall, seen from the south

readily apparent as shallow plough marks, orientated north/south, had at some time cut into the natural soil; some of the remaining stones even bore grooves cut by the plough. The stones may have been removed to improve the ground, although the field has not been ploughed within living memory. That this was done some considerable time ago explains why Macdonald was unable to trace the Wall here.

Another trench opened up 19 m to the east failed to find any trace of the Wall base, though here the topsoil was only 0.3 m deep as opposed to the 0.6 m in the main trench.

The survival of this small portion of the base is attributed to its location at a north/south field boundary which was left unploughed. This field boundary can be seen on an estate plan of 1810 surveyed by R Bauchop and had already been removed when the industrial exploitation of the area, begun in the 1850s, made it redundant. The destruction of the Wall base probably occurred during the agricultural improvements of the late 18th century.

Almost at the east end of the remaining base a line of small sandstone slabs had been incorporated, crossing the Wall line at right angles. Along the west side of this a few dressed stones survived, whilst on the east a number of large stones had been slightly displaced from their original locations. These features represent the shattered remains of a culvert whose base had been completely lined with sandstone slabs. The neat straight join between the two northernmost slabs may represent the line of the north kerb. The northern slab, which dipped more sharply to the north



ILLUS 6 St Mary's Church, Bo'ness: section across the Wall and Ditch

than any of the others, would then lie beyond the rampart base to prevent the channelled water from eroding the soil at the point of egress. However, this would give a basal width of only 3.9 m (12 ft 10 in) to the rampart.

At a much later date a north/south rubble-filled drain had been cut through the Wall base, destroying the western side of the culvert. Within the base it joined an east/west drain, forming a T-junction. These drains contained pieces of hand-moulded bricks, suggesting that they too are contemporary with the agricultural improvements of the late 18th century.

The Ditch was located 7.8 m (25 ft) to the north of the Rampart; 1.3 m of overburden had to be removed before the Ditch cut could be discerned in the natural deposits. Some 0.8 m of this could have been associated with the landscaping of the area in the 1960s for the church, but it still suggests that Macdonald found only these modern deposits of 'forced soil' and had not dug deep enough to prove that he had found the Ditch.

That part of the Ditch investigated had two distinct fills. The upper was of light orange-brown clay loam and contained fragments of 17th- or 18th-century pottery, as well as part of a bronze buckle. The lower part of this same layer, which was 0.55 m thick, was devoid of inclusions. Below it was a layer without finds, of light grey loamy clay, the colour and texture of which indicate that it had accumulated slowly in wet conditions. Whilst it may not represent primary silting, it must have been located towards the bottom of the Ditch. Within the excavated area the Ditch attained a depth of 0.9 m from the level of the surrounding subsoil. The angle of the southern bank suggests a total width for the Ditch of 8.6 m, assuming that it was approximately 3.7 m (12 ft) deep and symmetrical.

Plough-marks similar to those noted south of the Rampart were observed on the berm adjacent to the Ditch, this time aligned east/west. This can be accounted for by the need to turn the plough at the edge of a field. The Ditch would then have marked the north edge of the field which was being ploughed in the 18th century. The ploughing would gradually have encroached further and further into the Ditch causing the orange-brown clay loam to work its way downhill and accumulate in the upper part of the Ditch. By the time that arable agriculture in the field had ceased in the mid-19th century, the Ditch would scarcely have been recognizable. This would explain why it might have been visible as a landmark in 1649 and yet missed by General Roy in the 1750s.

A small U-shaped gully 0.35 m wide was located 1.8 m south of the lip of the Ditch. It survived to a depth of only 0.2 m, and its fill consisted of a light orange-brown silty loam, quite similar to the upper fill of the Ditch. No dating evidence was recovered for the gully which ended just short of the east trench edge. Its orientation was parallel with the Ditch and Rampart and so it may well have been of Roman date. In the light of subsequent discoveries it is reasonable to interpret this as a defensive feature (Bailey, this volume).

3 POLMONTHILL SKI-SLOPE (NS 949795) (not illustrated)

G B Bailey

Until recently the ski-slope at Polmonthill overlapped the south half of the Rampart, with the Ditch still visible to the north as a prominent depression. In 1992 it was decided to upgrade the facility and move the main ski-run further to the south, but still within the scheduled area of the Antonine Wall. Several trial trenches were therefore excavated in order to determine the extent of any stratified deposits in the area behind the Rampart and near the probable line of the Military Way. One of the trenches crossed the line of the old ski-run to within a metre of the estimated location of the Rampart, along the path proposed for a new drain. Excavation was restricted to the depth of the drain, 0.6 m maximum. The only deposits encountered were the levelling material for the ski-slope and 0.4 m of hillwash, into which 19th-century field drains had been dug. Trenches placed at the bottom of the slope, half-way up it, and on the crest of the hill, not surprisingly revealed an increase in the depth of hillwash to over 0.5 m at the base. The hillwash overlay boulder clay. In 1993 the Centre for Field Archaeology maintained a watching brief on the site during the earth-moving operations connected with the new construction. This confirmed that no deposits of archaeological significance were being disturbed by the programme of work (Dunwell 1993).

4 BEANCROSS (NS 924796) (ILLUS 7–12)

G B Bailey

INTRODUCTION

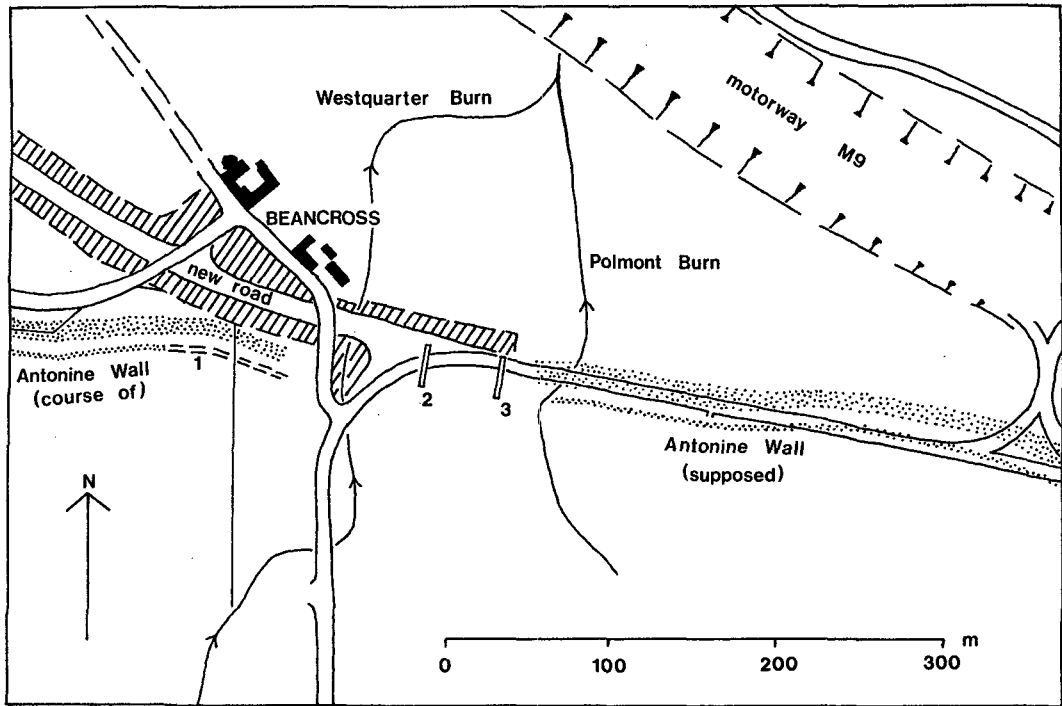
At Beancross the Antonine Wall, running west towards Falkirk, crossed the flat valley bottom through which the Polmont and Westquarter Burns flow and began the ascent to the Mumrills Braes. In 1914, Mungo Buchanan and James Smith traced the Wall through field no. 2116 (marked 1 on illus 7). At one location they cleared a 3 m length of the base, finding the kerbstones to be rather smaller than usual 'but exceedingly beautifully dressed and neatly laid' (Macdonald 1915, 134). Prior to this the Ordnance Survey, following Maitland (1757, 172), had placed the Wall further south where a series of convenient linear hollows were interpreted as surviving portions of the Wall ditch.

In 1965 two trenches were cut across the extrapolated line of the Wall obtained from the 1914 discovery (illus 7, points 2 & 3) with convincingly negative results (McCord 1981, 230). Although the excavator was cautious in his conclusions, he noted the 'distinct possibility that the accepted line of the Antonine Wall is not entirely accurate in the stretch between Polmont Hill and Mumrills'. Then, in 1973, the 1914 line seemed to be confirmed in the disturbed sections of a sewage pipe (Keppie 1976, 63) (the scattered rubble of the Wall base was observed in the east section of the pipe trench at point C on illus 8). Further east, the nearest point at which the Wall had been located by excavation was some 500 m away on the Cadger Brae (Macdonald 1915, 135), a location since obliterated by the M9 motorway.

DESCRIPTION

1987 excavation

In 1987 a 1.8 m wide trench, dug on the site of earlier work by Buchanan & Smith (illus 8, Trench A), recorded the Wall base 4.3 m wide and well preserved with both kerbs surviving, except where a field drain had crossed it at an oblique angle. The base, consisting of stones of varying sizes with a high proportion of small cobbles, had also incorporated a large glacial boulder, some 1.08 m

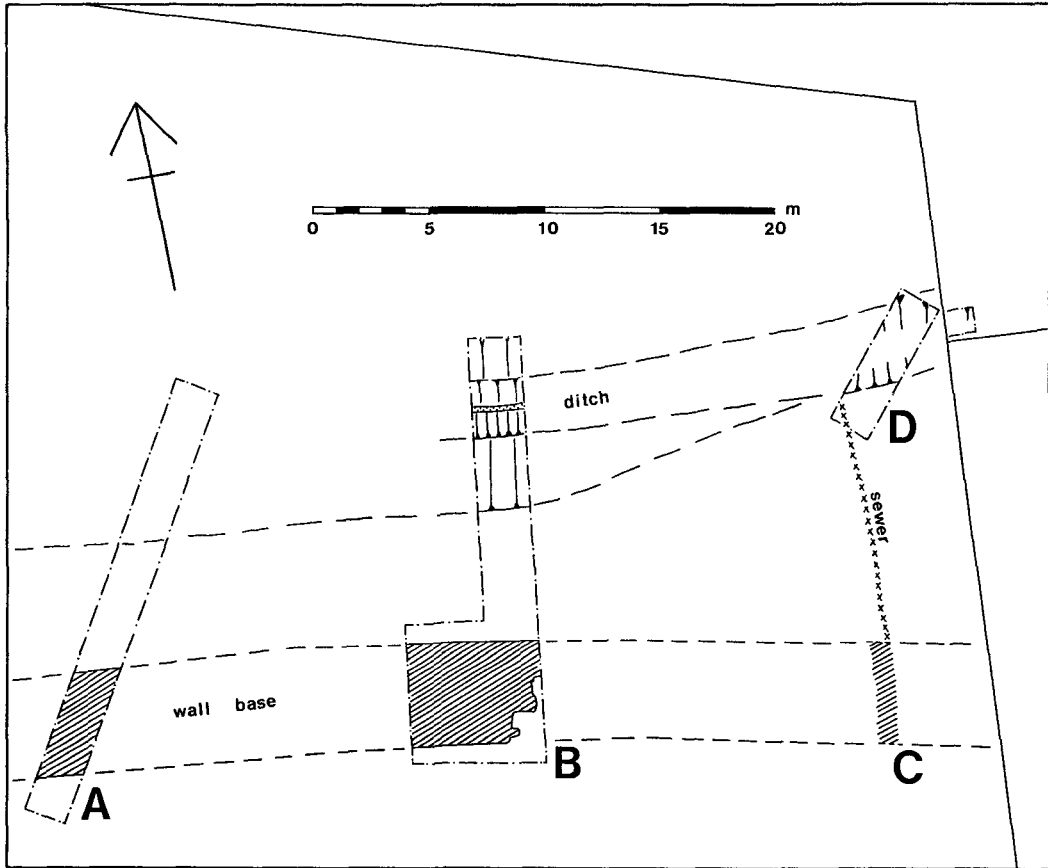


ILLUS 7 Beancross: location of excavations, 1973 and 1987. 1: area of Buchanan & Smith's trench, 1914; 2-3 McCord trenches, 1965

long, which protruded 0.18 m above the surrounding stonework. This boulder had evidently given the field-drain diggers some problems; rather than remove such a large stone, they had merely laid their pipes around it. The presence of the drain presented an opportunity to examine a section of the rubble foundation without removing any of the surviving portions. At this point the base was some 0.46 m thick, or three courses high. The base was set 0.2 m beneath the adjacent kerbstones and the contemporary ground surface to the north. Such a massive terraced foundation may have been used in order to buttress the Wall against the hill slope as it ascended the Mumrills Braes.

In Trench A the Wall base lay some 0.35 m below the present ground surface, preserving only 0.08 m of the Roman levels above the stone base (illus 9). The area above the core consisted of grey clay-loam containing from one to three distinct bands of red-brown soil, interpreted as the turf block structure of the rampart. The material used for the superstructure of the rampart above the kerbstones at Beancross was a deposit of yellow clay starting above the outside edges of the kerbstones and penetrating 0.3 m into the centre of the rampart, giving a total maximum width of 0.7 m for a revetment or facing of clay cheeks. The pure yellow composition of the clay would seem to rule out the possibility of the cheeks having consisted originally of turf cut on a clayey subsoil.

The yellow clay of the cheek over the north kerb merged to the north with an area of clay of more varied colour, which in turn merged into a blue-grey clay layer extending for over 9 m north from the Wall at an average thickness of 0.25 m. The blue-grey clay overlay the subsoil of brown



ILLUS 8 Beancross 1987, trench-plan

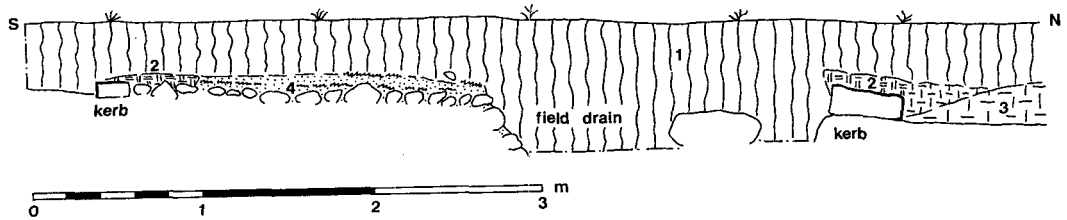
gravel and clay, level with the bottom of the kerbstones. Its origin is unknown; it was not found in Trench B only 13 m to the east where the depth of topsoil was considerably less. If it derived from the rampart superstructure, it could represent the collapsed north cheek or retaining wall, but large-scale excavation would be required to resolve the matter. These layers to the north of the Wall in Trench A dipped northwards, suggesting the nearby presence of the Ditch in this area.

Once the line of the Wall had been determined (in Trench A), the adjacent field to the east was examined for any remains within the area to be affected by the Bypass. Another trench was excavated on the projected line 5 m from the east boundary of that field. The upper 1.6 m consisted of ashes and domestic refuse dumped in the early 1930s to raise the level of the field and improve its drainage. Below this was a blue-grey layer of stiff Carse clay which quickly became waterlogged. Probing for the stone base met with no success.

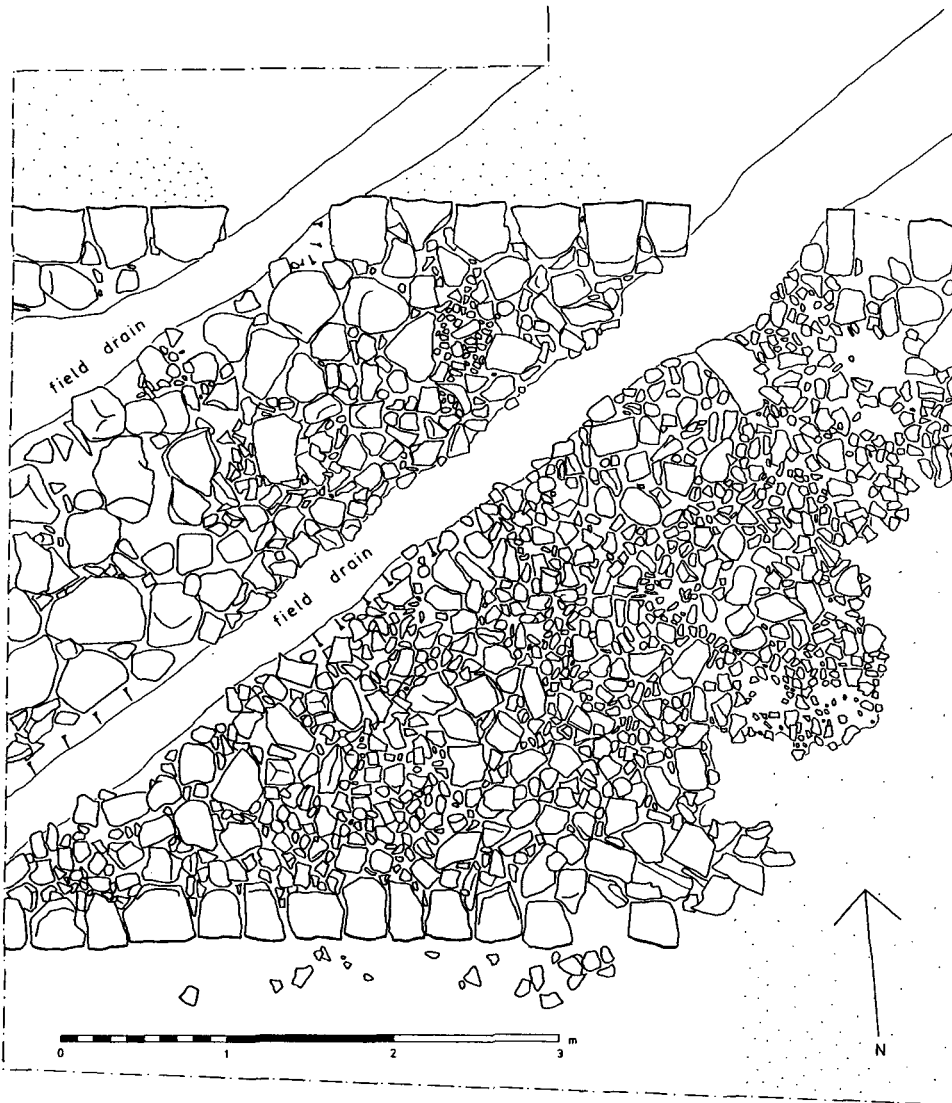
Whilst it is possible that this negative result was due to the complete removal of any Roman remains, it was decided to return to field no. 2116 to verify the accuracy of the projected course. Trench B exposed a 5.36 m length of the Wall base and also revealed that the Wall had in fact changed its direction by 8° in this 13 m stretch. Careful plotting of the 1973 observations indicates



ILLUS 9 Beancross: the Wall base in trench A, looking north



ILLUS 10 Beancross: section across Antonine Wall, trench A, looking west. 1, dark brown clay loam, topsoil; 2, yellow clay; 3, blue-grey clay; 4, grey clay loam with rust-coloured striations



ILLUS 11 Beacross: plan of trench B

that this south inclination may have been considerable. If the rate of deviation from the straight course continues as far as the Westquarter Burn, it would place the Wall well to the south of the trenches excavated in 1965 (illus 7, points 2 & 3). Such south-entrants are common along the Wall at low-lying valleys. Roy's map of the 1750s shows that the two burns here have not changed their courses significantly since the 18th century.

No original deposits survived above the stone base in Trench B. The topsoil was here much shallower than it had been in Trench A, and the find of a very corroded 1863 halfpenny between the stones makes it a reasonable assumption that it included a part of the length exposed in 1914.

The stones were of local sandstones and ironstones. The neatly trimmed kerbstones were generally larger on the north kerb than the south, and the presence of chippings of the same coarse-grained sandstone indicated that they had been dressed on site. The width of the Wall base was 4.32 m. The distribution of stones within the core was not entirely random; at the west end of the trench was an area of large boulders with a few small packing stones; then came a 2 m strip of angular medium-sized cobbles packed with pebbles; and, finally, these were replaced by small rounded pebbles (illus 11). There were no distinct junctions between the three zones and it is suggested that they merely reflect the different sources from which individual cartloads of the core material were obtained. Again the presence of field drains allowed a partial examination of the depth of the foundation, which on this occasion was only 0.2 m. There was no evidence of an old ground surface.

At the south-east end of the trench even the base had been destroyed, probably by an earth-moving machine, perhaps in 1973 when the sewage pipe was laid. Although the pipe was laid within a 5 m swathe just west of C (illus 8), the spoil from the pipe trench was deposited to the west. In backfilling the pipe trench it would seem that more spoil was taken from the tip than had been deposited, with the result that at least 15 m of the surviving Wall base was destroyed.

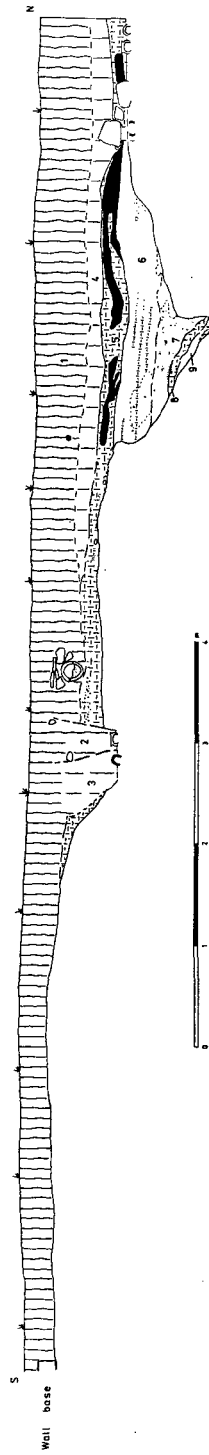
The accompanying Ditch was found 5 m north of the rampart. It shelved out at a depth of 0.5 m below the Roman ground level over a length of 3.2 m; then a steep slope took it rapidly into a narrow slot with a vertical north face; it then rose more gently up the outer face, emerging onto another shelf. Assuming this second shelf to be equal in width to that on the south, the overall width of the Ditch would have been in the region of 9.7 m, within the accepted range for Keppie's Sector 1 (Keppie 1974, 161). The more northerly of the two shelves was 0.24 m lower, which may reflect a slight slope in the contemporary ground surface when the Ditch was originally dug.

It would seem that the Ditch had remained almost totally open until the early 18th century. The two basal fills of the Ditch represent early silting. A layer of grey sand (layer 9) was in areas covered by a dark grey clay (layer 8). These suggest deposition over a long period of time in a watery environment which probably protected the sides of the Ditch from heavy erosion. Thereafter the fills indicate deliberate infilling of the Ditch. Layer 7 was a coarse-grained grey sand containing fragments of coal and a few strands of vegetable matter. It merged gradually into a slightly browner layer (layer 6) with several very thin bands of grey clay. This layer contained 18th-century glazed wares. The whole was then sealed by a thick layer of grey clay and very well preserved, densely compacted, vegetable matter (layer 5). This material engulfed a stone drain or culvert sited on the northern lip of the 'central ditch', which had probably served as an outlet sewer for the hamlet at Beancross. Layer 5 was itself cut by the trenches for five separate lines of ceramic field drains.

The unusual profile, and its position immediately to the rear of housing, may have been sufficient to mask it from recognition by the early antiquaries. Given the history of the Ditch, and the coarse-grained nature of the main fill (layers 6 & 7), which increased the chances of contamination, sampling was not considered worthwhile.

1993 excavation

In March 1993 a small excavation was carried out at short notice in advance of a sewer pipe diversion necessitated by construction of the Laurieston Bypass. A combination of the poor natural drainage and the high water-table, exacerbated by inclement weather, made it essential to employ a pump to remove surface water. Even so, water seepage remained a serious problem – not only because of its effects on the stability of the trench sides, but because it obscured the archaeological



ILLUS 12 Beacross: Section from the north kerb of the Wall to the north shelf of the Ditch

features. The trench (illus 8, Trench D) acted as a sump for the entire field. Given the atrocious working conditions it was possible to excavate only to a depth of 0.8 m. The south lip of the Ditch was located 12 m south of the boundary fence, only slightly further north than was anticipated. No traces of the south shelf of the Ditch observed in 1987 were found. The subsoil consisted of yellow clay, capping bands of gravel and silty sand, which contrasted sharply with the uniform light grey clay-silt ditch fill. These layers were overlain by 0.2 m of rubble laid down in an attempt to raise the level of the field.

The nature of the ditch fill at this level shows that this area has always suffered from drainage problems and at times must have been covered with stagnant pools of water. The lack of a shelf on the south side should not cause concern; it is only to be expected that the form of the Ditch here should vary considerably according to the nature of the ground and hence the difficulties encountered in digging it. East of this site the area becomes even wetter and it would have been sensible to have reduced the size of the Ditch here.

DISCUSSION

This is only the second time that turfwork has been found in the core of the rampart in the 9 miles of the Wall east of Watling Lodge (Keppie 1974, 161). The first case to be noted was the north rampart of the fort at Inveravon and therefore was in an ambiguous situation relative to the Wall curtain (but see Armit & Dunwell 1992). Clay cheeks have been claimed on numerous occasions along the first 9 miles of the Wall (Keppie 1974, 161), and were found in the lengths of rampart adjacent to the fort at Mumrills. However, 122 m west of that fort they had been replaced by turf cheeks, similarly at Polmont Park, $\frac{3}{4}$ mile to the east. This led to the suggestion of wing walls (Steer 1961a, 95), built at the same time as the primary fort, but before the erection of the rampart of the Antonine Wall. However, the presence of clay cheeks at Beancross, 450 m east of the fort, weakens the argument for these wing walls, the existence of which is supported only by the realignments in the Wall base on either side of the fort. The composite rampart structure at Beancross, consisting of a laid turf core and clay cheeks, is so far unique to this section of the Antonine Wall, but is known at some forts, such as Crawford (Maxwell 1972, 154). To the west, at Mumrills fort itself, the rampart had clay cheeks retaining a core of dumped earth (Steer 1961a, 95); and to the east, at Polmont Park, it had turf cheeks retaining the same earth core.

At 7.76 m OD this is one of the lowest points on the frontier at which the Ditch was dug, and would have been as liable to periodic flooding in the Roman period as it is today. It was probably for this reason that only the central 2.5 m was excavated more deeply. The base of this 'central ditch', with its classic Punic profile and basal 'cleaning slot', was at 5.94 m OD, and would have become submerged very shortly after having been excavated. It follows that the well-preserved 'cleaning slot' cannot have been used for the purpose suggested by that appellation. The second term commonly used for this feature, an 'ankle-breaking slot', would be more suitable. Few sections across the Antonine Wall ditch have been examined to the very base of the Ditch due to the ubiquitous problems of rising water. However, on those occasions when the bottom has been reached, it contained a similar slot which can now be accepted as a standard feature. The slot was first noted at Watling Lodge in 1894 by Mungo Buchanan (Falkirk Museum Archives a67.11); and subsequently seen by Macdonald (1934, 90). The steeper inner slope of the 'central ditch' is a common feature of Roman fort defences, although in this case it would to some extent have been necessitated by the localized stratigraphy, with a stiff clay on the south slope and base, and loose sands and silts on the northern slope.

The height of the water-table in the Roman period cannot now be ascertained. The nearby burns have been canalized along their lower reaches and modern roadworks have obstructed the natural drainage patterns. That the area has a long history of flooding is indicated by the fact that the area between the burns is known as the 'Weedings', ie Wetlands. Being less than 10 m OD much of the valley floor forms a natural extension to the Carselands. It is possible that most, if not all, of the 'central ditch' was usually under water. During the recent excavation the water rose to 0.05 m above the south shelf, at which height the water covered the whole 9.5 m of the floor of the original Ditch, hiding the deeper central portion.

5 TOLL BRAE, LAURIESTON (NS 908795) (not illustrated)

G B Bailey

During the laying of a sewer pipe under the former north carriageway of the A803, the fill of the Ditch was noted, consisting of a grey silty clay much disturbed by service trenches. The Ditch lay only slightly south of the line conjectured on Ordnance Survey maps.

6 TATTIE KIRK, FALKIRK (NS 889797) (not illustrated)

G B Bailey

A north/south aligned trial trench 1.5 m wide and 8 m long was excavated on the site of a new jeweller's workshop south of the Tattie Kirk and to the rear of the shops on the east side of Cow Wynd. It thus lay across the line of the Antonine Wall ditch as shown on some Ordnance Survey maps. In the event, no Roman or medieval occupation was observed, only 17th-century and later pottery being found in the cultivation soils. Within overlying modern building rubble was a roll-moulded skewput, perhaps derived from a building on the Cow Wynd and dated stylistically to c 1790.

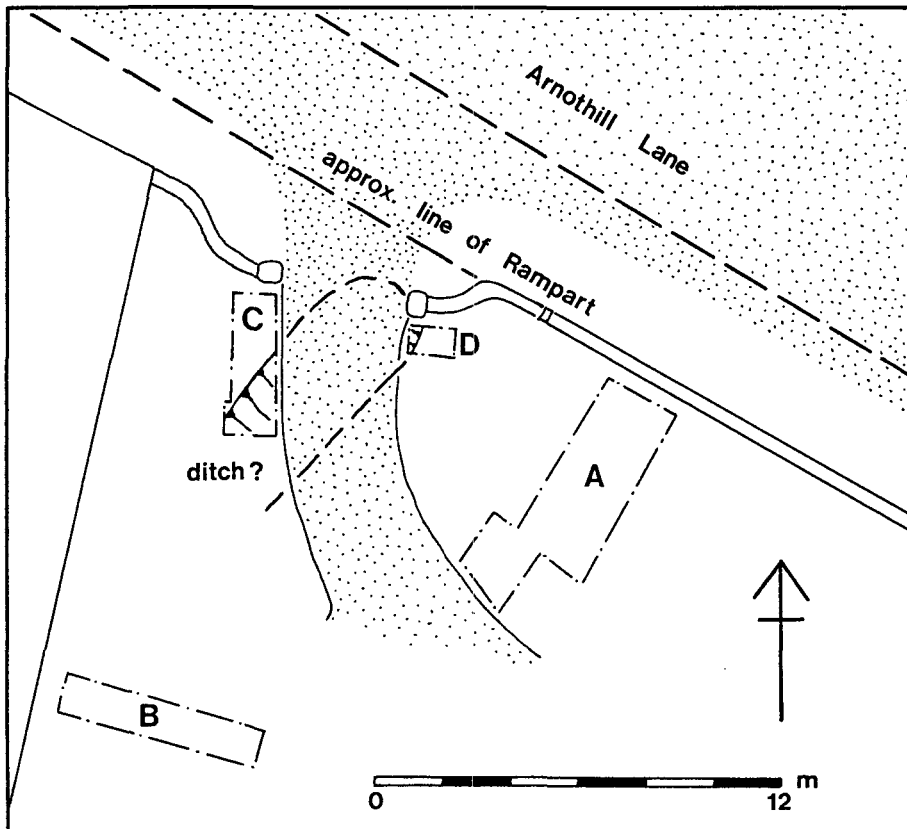
7 ARNOTHILL, FALKIRK (NS 883799) (ILLUS 13)

G B Bailey

INTRODUCTION

At a time when the curtilages of many of the Victorian villas on Arnothill were being developed for housing, a four-day excavation was undertaken in November 1990 in the grounds of Birchfield House, 15 Arnothill, in an attempt to locate the Roman frontier.

The site lies on an east/west ridge just west of Falkirk town centre. In this area the line of the Wall had barely been visible to early antiquarians and the remaining surface traces were finally removed in the 1870s when villas were built near the crest of the hill. Macdonald established the line of the Wall here only indirectly; he was told of an exposure of the rampart base in the grounds of Mayfield House at the corner of Maggie Wood's Loan and Arnothill Lane (Macdonald 1934, 125). Eastwards, his next known point was at Rosehall, just east of the Pleasance (Macdonald 1915, 128). In 1989 the Wall was located as it crossed the West Burn, well to the south of Macdonald's line at the east end of Arnothill (Bailey forthcoming 2).



ILLUS 13 Arnothill: plan of the trenches and features

DESCRIPTION

Trench A was located in the largest available space within the garden at right angles to the assumed line of the frontier. The area had been extensively worked and a rich humic soil 0.4 m deep directly overlay the subsoil. No features were found. Trench B was located to the south-west with the aim of determining whether any features survived behind the presumed line of the Wall. A cobbled surface (007) found at a depth of 1.3 m in the east end of the trench, consisted of a compact upper layer of gravel over red-brown gritty sand containing some 19th-century pottery, below which was a dark grey clay loam containing post-medieval and late eighteenth-century pottery sherds.

Trench C was located in the only other available space for exploration (illus 13). Here a patch of blue-grey loam in the subsoil indicated the presence of stratified deposits of some antiquity. The west side of a linear feature, F1, aligned roughly NE/SW in the south-east corner of the trench, was identified, sloping down at an angle of 45°. The lowest fill was of a light brown silt, only 10 mm deep, overlain by a layer of cobbles in an orange sandy matrix containing patches of clay and loam of various colours. Two pieces of iron slag were recovered. An 0.15 m thick deposit of blue, grey and white matter rose to the surface at the north end of the trench. Over this again, in the centre of the feature, was a lens of orange-brown sandy loam.

Trench D (see illus 13) was excavated in order to locate the east edge of this feature. A narrow, 0.10 m deep, band of blue-grey clay mixed with white clay loam was found, but beyond the protection of the driveway it gave way to the same rich humic soil found in Trench A.

DISCUSSION

The mixed blue-grey clay loam and white clay fill of the feature F1 is typical of debris derived from the superstructure of the Antonine Wall. These deposits showed no distinct signs of banding although the layers containing them sloped down from north to south. The addition of pebbles, cobbles and iron slag in the base of feature F1 strongly suggests that it had been deliberately backfilled from the north. Alternatively, it is just possible that the Rampart had collapsed into it. In this case the stone might have derived from a rampart walkway. Notice the stones on the north side of the rampart at Callendar Park (Bailey, this volume) and at Baginton (Jones 1975). In either case the small quantity of silt shows that the feature had not been open long.

Too little of this feature was available for inspection to be certain of its nature and hence its function. If it had represented a natural hollow which had been deliberately filled in to allow the construction of the rampart, then the choice of material would seem a little odd. It may have been an oval-shaped pit adjacent to the Wall (pits were found at the Wilderness enclosure and at the Bonnyside East expansion), or the butt-end of a ditch. The longitudinal section bears a striking resemblance to the butt-end of a ditch found at Wilderness West (Hanson & Maxwell 1983a). There, an 'enclosure' ditch terminated just short of the rampart base, and had apparently been deliberately backfilled during the Roman occupation. That the Arnothill ditch did not continue south on the same alignment is shown by its absence in Trench B, and indeed the natural topography does not make allowance for a large structure in the vicinity. It is therefore possible that F1 is part of an 'enclosure'.

The rampart itself was not located but its line can be deduced from the evidence of the roads in the area as shown on a series of maps. In 1781, a linear feature called 'Grames Dyke' is shown extending from Maggie Wood's Loan, at a point just south of the Bantaskine Gate, to the south end of the north/south section of the road called Arnothill, and thence curving south to meet the West Burn (Horne 1781), roughly where it was located in the 1989 excavation. Apart from Maggie Wood's Loan and the north part of Arnothill, there were no other roads on the hill top. It is reasonable to assume that the feature marked on the plan is the Ditch. The same features appear on Roy's map of the 1750s. Running down from the crest of the hill to the north and south was a system of rig and furrow. This situation had not changed in 1812 (Shaw). However, by 1818 Garthill Lane had been constructed, together with the east/west part of Arnothill (Anderson 1818). These were quite broad tracks with the east/west section apparently built on the upcast mound (as is commonly found elsewhere, for example at Dean Road, Bo'ness). Garthill Lane crossed the Ditch at right angles near to the point at which the Ditch begins to turn south. Between 1818 and 1832, that part of Arnothill from Garthill Lane to the West Burn was added as a narrow lane. It started at a point well to the south of the corner of Garthill Lane and the east/west section of Arnothill. The reason for this was evidently so that it would follow well to the south of the Ditch, avoiding the surviving hollow. The road assumed its present form only in the 1870s when the villas were constructed.

The 1870s saw a massive amount of landscaping of the area. The cobbled surface found in Trench B was the 1832/70 lane which had been covered with 0.6 m of clean sand to provide a terrace around Birchfield House. When the boundary wall was built on the west side of this property it acted to retain yet further earth, burying the road even deeper. The flat surface of the subsoil in Trench A testifies to further terracing. The whole area was then extensively landscaped and the topmost 0.4 m cultivated.

Below the 1832/70 cobbled road the dark soil is a reminder of the agricultural nature of this site in the 18th century. There was no evidence of the rigs shown on the 1781 map in the small

areas excavated. The natural topography shows the hill to have been quite narrow on the top, with the assumed line of the Rampart lying just to the north of the crest. Garthill Lane lies in a natural valley set into the back of the ridge and the land at Birchfield was clearly sloping from east to west into it.

There are at present only three enclosures known along the Antonine Wall, all of which occur in the short stretch adjacent to the fortlet at Wilderness (Hanson & Maxwell 1983). Despite speculation that they formed a regular series, no evidence for this has been forthcoming. An aerial photograph of 1947 (Falkirk Museum Archives p12342-3) shows a possible enclosure c 220 m east of the fortlet at Kinneil (though here there may be complications caused by the medieval village). The Arnohill feature might then be part of a series of such short-lived enclosures.

8 WATLING LODGE FORTLET (NS 867797) (ILLUS 14–15)

G B Bailey

INTRODUCTION

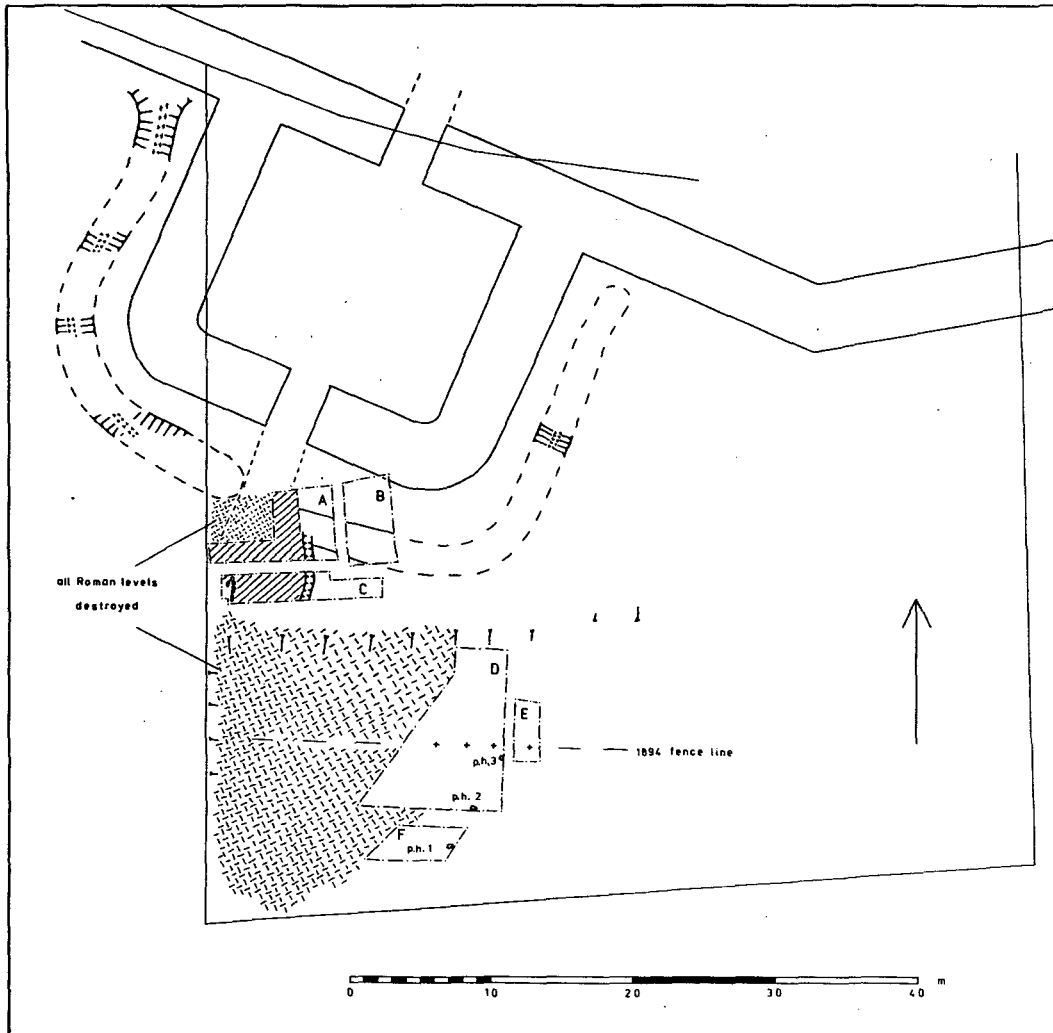
The fortlet at Watling Lodge was first discovered in 1894; a report published seven years later (Christison & Buchanan 1901, 336), and a plan in 1911 (Macdonald 1911, 249). In the period 1972–4 excavation clarified the location and dimensions of the fortlet defences (Breeze 1974), and demonstrated that Buchanan's observations were unreliable in detail. From this work it became apparent that the fortlet was of the same type as other fortlets along the Antonine Wall, which appear to form a series at approximately one-mile intervals. The Watling Lodge fortlet differed from the others only in that a major road ran north through it to the outpost forts at Camelon and beyond. In 1986, in advance of development, the opportunity arose to investigate a part of this road as it issued from the south of the fortlet, and to establish whether any extramural features survived beside it.

DESCRIPTION

Three trenches A–C were laid out over the area of the road and the south defences of the fortlet in a part of the site initially zoned for gardens. During excavation, no Roman stratigraphy was disturbed, apart from a small section placed across the fortlet ditch in Trench A, and the topsoil was replaced after the features had been recorded. At the north end of Trench A, a cobbled road was found only 0.05 m below present ground level and it was later agreed with the developer that the area should be grassed over in future years. As yet, this development has not taken place.

To the north-west of Trench A, between it and the fence, a large water tank had removed all traces of Roman levels. To the south they were found below the concrete floor of the associated building. In Trenches A and B the fortlet ditch appeared as an area of orange-brown sandy soil against the grey-yellow clay subsoil. Its surface was 2.6 m wide, slightly narrower than elsewhere (Breeze 1974), which suggests that this area had been truncated by recent activity. This would seem to be confirmed by the complete absence of any trace of the south rampart and may be accounted for by the intense cultivation of this garden area.

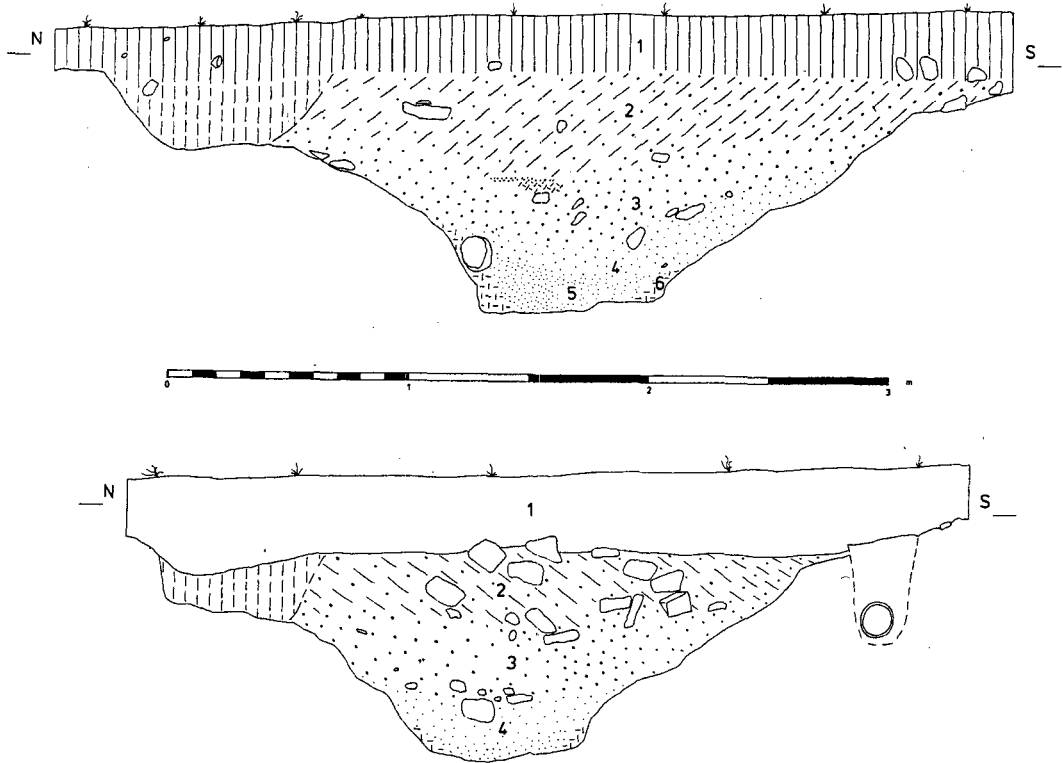
At the bottom of the ditch a 0.15 m layer of fine brown-grey silt (layer 5) graded into a browner coloured silt (layer 4) of similar depth. This merged into a thicker brown-grey sandy silt (layer 3) and then the orange-brown sandy loam of the upper ditch fill (layer 2). Although only 0.4 m to the west, the opposing face of this section contained considerably more stone in layer 2. At the junction of the ditch and the road, the latter could clearly be seen to override the ditch fill, and one large boulder measuring 0.48 m by 0.6 m would seem to have been placed so as to consolidate the edge of the road at this point.



ILLUS 14 Watling Lodge: plan of the 1986 excavations

Two distinct levels of road surfacing were discerned. These were particularly noticeable at the west end of Trench C where the kerb bounding the foundation material of the later phase road overlay the fine gravel surface of an earlier road. The kerb consisted of unworked stones laid with a naturally occurring facet on the outside forming a rough line, with a return at the north end of the trench. This created a roadside drain which began at this point and thence inclined downwards to the south. To the north, in Trench A, the foundation of the upper road surface appeared to extend all the way across to the west end of the trench.

The later phase road was further bounded on the east by a shallow ditch or drain 0.8 m wide and only 0.12 m deep, now filled with 0.06 m of coarse sand and silt. This fill also cut layer 2 of the fortlet ditch, confirming that the upper road surface post-dated the ditch. Little of the original surface of this late road survived above the quite substantial foundation layer.



ILLUS 15 Watling Lodge: sections across fortlet ditch in trench A

To the south of Trenches A–C, terracing for a tennis court had removed the original stratigraphy over a large area. A series of trenches (D–F) were excavated to ascertain if any Roman levels remained in the vicinity. The ground in this area slopes naturally from west to east, and the trenches were placed where the terracing was thought to change from cutting to embanking. No archaeology remained in the west of the trenches which contained a complex pattern of field drains for the tennis court. Where the ground dipped in the extreme east of the trenches two, or possibly three, stone-packed post-holes were located. The most clearly defined of these, Post-hole 1 in Trench F, contained an amphora sherd. The possible third post-hole contained a rim sherd of Black-burnished 2 (no. 3 below), whilst the base of a coarseware vessel was found in the adjacent levels (no. 2 below). Due to the large areas of modern disturbance it was not possible to relate these post-holes to any other feature.

THE POTTERY:

- 1 Fragment of Dressel 20 South Spanish olive oil amphora. From Post-hole 1.
- 2 Base of a jar in a fabric now light grey externally and light brown internally. Probably burnt and worn BB1. From the layer of orange-brown loam near Post-hole 1.
- 3 Rim of a bowl in BB2, cf Gillam 1961, no 40. From Post-hole 3.
- 4 Rim of a jug in light brown fabric with a granular green and brown glazed exterior. Late medieval. From topsoil.

Nos 1–3 are consistent with an Antonine date.

DISCUSSION

The Ditch section was similar to those recorded in 1972 (illus 15) with the exception that here the slightly steeper slope occurred on the inside. The ditch had clearly silted naturally over a long period of time (layers 3–5), leaving only a gentle undulation on the surface to be filled by the orange-brown loam (layer 2). The stone seen in section to the west was presumably derived from the later phase road whose foundations, further west, were embedded into the top of the ditch.

The Roman road from the Antonine Wall to the forts at Camelon was noted as early as 1697 by the anonymous traveller who described it as a ‘paved way of half a mile long’ (HMC 1893, 57). Its course is clearly shown on General Roy’s plan of Camelon (Roy 1793; reproduced in Christison & Buchanan 1901, 333) and on the plan accompanying Stuart’s *Caledonia Romana* (Stuart 1852). In each case the road passes north through the Antonine Wall in the vicinity of Watling Lodge, descends the steep slope along the top of which the Wall runs, and then turns NNE looking towards Arthur’s O’ on in the distance. After some 320 m the line turns sharply northwards heading for the south gate of the South Camp at Camelon. It was this path that was also recorded by the first Ordnance Surveyors in 1860.

At the point where it crossed the Ditch of the Antonine Wall a causeway had been left in position. Sir George Macdonald was fortunate enough to locate a photograph of this feature (1934, 348), taken before its destruction in 1894, during construction of the villa which was given the modern appellation ‘Watling Lodge’. The building operations at this site were observed by Mungo Buchanan who saw the road and the point at which it crossed the Wall, by way of the north gate of the fortlet. A brief account of these observations was printed in the Camelon excavation report (Christison & Buchanan 1901); a fuller account from Mungo Buchanan’s original notes is given in Appendix 2, in order to clarify any ambiguities.

This road was again located in the 1986 excavation as it issued from the south gate of the fortlet. Presumably the first phase of the road ran symmetrically through the fortlet as indicated by those areas of the early phase road found in the excavation. The Royal Commission suggested that the road to the Flavian fort at Camelon had been from the south-east passing through Falkirk (RCAHMS 1963, 112). However, in the second century with the construction of the Military Way behind the linear barrier, the new route from Watling Lodge, directly south of Camelon, would have been more suited for access. On the Antonine Wall, the placing of the fortlets seems to have been less rigidly spaced than had been the case with the Hadrianic milecastles. The fortlet at Watling Lodge occupied the edge of a prominent ridge with clear views to the west, north and east. It has been suggested that this position was chosen as the point from which construction work began on the Antonine barrier, proceeding in a western direction (Bailey 1992b, 7; & forthcoming 1). In this case the direct road running south-east from Camelon may have continued in use until the work on the east extension of the Wall to Carriden was started. In the meantime, traffic approaching from the west could have rounded the Wall at the Watling Lodge fortlet, a route finally adopted for all traffic.

Unlike the other fortlets along the Wall, Watling Lodge appears to have been occupied throughout the Antonine period. At the other fortlets investigated, the surrounding ditches had been deliberately backfilled using materials from the rampart or upcast mound, whereas at Watling Lodge the ditches show signs of having silted up slowly as a result of natural agencies. Occupation may therefore have continued until the end of the Antonine period as suggested by Breeze (1974). The reason for this would be the continued need for the strict maintenance of control over the use of the road, with access to the north of the Wall being confined to the forts. As the other fortlets were dismantled their causeways over the Wall ditch were removed and the Wall curtain completed to seal the former gates (Keppie & Walker 1981, 160; Bailey & Cannel forthcoming).

It is difficult to date the three post-holes to the south of the fortlet; the pottery found in their vicinity suggests a second-century date, but its association is only tentative. Nor is it possible to assign them to any type of structure. They would not be out of character in an extramural setting in the Roman period, but could equally belong to the medieval settlement here. This settlement took the form of a motte grafted on to the upcast mound of the Antonine Wall just to the west of the Roman road (Macdonald 1934, 344; Breeze 1974, 174); it came to be known as Maiden Castle.

Some time after the silting of the fortlet ditches a new road foundation was laid almost directly upon the old one, taking a slightly different line. Again no dating is available although the degree of silting in the ditch could support a Severan date. No Severan material has yet been identified at Camelon, but the numerous temporary camps in the area indicate a long-term strategic interest. A Severan date has been proposed for the Househill camp, Dunipace, north of the river Carron (Maxwell 1991, 9). Cramond and Carpow were occupied at this time and a land route between them would have been useful. Several phases of road metalling are suggested by Buchanan's account (Appendix 2), and by Nimmo's observations elsewhere along the road (1817, 30). From his detailed description of the road's composition it would appear that he actually saw for himself the destruction of part of the road south of Stirling. He describes the road as consisting of several layers of stone and earth with a distinct camber and an uppermost layer of small stones. It is also possible that the later road surfacing at Watling Lodge was medieval in date, servicing the 12th-century motte.

9 TAYAVALLA, TAMFOURHILL (NS 859798) (ILLUS 16–18)

G B Bailey

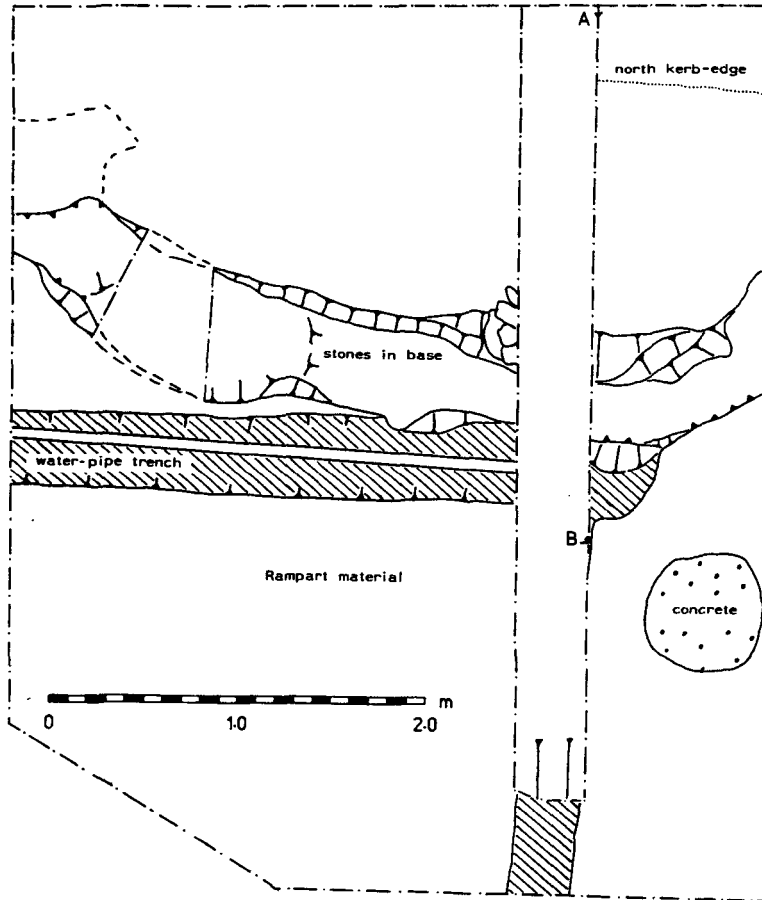
DESCRIPTION

A four-day excavation took place at the end of February 1988 in the grounds of Tayavalla, immediately east of the house, prior to the construction of an extension.

The excavated area, 3.97 m by 4.64 m, along the east boundary of the property, was taken down to the top of the Rampart of the Antonine Wall, which was reached at a depth of c 0.26 m. The turf structure of the Rampart could clearly be seen in plan with a narrow strip of pale white clay, c 0.4 m wide, immediately behind what turned out to be the position of the north kerb. Cut into the back of this clay spread was a narrow slot, on average 0.6 m wide at the top, narrowing to c 0.25 m at the bottom at a depth of 0.6 m. It rested upon the small cobbles of the Wall base and sloped upwards towards the north for most of the excavated length. Its course was somewhat irregular, with occasional swellings. The front edge of the slot trench, at the top, was approximately 1.1 m from the front edge of the stone kerb.

A 0.9 m wide section was cut through the north part of the Rampart in the north-east corner of the site, extending as far back as the above mentioned trench. The humic layers of turf were clearly visible in the centre of the Rampart. The first layer of turf appeared to have been laid face down upon the stone base; above this at least seven more layers were recognized, giving the surviving rampart a height of 0.5 m. There was a perceptible decrease in the intensity and thickness of the humic layers in the 0.5 m of the Rampart front as compared to those of the remainder. To the north of the Rampart an accumulation of grey clay-loam met the Rampart structure along an almost vertical front.

A monolith sample was taken from the front part of the Rampart, and a second from midway between it and the slot. Unfortunately, the preservation of the pollen was poor, making palaeoecological reconstruction impossible (R Tipping, *pers comm*). Percentages of pollen species varied markedly between two subsamples taken from the second monolith (Appendix 3). The result, therefore, gives little more than an indication of the presence of certain species and a general idea of their relative abundance.

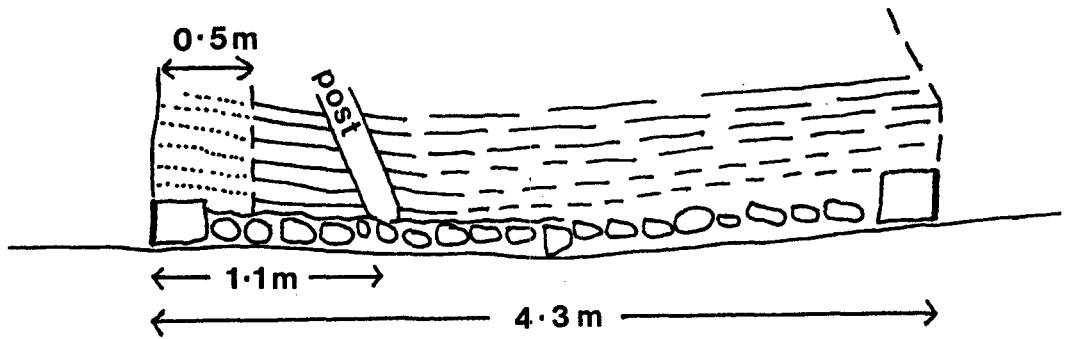


ILLUS 16 Tayavalla: plan of the excavated area

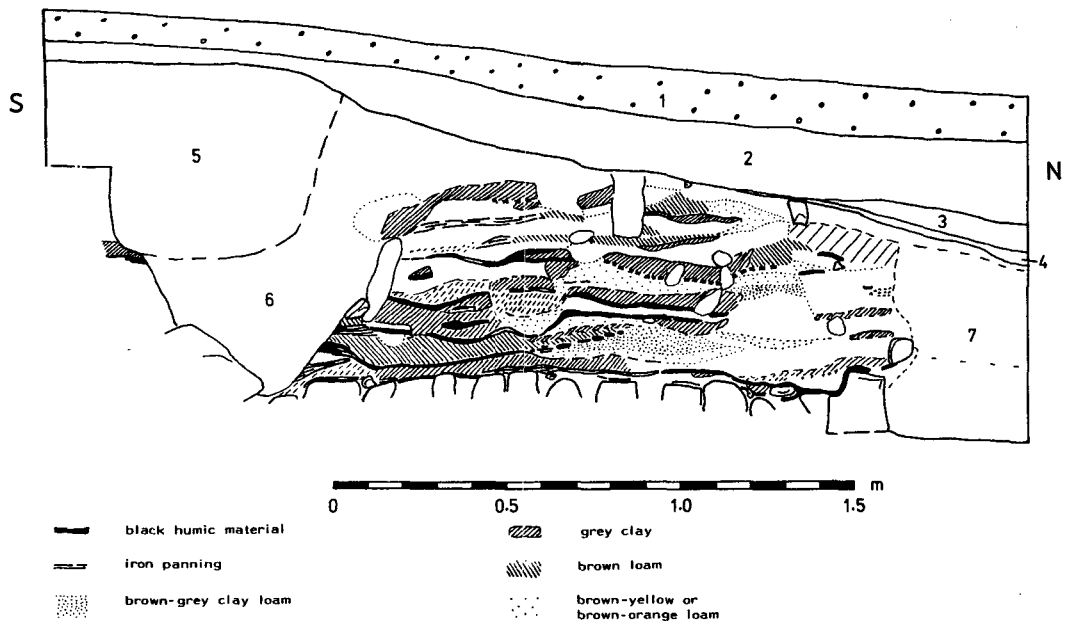
Three kerbstones were exposed, producing an alignment which diverged gradually from that of the Ditch as it proceeded east. This may have been in order to take the Rampart further south at the crossing of a burn where the Wall and Ditch required a greater degree of separation than was normal.

DISCUSSION

The 1988 section confirmed the turf composition of the Wall at this point. A section cut just west of Watling Lodge in 1974 (Breeze 1974) also revealed turfwork, but had been too close to the fortlet there to provide evidence of the nature of the superstructure. This structure agrees with a change in construction of the Rampart, from one of earth revetted by cheeks of clay or turf to one wholly of turf at the fortlet at Watling Lodge, as noted by Macdonald (1925, 285; Bailey 1992b). It appears that the Rampart had some internal structure. The finer dark lines seen in the first 0.5 m would be consistent with the provision of finer-quality turf for 'cheeks'. The Bonnyside East expansion had similarly differentiated cheeks, 0.9 m wide (Steer 1957, 166), which may represent later repairs, although this is less probable.



ILLUS 17 Tayavalla: schematic section of the rampart compiled from several sections



ILLUS 18 Tayavalla: section of the north front of the Antonine Wall

Interpretation of the narrow slot set 1.1–1.3 m back from the front of the Rampart is more difficult. It contained no dating evidence, and can be related only to a pipe-trench of c 1880 which cut it. The feature sloped to the north as it rose, which may either reflect an intentional incline of a palisade, or subsequent slumping when the Rampart moved northwards. That it held vertical timbers and not a drain is suggested by the fact that its base rested upon the uneven stone cradle of the Wall and the occurrence of globular swellings along its course. Seven sections across the slot were examined, revealing that its fill was homogeneous. If it indeed once held vertical timbers, these must have been deliberately removed, which may explain the swellings on the sides of the slot trench.

Whether this was a boundary fence or a palisade is now impossible to determine. The site lies 340 m west of the fortlet at Watling Lodge and so would be inappropriate for a 'turret'. However, this is exactly midway between the fortlet and an expansion, Gilmour Seat (or Tentfield) East (Macdonald 1934, 352). This may or may not be significant. It will be useful to be aware of the slot's possible presence elsewhere along the frontier. The feature has not been noticed before, although it would normally be difficult to detect as the slot did not penetrate the stone base. It may, of course, be of post-Roman origin. A motte lay at Watling Lodge and a palisade might conceivably be connected with an associated enclosure which reinstated the earlier rampart.

Approximately 3 m to the east of the 1988 section an earlier trench can be seen cut into the bracken-covered mound of the Rampart. This was opened by Mr R Sutherland in 1877 and re-examined by Mungo Buchanan in 1891. It contained a stone conduit (Glasgow Archaeological Society 1899, 128 note 2).

10 SEABEGS PLACE, BONNYBRIDGE (NS 818794) (not illustrated)

G B Bailey

INTRODUCTION

In June 1989 a two-week-long archaeological assessment was undertaken of the 0.94 ha field lying to the south of Seabegs Place, Bonnybridge, in advance of housing development. The field lay some 70 m to the south of the Antonine Wall and it was therefore thought possible that the Military Way ran across it. In 1707 another feature was noted in this area: 'at the East end of the Seabegwood there was a great fort' (Sibbald 1707, 16). However, Macdonald failed to locate the site of this missing fort; in 1968, the field was extensively trenched with negative results (Briscoe & Thomson 1968, 44).

DESCRIPTION

In 1989 a resistivity survey, covering the west half of the field, produced some anomalous readings near the ridge of an east/west hill, which, on examination, were found to be patches of natural gravel. Trenches were also dug at numerous other locations in the field. On the higher ground in the centre and west end of the field the soil cover was often less than 0.2 m and no man-made features were apparent. Continuous ploughing would have removed all but the deepest of man's activities here. Around the remaining margins of the field the soil cover increased, but only on the north side was any feature of interest encountered. Approximately half-way along the south side of the narrow lane known as Seabegs Place the original ground surface was found to slope downwards relatively steeply from south to north, and more gently from west to east. In this depression, at a depth of 0.7 m, lay an area of random stonework composed of rounded cobbles. Much of the overburden was Victorian, although two pieces of green-glazed pottery were found immediately above the cobbling. The stonework stretched along the margin of the field for over 10 m and extended some 7 m into it up to the point where the ground rose to within 0.3 m of the present surface. This area is now incorporated into the rear gardens of the properties in the new housing development.

DISCUSSION

Whether the stonework was medieval in date, and thus associated with the Place of Seabegs, or Roman, and associated with the Military Way, was impossible to determine in the area available for excavation.

11 LOCHPARK COTTAGE, ALLANDALE (NS 804789) (ILLUS 19)

G B Bailey

INTRODUCTION

In May 1988 the Water & Drainage Department of Central Regional Council advised Mr and Mrs Williams of Lochpark Cottage to replace a septic tank with a connection to the main sewer which lay in the field to the north. The trench, subsequently dug with the farmer's permission, traversed the scheduled area of the Antonine Wall.

DESCRIPTION

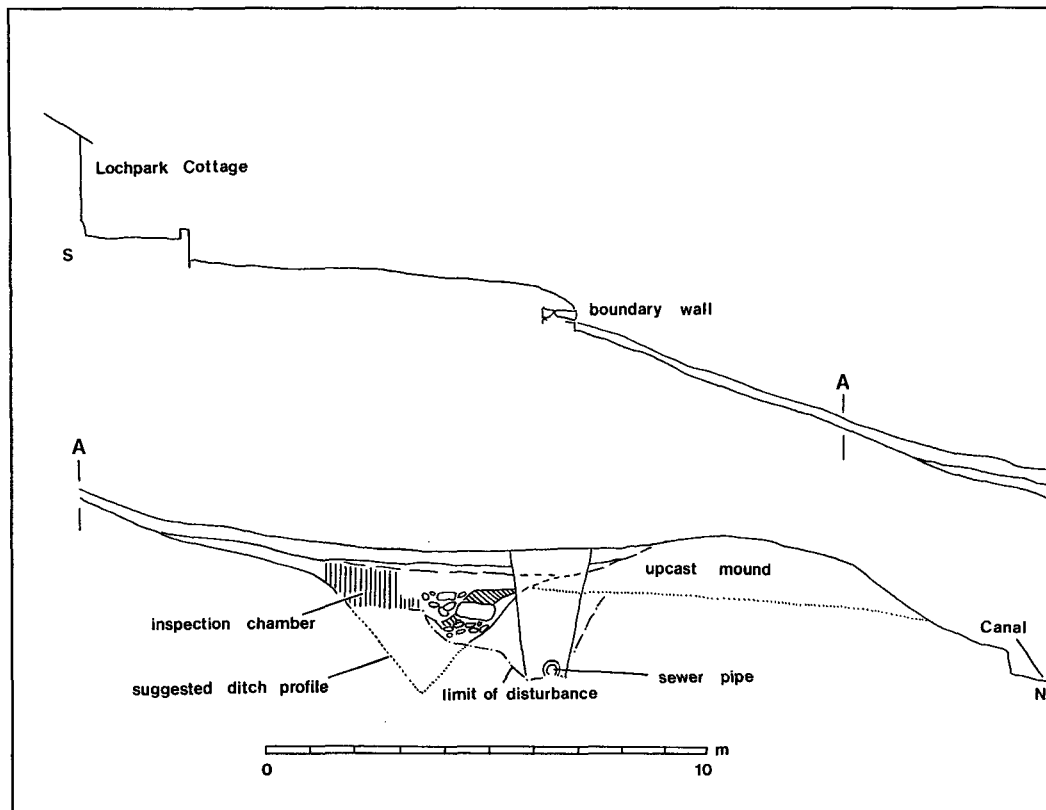
Unfortunately, by the time that Falkirk Museum became aware of the work, a large inspection chamber had already been constructed over part of the Roman Ditch. The east section of the trench was cut back and drawn. The upper 1.5 m of the Ditch fill consisted of a grey clay containing large cobbles; this overlay a thick band of red-brown vegetable matter containing twigs, branches and hazelnuts. Towards the bottom of this layer were smaller cobbles with a boulder at a higher level; below the vegetable matter a gritty layer of gravel and decayed greenstone was just discernible. Fragments of ceramic field drains had been incorporated with the stone deposits. The Ditch could be seen to have been cut through an orange-brown sandy layer of natural on the south, but the north edge had been removed by the main sewer pipe in c 1920, with only orange-brown sand appearing to the north. Below the orange was a stiff purple-grey clay which had been dug through by the pipe-laying operations, and presumably by the Ditch.

As it is reasonable to assume that the angle of the natural slope of the hill continued beyond the Ditch, a substantial upcast mound should survive here. However, no old ground surface could be seen in the north side of the sewer pipe-trench. (No disturbance should have occurred at this point as a result of the construction of the Forth & Clyde Canal, as the builders would cast their spoil to the north to provide banking on that side.)

As the upper part of the pipe-trench, in the garden of Lochpark Cottage, had been filled in, it was not possible to locate the base of the Wall. Given the topography, the latter should have been directly under Lochpark Cottage, perhaps providing the foundation for the long, narrow 18th-century farmhouse. This would place the Wall 8 m further south than shown on Ordnance Survey maps, a supposition which must await confirmation.

DISCUSSION

The true dimensions of the Ditch here are not known, but it may be estimated at 5 m wide and 2.4 m deep, considerably less than the average width of 12 m in this Wall sector. The Ditch must have remained open until deliberately infilled in the late 18th, or early 19th century. By using cobbles and boulders in conjunction with vegetable matter, the farmer, or the builders of the Forth & Clyde Canal, created a large drain which still gathers water from the surrounding area.



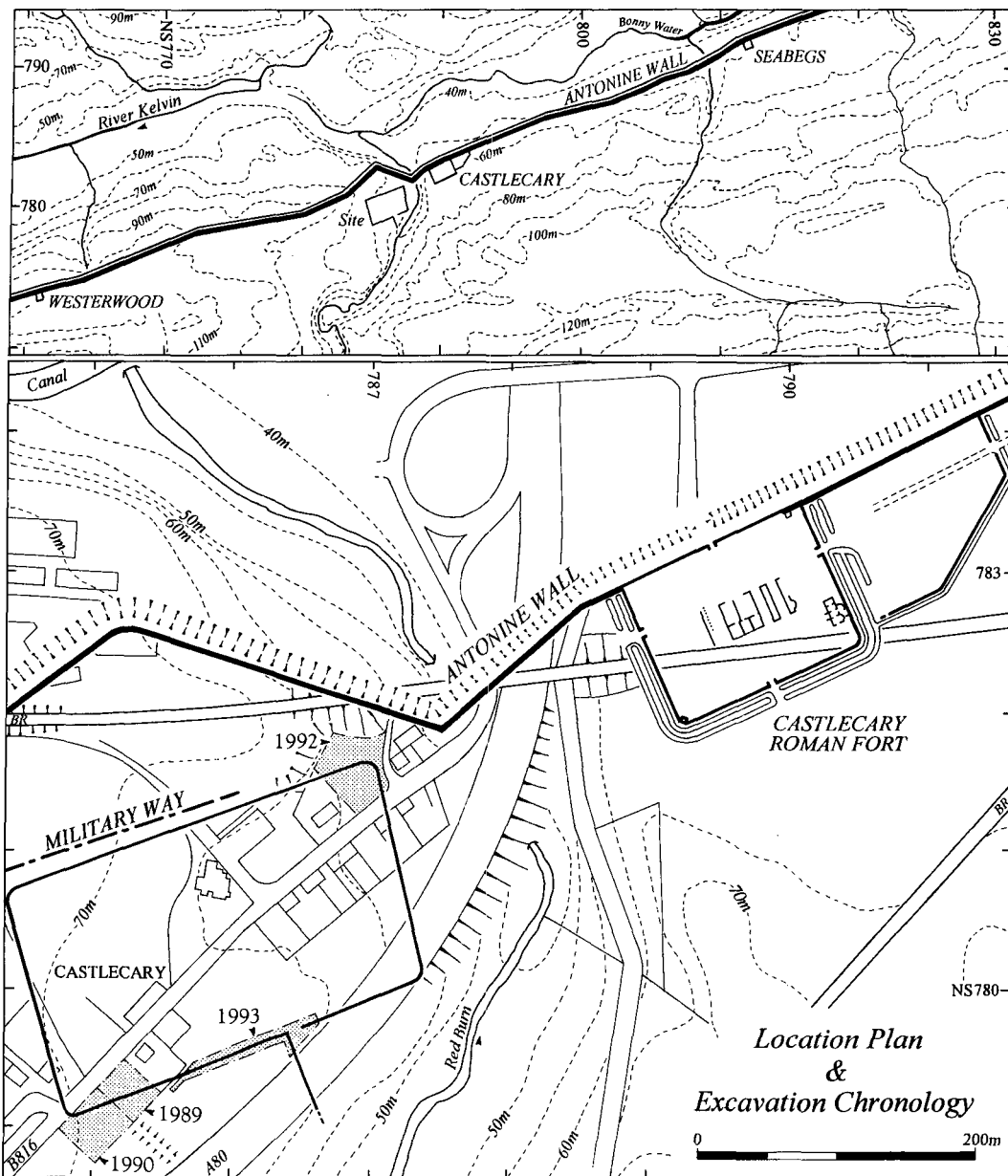
ILLUS 19 Lochpark: section of the Ditch

12 GARNHALL (NS 785779) (ILLUS 20–26)

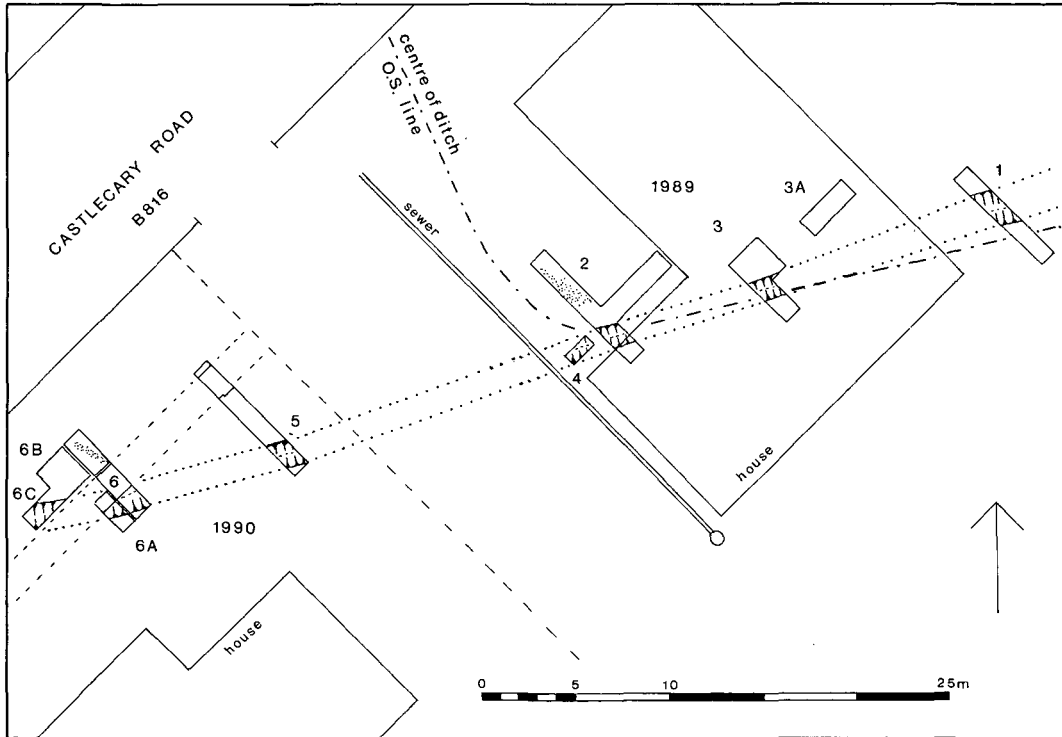
L J F Keppie & K Speller

INTRODUCTION

Parts of the perimeter of the camp known as Garnhall 1, which lies immediately south of the Antonine Wall in Castlecary Village and immediately west of the Red Burn, on ground which slopes away to the south-east, were examined in 1989–93 prior to four separate housing developments (illus 20–26). The camp was located from the air by J K S St Joseph in 1952, when much of the south side, and the south-east corner-angle were plotted (St Joseph 1955, 86). It was photographed again in 1958. The south side is interrupted by a gateway, and the south-east corner is now overlaid by the A80 trunk road. The line of the north defences was identified from the air in 1962, together with part of a north-west corner-angle (St Joseph 1965, 80). The camp lies immediately south of the Military Way (illus 20).



ILLUS 20 Garnhall 1 camp: general plan of excavations 1989–93. (Based upon the Ordnance Survey map © Crown Copyright)



ILLUS 21 Garnhall 1 camp: plan of trenches 1989–90, south of Castlecary Road

DESCRIPTION

South of Castlecary Road, October 1989

L J F Keppie

The construction of a bungalow overlying the camp's southern defences, close to the likely south-west corner, prompted a two-day excavation in October 1989 (illus 21). Current Ordnance Survey 1:2500 maps showed the south ditch of the camp turning sharply to the north within the area being built over, while the Ordnance Survey *Map of the Antonine Wall* (1969) suggested a more gradual turn. On the other hand, reference to aerial photographs held at Cambridge suggested that the south ditch ran straight across the zone under threat without any turn. A particular aim of the excavation was thus to determine the true alignment of the ditch.

The ditch was first located close to the eastern boundary of the plot (Area 1989–1). It lay immediately below topsoil, about 2 m north of the Ordnance Survey line. The ditch was 2 m wide and 0.6 m deep from the Roman ground surface (illus 23.i). The fill was of grey silty material (layer 3) overlain by a buff sandy/earthy mix (2) and the modern topsoil (1).

The alignment of the ditch was picked up again below the planned house itself (Area 1989–3). Initially it seemed that an orange sandy clay subsoil hereabouts was undisturbed here, but continued investigation established that this was a redeposited layer 0.2 m thick overlying the

actual subsoil, which was a clean yellowish sandy clay. The ditch as revealed in Area 1989–3 was 1.2 m wide and 0.6 m deep, with rather steep sides (illus 23.iii). The fill here seemed to have formed in distinct layers separated by vegetation lines. A large boulder (6) was sited in the bottom of the ditch; layers of fill had formed against it: charcoal material (layer 5) and light grey fill (4), overlain by sandy fill (3), an orange sandy earth (2) and topsoil (1).

The ditch was again located in Area 1989–2, where it was only 1.1 m wide and 0.5 m deep (illus 23.ii). Greyish-buff fill (layer 5) was overlain by clean grey fill (layer 4), then mixed grey fill (3), which had been covered by orange-buff sandy clay (2), under the present topsoil(1). North of the ditch, a layer of cobbling overlay the subsoil. The purpose of the cobbling is unclear, but it may well have been inserted in Roman times. No trace of the camp rampart was revealed in any of the trenches.

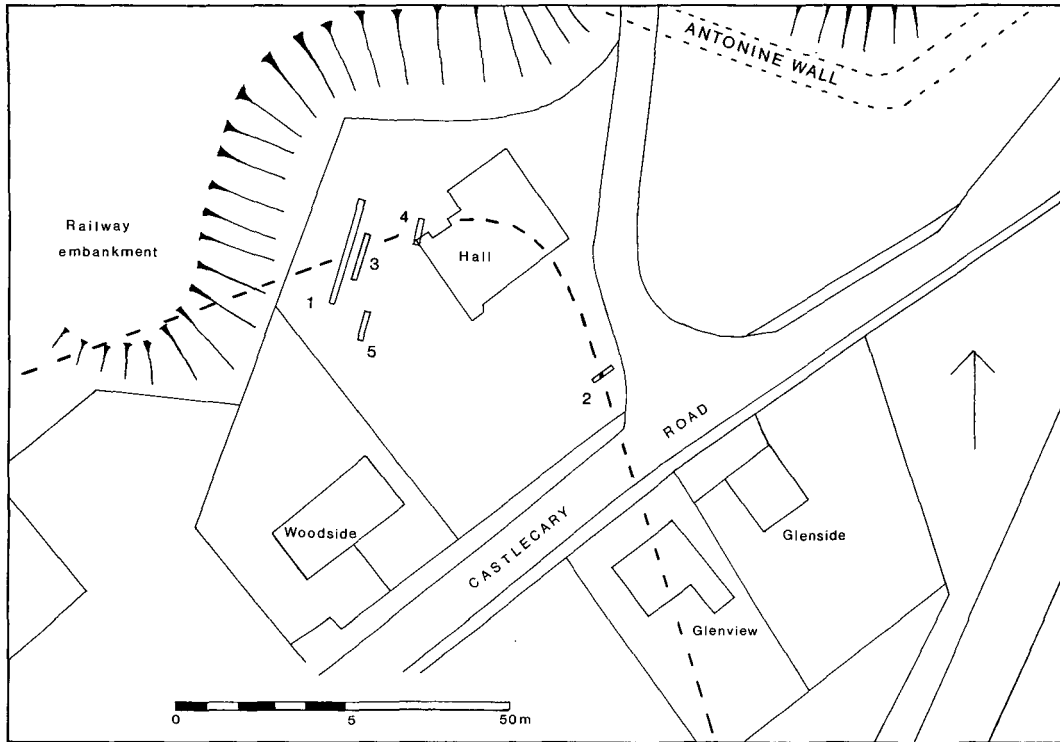
The ditch ran in a straight line, though it became noticeably narrower towards the west. Between Area 1989–2 and the western edge of the plot, only one small trench (Area 1989–4) could be excavated because of the difficult nature of the ground: a newly laid sewer hampered investigation, and to the west lay the present access track, recently resurfaced. Below the latter was an earlier track, which lies on the line of a mineral railway serving now disused lime-kilns. This trench (Area 1989–4) revealed the ditch once more and confirmed its alignment. The ditch had been cut by a stone-filled hollow running north/south, of uncertain but clearly post-Roman date.

A Queen Victoria halfpenny of 1863 was found lying on top of the upper layer of clay in Area 1989–3. It is understood that the field was used by heavy vehicles during construction of the adjacent A80 trunk road in the 1960s.

South of Castlecary Road, April 1990

L J F Keppie

Shortly after the completion of the above work, it was learned that another bungalow was to occupy the plot immediately to the west. A second excavation took place, in virtual continuation of the first, to pursue the alignment of the camp's southern ditch (illus 21). This was located at four different points in the threatened area, but the corner again proved elusive. In Area 1990–5 (trenches were numbered consecutively from those dug in 1989), the ditch was 1.3 m wide and 1 m deep from the Roman ground surface (illus 23.iv). The fill was of a light grey silty material; several phases were observed: greyish-brown silty soil (layer 5), was overlain by vegetation layers (4), below grey silty soil (3). More recently, a layer of hard-crushed whinstone (2) had been laid down, now covered by topsoil (1). Crossing the north end of the area from east to west was a broad sewer trench. Further trenches, straddling the course of the sewer, were cut further west, in the hope of detecting the south-west corner-angle of the camp. In Area 1990–6 the sewer had destroyed much of the north face of the ditch; the estimated overall width was probably about 1.7 m, and it was c 0.2 m deep. At the bottom was a narrow slot. Prior to the modern disturbance, the ditch had already been cut into by a stone-filled channel running north/south, similar to one observed in 1989. The south edge of the ditch was found in Area 1990–6a, and its north edge in Area 1990–6c, together with enough of the south face to establish its overall width as about 1.7 m. The fill was again of a light grey silty material. A slight change of alignment in Area 1990–6c may presage the corner which must now be presumed to lie to the north-west mainly below Castlecary Road.



ILLUS 22 Garnhall 1 camp: plan of trenches 1992, north of Castlecary Road. (Based upon the Ordnance Survey map © Crown Copyright)

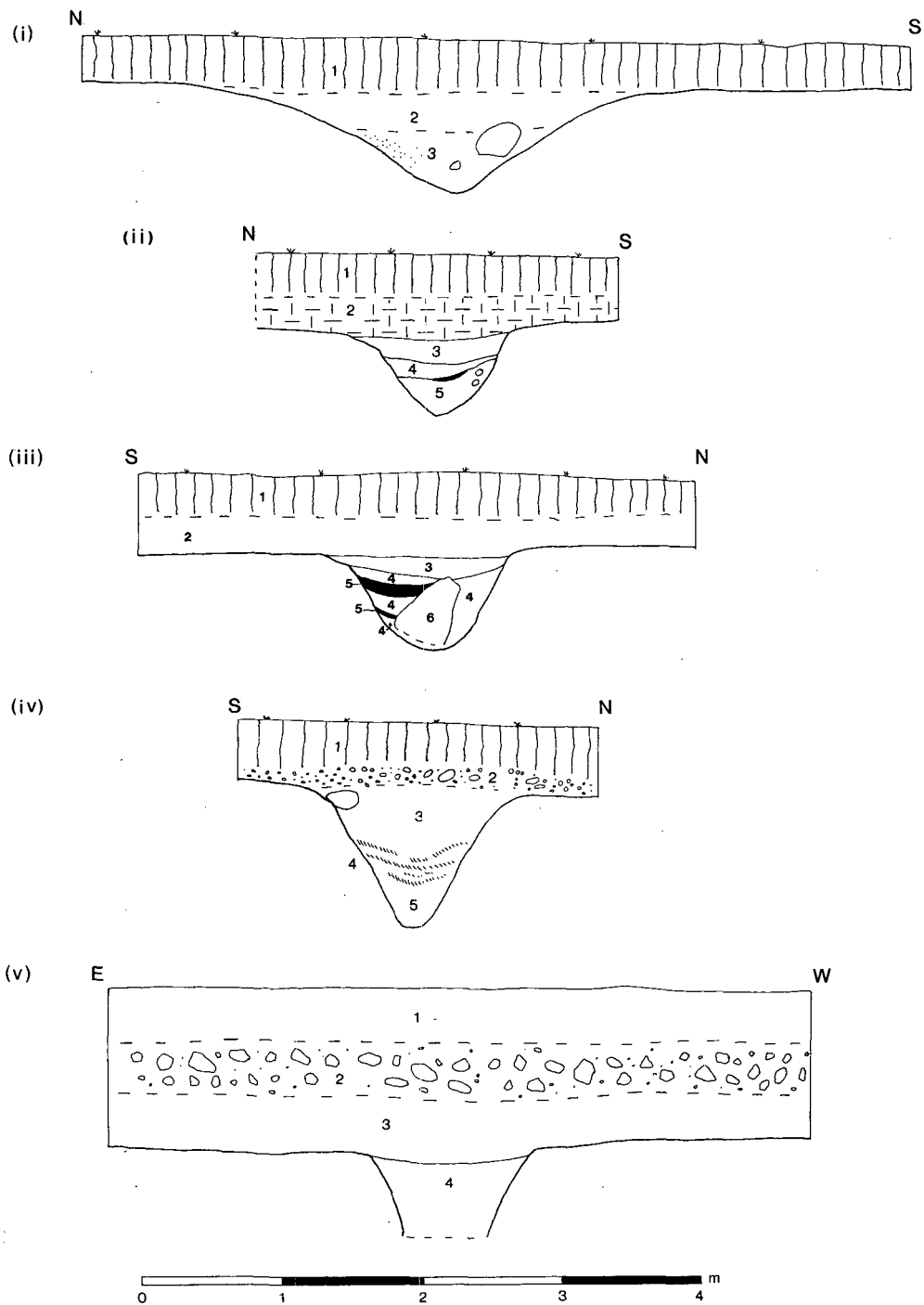
Village Hall, north of Castlecary Road, January 1992

L J F Keppie

A two-day excavation examined a plot of ground, formerly the site of Castlecary Village Hall and Social Club, in advance of housebuilding (illus 22). If the tentative reconstruction of the camp's ground-plan was correct, this plot contained part of the camp's north and east sides, and its north-east corner. The aim of the excavation was to confirm the location of the camp's defences and, if possible, to establish the relationship between the camp and the adjacent Military Way.

The course of the camp's east ditch was established (Area 1992-2) close to the access road leading to the Avonside Homes factory. The ditch was located at a depth of 1.2 m from the modern ground surface (illus 23.v). It had a width of 1.15 m and was excavated to a depth of 0.6 m. The exposed fill was a uniform grey silty soil (layer 4), topped by sandy soil (3). The ditch here had survived below layers of soot, cinders and rough stones (2), which had once formed the hard-core bottoming for a car-park adjacent to the Village Hall, and some topsoil(1). Other disturbance was evident. There was no trace of a rampart accompanying the ditch. A dramatic encounter with unmarked telephone cables and the presence of live electricity cables close to the access road made further work in this area ill-advised, and thus the corner-angle itself was not located.

Attention was then directed to a search for the ditch forming the camp's north side, whose course was projected east from the known alignment. Several trenches were cut by machine on the



ILLUS 23 Garnhall 1 camp: ditch-sections 1989-92: (i) east side of Area 1989-1; (ii) east side of Area 1989-2; (iii) west side of Area 1989-3; (iv) west side of Area 1990-5; (v) south side of Area 1992-2

likely alignment (Areas 1992–1, 3–5), where it entered the plot from the west. Although a V-shaped cut 1.1 m wide was detected at one point, it appeared to be a localized feature, not of Roman origin. The Roman ditch was not found. It seemed very likely that the construction of the adjacent embankment for the Glasgow–Edinburgh railway line, where it crosses the Red Burn on an imposing viaduct, had considerably altered the ground surface throughout the area under inspection. A spread of cobbles edged to the south by very large boulders was discovered (in Area 1992–3) on an alignment parallel to the Antonine Wall, which lies some 35 m to the north. At first identified as the Military Way, it is more likely to represent an access road leading to the railway embankment whose construction can be dated to 1841.

The ground surface over the whole area had been substantially disturbed by the construction and subsequent demolition of the Village Hall, the debris from which is reported to have been tipped into a specially dug pit nearby. A single trench close to the western limits of the Hall (Area 1992–4) revealed loose building debris to a depth of at least 1 m, before work stopped on safety grounds. The excavation was thus only partly successful. However, since the ground may have been made up hereabouts, the ditch could well remain undisturbed by the imposition of the new houses.

South of Castlecary Road, October 1993

K Speller

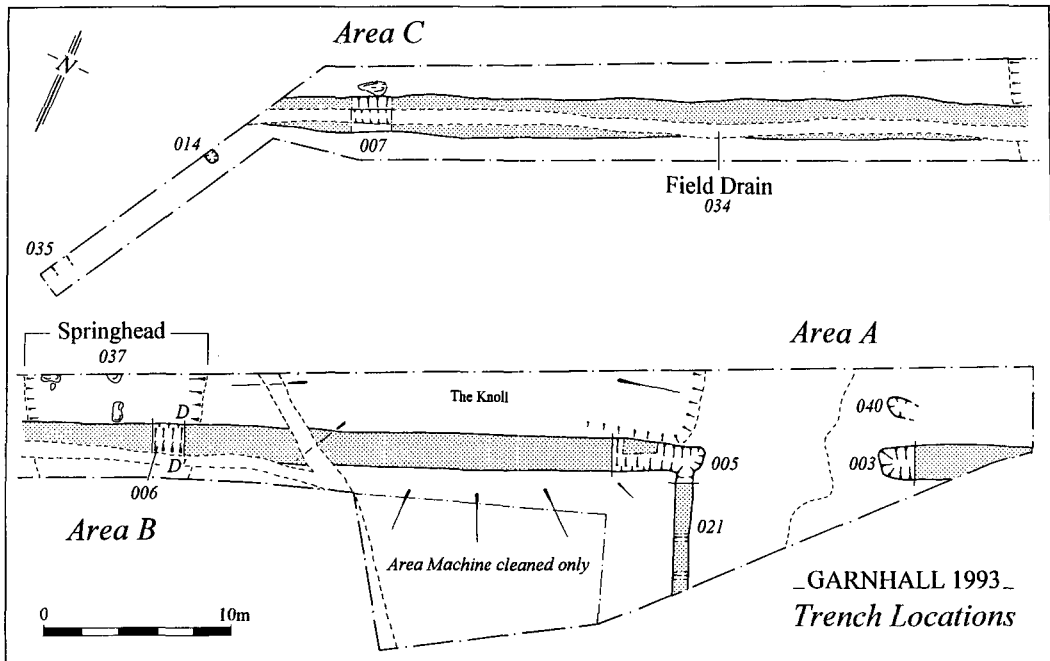
DESCRIPTION

In advance of an extensive housing development, a total of 82 m of the south perimeter ditch of the camp was uncovered by machine, of which 11 m were fully excavated (illus 20, 24–26). The perimeter ditch cut through a waterlogged area and then climbed a small promontory or knoll, capped with a morainic dump of clays, sands and large stones, before falling away to the east. The entrance area was situated off the east slope of the knoll. South-east from this point the ground fell away more sharply into the valley formed by the Red Burn.

SOUTH ENTRANCE (AREA A)

The entrance area was formed by a break of 9 m in the perimeter ditch (illus 24–25). On excavation, the two opposing terminals (003 & 005) were similar in plan, the cut curving inwards to form a sharp return angle on the internal side. Both terminals contained an intermittent, eroded slot along their bases. The cross-section of 003 (illus 25) showed a roughly symmetrical V-shaped profile. The ditch was 1.55 m wide and 0.8 m deep. The longitudinal cut of 003 was c 45°, gently levelling out at the base. The cross-section of terminal 005 was also a V-shape, with the external cut slightly the steeper of the two. The longitudinal cut formed a more gentle slope of c 35°, but with a more abrupt change in angle at the base. The internal return of 005 formed, in plan, a very sharp angle, descending in a dead-straight line to the base of the ditch.

The primary fills of terminal 003 (019, 020; see illus 26, section A-A¹) comprised an orange and brown clay/silt and sand mix, derived from the surrounding subsoils, which were very loose and unstable at this point, making the exact edges of the upper reaches of the cuts difficult to find. The subsequent fills (016, 017 & 018) comprised a series of wind- and water-borne clay/silts, predominantly grey in colour, with a gradual increase in organic content throughout the sequence. The top fill (008) was a truncated ploughsoil, a continuation of the B Horizon (002), slumped into



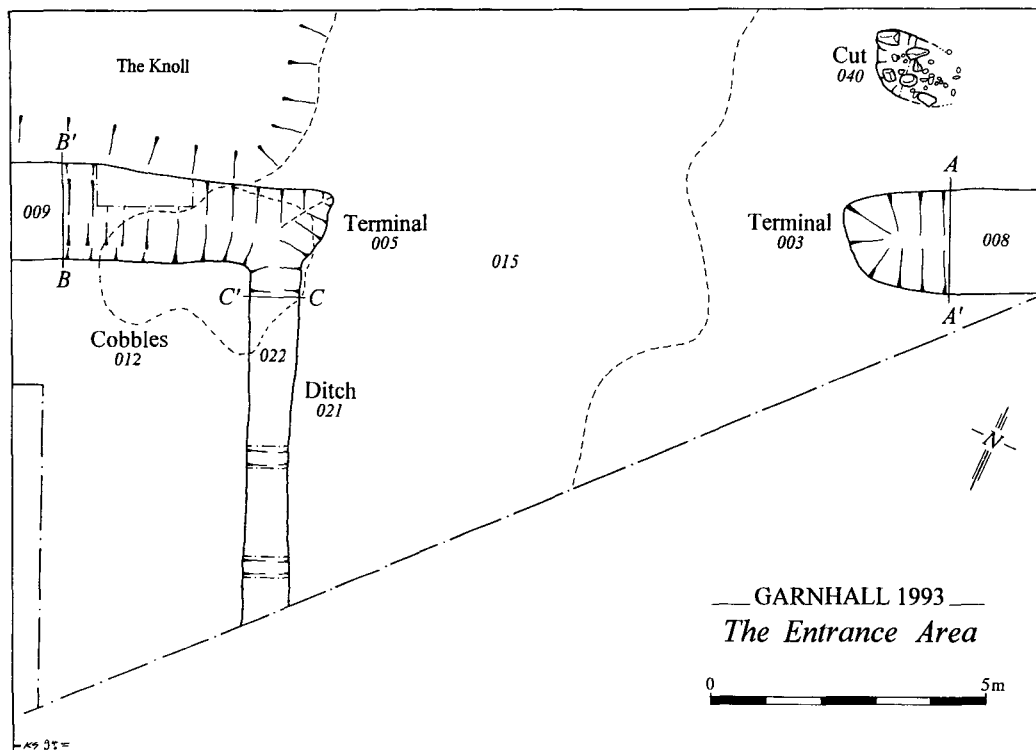
ILLUS 24 Garnhall 1 camp: entrance area, south side, 1993

the top of the ditch. All fills were well sorted, containing few small stones. Silting patterns were approximately even from both the internal and external sides.

The primary fills of terminal 005 (025 & 026; illus 26, section B-B¹) comprised moderately stony, grey/brown clay/silts with sandy inclusions, derived mostly from the very loose and unstable stones and subsoils forming the southern slope of the stony knoll, at the section point rising c 0.5 m higher on the internal side of the ditch. The unsorted nature of these fills indicated that they had largely slipped in, probably relatively quickly. (This phenomenon was actually observed whilst the ditch lay open during excavation.) The later fill (024), a well-sorted grey clay/silt, formed the bulk of the ditch fill at this point, silting predominantly from the internal side. Towards the terminal, a layer of cobbling (012) overlay the upper fill (024) and is described below. The uppermost fill (009) was again a truncated ploughsoil. There was no evidence for the survival of any internal rampart. The ditch itself, on line B-B¹, was 1.5 m wide and 0.8–0.9 m deep.

Extending south from the western terminal 005, and evidently contemporary with it, was another ditch (021). This straight, linear feature was visible on aerial photographs (CUCAP, JS 2 & XH 35), running for at least 60 m downslope before being obscured by trees. The profile was an eroded V-shape, the eastern cut being the steeper. The ditch was cut to the same depth as 005 at their junction, but became shallower to the south, and was only c 0.25 m deep where it ran out of the excavated area.

The basal fill (023; illus 26, section C-C¹), continuous with the basal fill 025 in segment 005, was a predominantly grey clay/silt, almost stone free. The upper fill (022) comprised a bright orange, hard-packed sand and gravel mix with silty inclusions. Both the high ferric content and the compacted nature of the fill (022) were due to the overlying stone spread (012), here at its thickest,



ILLUS 25 Garnhall 1 camp: details of entrance area, south side

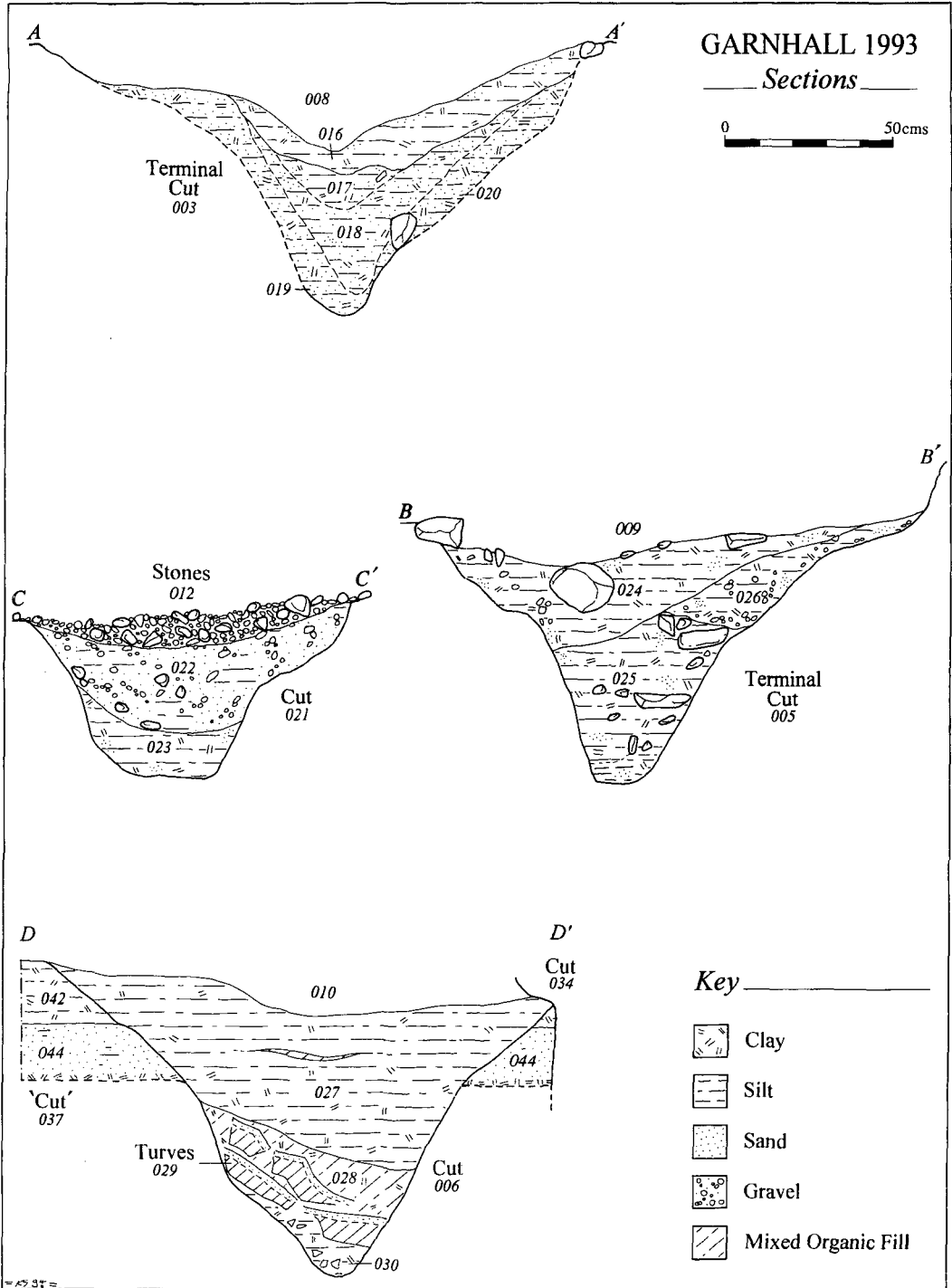
which had slumped into the top of the ditch (see below). Neither the perimeter ditch, nor ditch 021, showed evidence of re-cutting; they appeared to be contemporary. The ditch, on line C-C', was 1 m wide and 0.5 m deep.

The area between the two ditch terminals comprised a series of banded subsoils. Of note was a broad band of terrace gravel (015), eroded out of the west slope of the valley side. This band was visible on aerial photographs (CUCAP, JS 2 & XH 35); it formed a very hard-packed strip, running at an angle between the two ditch terminals. Partly overlying 015 and the fills of ditch 005 and gully 021 was an amorphous patch of small, rounded and compacted stones (012), covering an area of c 6 sq m.

If there was a *titulus*, it was not encountered in 1993. It may have been destroyed during construction of the A80, but no evidence for a *titulus* appears on aerial photographs.

SOUTH PERIMETER DITCH WEST OF SOUTH ENTRANCE (AREAS B, C)

A stretch of the perimeter ditch (Area B at 006), immediately west of the knoll, in a waterlogged area, was selected for excavation. The ditch profile (illus 26, section D-D') formed a V-shape, slightly steeper on the external side, with the remains of a narrow slot at the base. The ditch at this point cut through the fills of a waterlogged area (037), sloping gently to the south. This area had a definite edge on its west side. The east perimeter was formed by the stony knoll described above.



ILLUS 26 Garnhall 1 camp: ditch-sections, south perimeter ditch and south gate, 1993

Two similar profiles were recorded within the 2 m length excavated. The primary fill (030) was a mid-grey clay/silt, containing occasional small to medium-sized angular stones. Lying directly above 030, throughout the excavated area, were a number of dark brown, highly organic and fibrous rectangular blocks (029), interleaved with narrow strips of brown leached silt/sand, having entered the ditch from the interior. A more mixed variation of 029 formed the overlying fill (028). These primary fills were overlain by the main bulk of the ditch fill (027), a fine, stone-free water- and wind-borne clay/silt becoming lighter in colour towards the top of the fill. A ploughsoil-derived light-brown clay/silt with sandy inclusions (010) formed the top fill. All the fills except 010 were waterlogged, water constantly entering the cut during excavation.

The waterlogged area had as its fill a series of mixed and highly gleyed dark brown clay/silts (042 & 043), containing a high organic and humic content. Below these, an abrupt change took place revealing a moderately compacted, leached and clean grey/white coarse sand with silt inclusions (044). This layer remained pure for c 0.1–0.15 m before merging gradually with the clay/sand C Horizon, there being no distinct basal cut. A number of large, smoothed and rounded boulders were visible protruding from 042.

A further length of the ditch was excavated towards the west end of the opened area (Area C at 007). This stretch of the perimeter ditch was disturbed by a massive field drain (034), cutting away the southern portion of the ditch fills and cut. The northern edge of 007 cut through the southern side of a large stone or natural rock outcrop, in order to maintain the straight line. Apart from the camp ditch and later field drain 034, no archaeological features were recorded between areas B and C, and no rampart remains were observed.

Undisturbed fills survived only within the northern portion of the cut. The basal fill (039), a grey/brown clay/silt containing small and medium-sized angular stones, was derived from the surrounding natural subsoils, here as in segment 006 comprising a blue/grey clay/sand mixture. Overlying 039, an intermittent dark grey/black, clay/silt fill, c 0.05m thick on average and with a high organic and charcoal content (033), was exposed throughout the segment. Above 033, a light grey fine clay/silt (032) formed the bulk of the ditch fill. The primary fills all sloped in from the interior. Water persistently entered the cut during excavation, mostly from the field drain. Further west two uncertain features were plotted south of the ditch itself (illus 24; 014, 035).

DISCUSSION OF 1993 EXCAVATION

In total, four lengths of the camp ditch were excavated in 1993. All the profiles were broadly similar, showing the V-shape normally associated with Roman military ditches. Variations in slope and angle tended towards the outer cuts being relatively steeper, in line with the presumed construction technique, involving throwing earth up into the interior, to form the defensive rampart.

The ditch fill types and silting sequences were all broadly similar; silting primarily and predominantly occurred from the interior, initially as a rapid series of events, ie slippage or dumping of the rampart and erosion of the ditch sides, subsequently slowing as the ditch was gradually filled by soils washed and blown in over many centuries.

The fibrous blocks observed in Area C (at 006) may be interpreted as turves. Their presence may be explained by the much higher anaerobic conditions prevailing here as a result of the permanent saturation of the lower ditch fills, caused in the main by feature 037. Whether these turves were thrown into the ditch, or whether they subsequently slipped in under natural erosion of the rampart and ditch edge, is debatable. Another possibility is that they belong to a repair of the rampart at this point, perhaps due to subsidence caused by area 037. The bulk of the evidence

suggests that the camp ditch was not backfilled by pushing the rampart back into the ditch. Apart from the small amounts of initial backfill deposits contained within the ditches, derived mostly from the soft subsoils through which the ditch had been cut, the bulk of the silting displayed the homogeneity normally associated with natural backfill sequences (see above). Backfill by dumping would have provided a more mixed and heterogeneous fill with no particular silting sequence. A dumped backfill hypothesis may be offered as an alternative in 005, although natural slippage from the very fragile and higher knoll described above is the more likely cause.

The fill 033 in cut 007 with its high charcoal content suggests that, at a time when the ditch was only partially silted, relatively shortly after the abandonment of the camp, burning of materials, possibly within the confines of the ditch itself, took place. By implication, this would also suggest that the rampart was still largely *in situ* at this time.

The waterlogged area west of the south entrance is interpreted as a springhead. The downslope direction of the feature together with the smoothed boulders indicating water movement over a long period of time, in addition to the high water-table in this area, probably signifies the beginnings of a burn feeding into the valley of the Red Burn, directly to the south of the site. Presumably this feature was not seen as an obstacle to the camp builders, as no attempt had been made to consolidate the ground. It would not have been a problem to move the ditch northwards by a few metres to avoid the spring. Also it is notable that any subsequent flow during or after occupation would quite quickly have formed an erosion channel through the ditch segment; but none was visible.

The series of features forming the entrance to the camp are interpreted as a single phase construction, with no evidence of re-cuts to the ditch terminals. The gully 021 was perhaps dug to aid the drainage downslope of water building up from the western extent of the camp ditch, this being too much for the terminal area to hold, the problem probably exacerbated by feature 037. Presumably no twin gully to 021 was deemed necessary for the eastern terminal 003, as water would have drained away from the terminal to the east. Alternatively, but perhaps less plausibly, the gully served to enclose an annexe, linking the camp to the adjacent Red Burn.

The amorphous stone spread 012 is obviously much later than the camp and no interpretation is offered. The slumping of these stones into the tops of 005 and 021 may be the result of settling of the ditch fills or alternatively could indicate that a slight depression was still visible at ground level at the time of deposition.

No evidence for the *in situ* survival of an internal rampart was retrieved, although displaced turf blocks were present in the primary ditch fills. There was tentative evidence for the extended occupation of the site in the form of rampart repair, which would help support the theory that Garnhall was a construction camp. After abandonment of the camp, it is argued that the ditches silted up through natural processes, although some evidence suggesting a dumped backfill is present. Potentially good environmental evidence was retrieved in the form of bulk and profile soil samples from selected ditch fills and from the waterlogged area through which the ditch was cut.

CONCLUSION, 1989–93

L J F Keppie & K Speller

Excavation work in 1989–93 at Garnhall has established that the camp measured c 280 m east/west by c 170 m north/south, giving an area of 4.76 ha, a little larger than hitherto supposed. There was no evidence of more than a single phase of use beyond minor repairs. The date of the camp was not established. The camp clearly had a close relationship with the Antonine Wall itself. It lay

parallel to and immediately adjacent to the Military Way. It is also positioned very close by the Wall fort at Castlecary. Upwards of 20 camps, ranging in size from 1.4 ha to 5.1 ha, have been located by aerial reconnaissance in close proximity to the line of the Antonine Wall (Hanson & Maxwell 1983b, 117ff, 124ff, table 6.3). They are thought to have housed troops engaged on the construction of the Roman frontier line, and their distribution has been studied in relation to work-sectors as evidenced by the distance slabs (Keppie 1979) and by variations in the construction of the stone base, superstructure, berm, and ditch observed by ground observations and archaeological excavations over many years (Keppie 1974). A second camp at Garnhall, 600 m to the west, occupies higher ground and may indeed underlie the Wall itself (Hanson & Maxwell 1983b, 118, but see now *Britannia*, 26 (1995), 334).

In a paper discussing the construction of the Antonine Wall, Maxwell viewed the Garnhall 1 camp as marking the west end of a relatively short sector of the Wall, between Castlecary Village and Seabegs Wood, with a camp at Dalnair marking the east end of the sector (Maxwell 1974, 329). Hanson & Maxwell (1983b, 188) subsequently drew attention to the possibility that Garnhall should be seen as housing a construction party engaged on the nearby fort at Castlecary. Against this latter view is the fact that the camp is separated from the fort by a deep river valley. It is important also, in the local context, to assess the function of the camp in relation to the Military Way. The line of the latter (see illus 20), if projected east from its last known alignment on farmland (Macdonald 1934, Plate XXI B), would intersect with the Antonine Wall just west of the Red Burn. Therefore the road presumably either diverted to the south, and crossed the defences of the Garnhall camp near its north-east corner, or respected the camp's position and turned sharply south in the gap between it and the Wall. No evidence for the Military Way was found during excavation in 1992.

13 NETHERCROY (NS 721764–725762) (ILLUS 27–32)

L J F Keppie

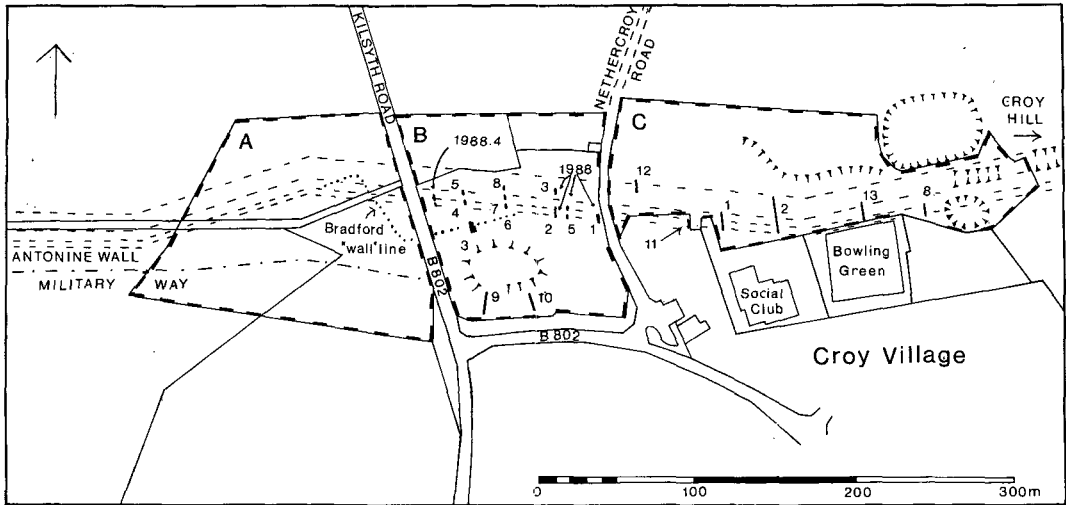
INTRODUCTION

Extensive landscaping is proposed to improve the attractiveness of a zone north of Croy Village, between the Kilsyth Road (B 802) and the start of that stretch of the Antonine Wall over Croy Hill, which is held in care by the Secretary of State for Scotland. Three distinct areas, in line from west to east (see illus 27), were earmarked for improvement: A (to the west of Kilsyth Road), B (between Kilsyth Road and Nethercroy Road), and C (between Nethercroy Road and the west slope of Croy Hill). Exploratory excavation took place in 1988, followed by a resistivity survey in 1989, and larger-scale excavation work in September 1990.

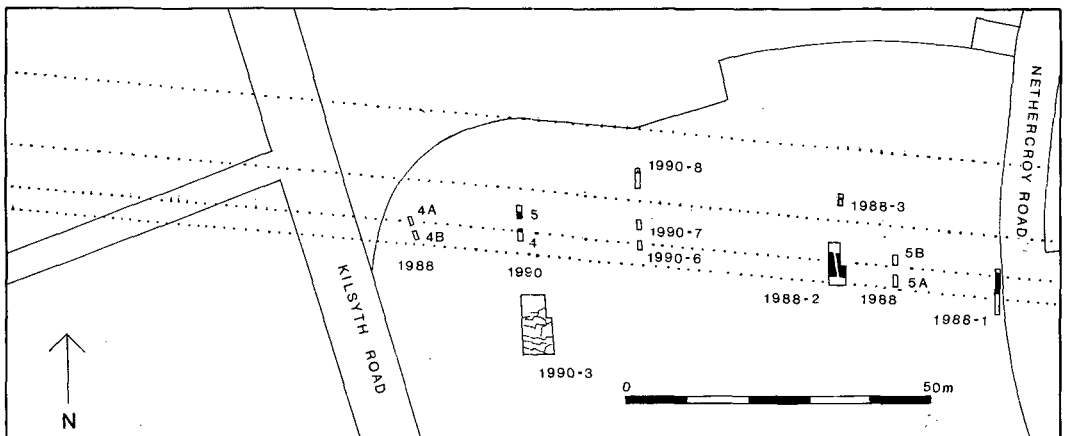
DESCRIPTION

Wall and Ditch at Nethercroy Road, 1988

Attention was directed first towards a field bounded on the east by Nethercroy Road and on the west by Kilsyth Road (Zone B). Sir George Macdonald (1934, 145) traced the wall base across this field in 1931, noting that its width was less than the norm of 14 ft (4.3 m), being at one point no more than 12 ft 8 in (3.9 m) wide. It is not clear how extensively the field has been ploughed since then, but small-scale quarrying is likely to have taken place immediately to the south, where rock



ILLUS 27 Nethercroy: general plan of excavated areas, 1988-90. Dashed lines represent Ordnance Survey alignment of the Wall and Ditch. Dotted lines show the route suggested by geophysical survey. The 1988 trenches indicated by year, 1990 trenches by area number only. (Based upon the Ordnance Survey map © Crown Copyright)



ILLUS 28 Nethercroy: plan of trenches between Kilsyth Road and Nethercroy Road, 1988-90 (Zone B), showing Wall and ditch as located; current Ordnance Survey alignment shown in dotted lines

comes close to the surface. Something can still be seen, towards the west end of the field, of the north slope of the ditch and the ditch-upcast. A particular reason for directing special attention towards this zone was the fact that it lay midway between the forts on Bar Hill and Croy Hill, and might be thought suitable for an interval fortlet. The alignment of the frontier here changed direction twice for no obvious reason.

The base was detected immediately west of Nethercroy Road (illus 28), at a depth of 0.4 m, on the line shown on current Ordnance Survey maps (Area 1988-1). The north kerb survived, as did part of the core, to a width of 3.9 m. Further south were scattered stones, and a single large kerb-stone, which seemed unlikely to be in its original position.

The stone base was further investigated some 30 m further west (Area 1988–2), where the south kerb was found intact, together with a substantial part of the core (illus 29). The base incorporated a culvert, the presence of which was not immediately obvious, as the stone base was here crossed by a firmly rammed pebble track, c 2 m wide, running from NW/SE. At first it seemed likely that this rammed pebbling was of Roman date, in that it lay directly on top of the base, without any turfwork intervening. However, it soon became clear that the track had been laid down after the north kerb of the stone base and the capstones of the culvert had been removed or lost, and the culvert itself had silted up. Some of the edging stones flanking the culvert were visible through the pebbling. Small finds suggested a date of about c AD 1600 for the use of this path, which would indicate that the superstructure had been entirely lost by that date.

The culvert itself was 0.2 m wide and 0.1–0.2 m deep. Though the soft sandy fill was only partly removed, there seemed to be no basal slabs present except at its north end. The neat north edge of the most northerly surviving basal slab may indicate the original position of the north kerb of the Wall base itself, now lost. If so, then the base had a width of c 4.15 m. No turfwork survived above the stone base, and of turf slip only a few small lumps were noted. Nothing was found to indicate the presence of any installation or fortlet. Some 7 m further east, a narrow trench confirmed the alignment of the south kerb (Area 1988–5), but the north kerb was again robbed away. The south lip of the ditch was located north of Area 2; the berm seemed to have a width of about 9 m (1988-Area 3). At the extreme west end of the field, two small trenches were dug on the presumed line of the stone base (1988-Area 4) but natural rock was soon encountered, with no trace whatever of laid stonework.

Nethercroy: geophysical survey

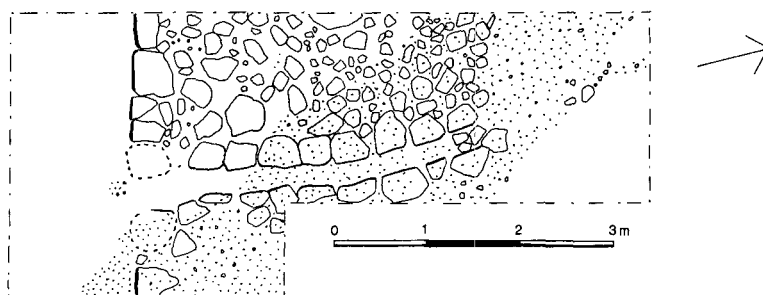
Early in 1989 a team from the School of Archaeological Sciences, University of Bradford, examined Zones A and B (Zone C, which was largely a desolate wasteland with disused quarries, refuse and coal yards, was considered unsuitable). The geophysical survey, undertaken with a Geoscan RM4 resistance meter, in extremely adverse weather conditions, indicated an alignment for the Antonine Wall radically different from that shown on current Ordnance Survey maps, but yet seemed to agree with the results obtained by excavation in 1988 (see illus 27).

Nethercroy: Wall, Ditch and Military Way, September 1990

In 1990 Strathclyde Regional Council decided to exclude Zone A from its environmental improvement plans, so that the aim of the follow-up excavation was restricted to establishing the alignment of the various elements of the Roman frontier in Zones B and C, and to determine which features visible in the landscape were associated with it.

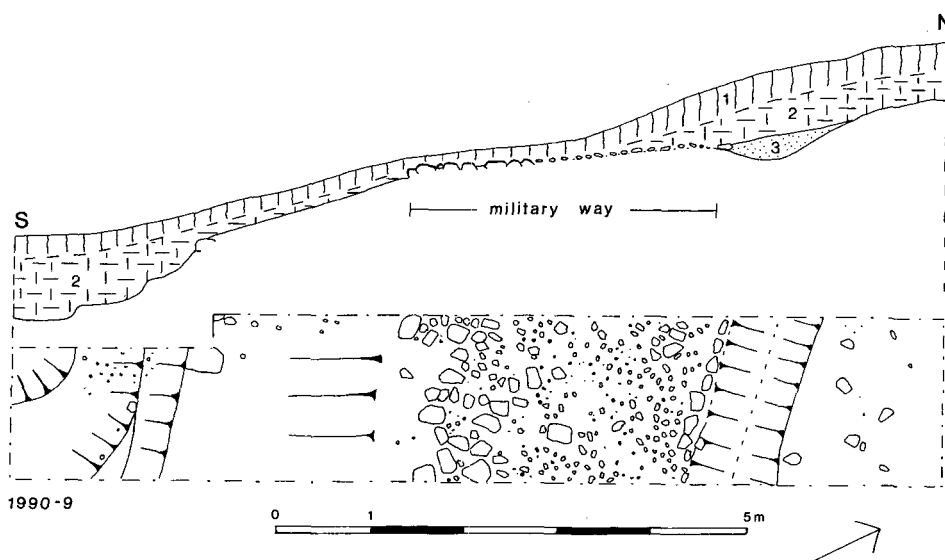
The work in Zone B was designed primarily to test the validity of the results of the geophysical survey (illus 27). A large area (1990–3) was opened up by machine on the projected line of the Wall, at a point where a subcircular feature attached to its south side had been noted by the Bradford team. Excavation, however, indicated that the ‘Wall’ recorded by geophysical survey was, in fact, a ridge of rock running east/west close to the surface of the field. The subcircular feature seemed also to be natural in origin, the result of undulations in the underlying bedrock. Certainly no archaeological remains were observed.

The line of the Antonine Wall was subsequently established first by probing, then by small-scale excavation (Areas 1990–4, 1990–5). The stone base was 4.2 m wide and was built of well-cut kerbstones enclosing a rubble core. It lay at a depth of 0.4 m from the modern surface. No



1988-2

ILLUS 29 Nethercroy: plan of Area 1988-2, showing stone base interrupted by culvert, and crossed by later pathway (stippled)



1990-9

ILLUS 30 Nethercroy: plan of Area 1990-9 showing the Military Way, and a section of its west side, from south to north. Note: 1 = topsoil; 2 = clayey soil; 3 = side-ditch

turfwork remained from its superstructure. Some 20 m to the east, again on the traditional line of the Wall, the base was absent (Areas 1990-6/7) but the south edge of the accompanying ditch was located (Area 1990-8).

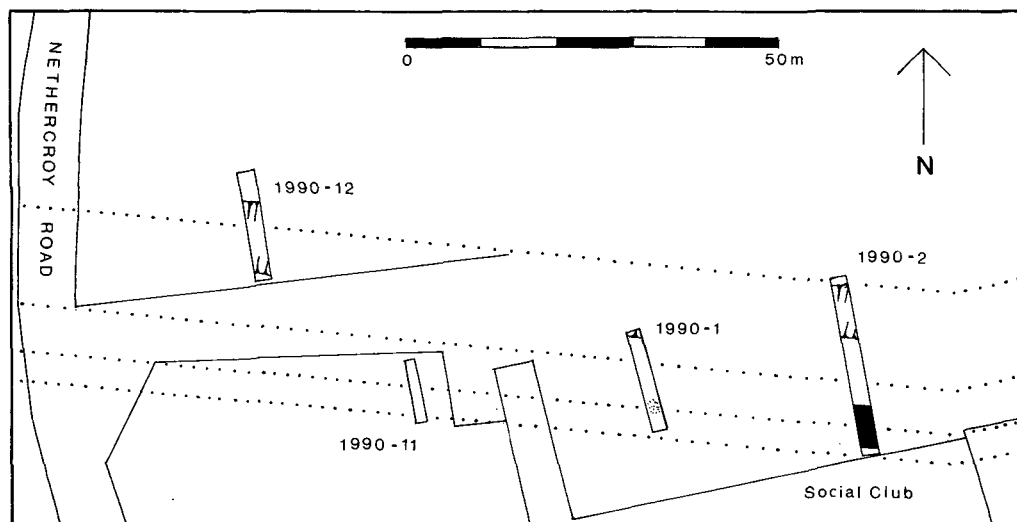
The opportunity was also taken to establish the alignment of the Military Way, which was known to have descended from Giral Hill (where the terracing needed to receive it is a distinctive feature on the north face of the hillside even today) to the Kilsyth Road. Two trenches were placed across likely alignments east of the Kilsyth Road, south of a knoll which occupies the centre of the field (Areas 1990-9, 1990-10). It was hoped that one or both of these trenches might also pinpoint a curving feature noted by G S Maxwell on aerial photographs taken in 1971, whose archaeological significance, if any, needed to be clarified. In the event, the Military Way was

located (Area 1990–9) in line with its course west of the Kilsyth Road. It occupied a shelf in the hillside, below the summit of the knoll, and consisted mainly of small cobbles firmly rammed, with larger stones towards the south end of the surviving surface. It was edged on the north side with carefully laid medium-size cobbles and was there accompanied by a shallow drainage gully 0.8 m wide and 0.2 m deep. The breadth of the road could not be established. Immediately south of the surviving cobble spread, which had a width of 3.5 m, the ground fell away sharply. If the road approximated to its more normal width of about 6 m, considerable underpinning would have been needed to obtain a level surface. There was no evidence of any such revetment, and it remains possible that the road was narrower than usual here, because of the difficulties of the terrain. At the lower (south) end of the trench, a raft of rough stones seemed a modern feature; a halfpenny of George VI was found among them.

In the second trench (Area 1990–10), placed a little to the east, and also designed to pick up the line of the Military Way, a cobbled surface was present, without any recognizable edge. No evidence for a drainage gully was observed. The remains here had suffered considerable plough damage. The feature noticed on aerial photographs by G S Maxwell was not located and may indeed have been agricultural, a possibility allowed for by Maxwell himself.

The area to the east of the Nethercroy Road (Zone C) seemed at first sight highly unlikely to yield significant archaeological remains, given that it appeared to have been so comprehensively disturbed by quarrying and other industrial activities in past decades (illus 31). Sir George Macdonald (1934, 145) traced the line between the quarry and the Nethercroy Road in 1931, noting a slight turn to the north at c 115 m east of the Nethercroy Road itself.

Much of the zone is now covered by tarmac. Close to the east end of the stretch, next to the guardianship zone, the ditch is visible, rock-cut, but is soon interrupted by a series of quarries which have swept away the line of the ditch and part of the berm. (Area 1990-Trench 13 proved negative.) At one point the line of the Wall itself was untouched by the quarrying,



ILLUS 31 Nethercroy: plan of trenches east of Nethercroy Road (Zone C), showing evidence for line of Wall and Ditch. Dotted lines shown alignment on current Ordnance Survey sheets

and a few cobbles remained atop the bedrock, where the base must once have rested, with a small area of burning to its rear; but the ground had been much disturbed in modern times (Area 1990–8a).

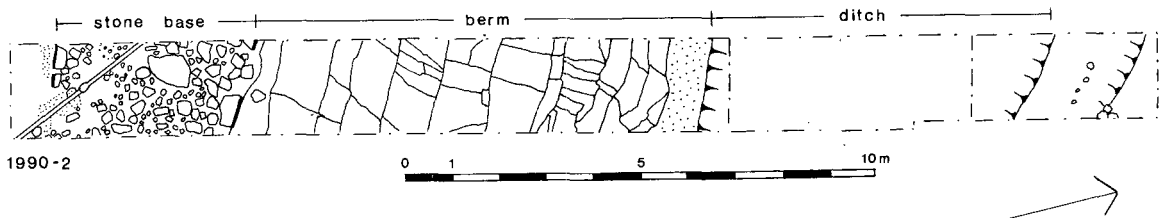
However, further west, immediately north of the Miners' Social Club, the base had survived (Area 1990–2). It has a width of 4.2m (14ft) and was placed just to the south of a natural east/west ridge in the underlying bedrock (illus 32). It was constructed of broken whinstone, with the normal kerbstones to north and south. A very large boulder was incorporated in the core. The northwards slope of this ridge, which may have been 'sculpted' to establish a smoother surface, was utilized for the berm which was about 10 m wide. The ditch began just to the north of the ridge, where the subsoil changed to a red-orange sand. The ditch itself was at least 6.5 m wide. Its fill was not emptied out. As the area immediately to the north had been badly disturbed by the laying of an access road into one of the quarries, it was not possible to make a full examination of the zone north of the Roman ditch. However, in a small area which was accessible, there seemed no evidence for an upcast mound which would be particularly expected here to counter the sharp fall in the ground from south to north.

Further west, the base was increasingly robbed out, but the south lip of the ditch was located on the expected alignment (Area 1990–1). In a section close to the Nethercroy Road, it measured c 9.2m (31 ft) wide (Area 1990–12). Lines of cobbles were found placed on narrow shelves cut just below the lips on the north and south sides, and also into the fill. A fragment of green glazed ware came from nearby. It seemed likely, therefore, that these cobble alignments were put in place in post-Roman times. To the north of the ditch, but separated from its north lip by a gap of 2 m, there began a bank of gravelly material mixed with natural pebbles, rising to a height of 0.3 m, probably to be identified as the beginning of the upcast mound.

DISCUSSION

The excavation in 1988–1990 served to plot the course of the Antonine Wall and associated features over a distance of about 400 m. From the results of the 1988 and 1990 trenches in the field west of Nethercroy Road (Zone B), it can be concluded that the base there lies a few metres north of the Ordnance Survey line. It had been ploughed away across the centre of the field though it survived closer to its east and west limits. No hint was found of the presence hereabouts of a fortlet, but the course of the Military Way was established.

In general, it was difficult not to be impressed by the tenacity of the Roman remains in the face of comprehensive modern disturbance, especially east of the Nethercroy Road (Zone C). Sir George Macdonald in his report on work in 1931 observed that, 'For a length of 350 feet between the turn [see above, p 647] and the eastern margin of the Nether Croy Road, the south kerb was supported by a substantial backing of boulders, which was found to vary in breadth from 1 foot to



ILLUS 32 Nethercroy: plan of Area 1990–2, showing stone base, berm of natural rock and ditch

6, and which was doubtless designed to counteract the exceptional softness of the subsoil' (Macdonald 1934, 145). At first sight he seems to be describing some form of underpinning, such as might well have been required between the rocky outcrops (as at Carleith; see Keppie & Breeze 1981, 242); but more probably he was noting some repairs to the rear of the turf stack, a practice documented several times elsewhere (Keppie & Breeze 1981, 245). There was no confirmation of these observations in the results of the work in 1988–90. The stone base of the Wall was established at 4.15 m west of the Nethercroy Road, with a berm of c 9 m, and was found to be 4.2 m wide east of the Nethercroy Road, with a berm of c 10 m; the ditch there was c 9.2 m wide.

It may be appropriate to finish by indicating which present-day ground features preserve the outlines of the Roman frontier line:

- 1 At the east end of Zone C the rock-cut ditch survives over a distance of about 50 m.
- 2 The northwards slope immediately north of the Social Club undoubtedly represents the berm sloping towards the Antonine ditch.
- 3 In Zone B, the hollow of the ditch can be followed across much of the field.

14 TWECHAR (NS 700759 TO 697757) (not illustrated)

L J F Keppie

A gas pipeline, set in a trench 1 m deep and 0.3 m wide, was laid in April 1992 north along the east pavement of Main Street, Twechar, from the access road towards Bar Farm to the junction with Shirva Road, then west along the south side of that street, into the housing scheme. The line of the Antonine Wall was crossed three times; but observation revealed only that the ground had already been disturbed by the laying of earlier services.

15 KIRKINTILLOCH, COWGATE (NS 653741) (not illustrated)

L J F Keppie

The construction in the town-centre of Kirkintilloch of a 'relief road' running parallel to the Cowgate in December 1988 necessitated a deep north/south cut across the presumed line of the Roman frontier 50–70 m east of the Cowgate itself. Excavation in advance of the construction work had been proposed on and near the site of a disused cemetery, but a safety hazard in the form of the graves of smallpox victims militated against any archaeological investigation. In the event a watching brief was carried out during construction work itself, after the cemetery had been cleared and the area declared safe.

The precise alignment of the Antonine Wall hereabouts is uncertain. The line has to be projected east from its presumed position at the north-east corner of the Peel Park. On this supposed alignment, a shallow V-shaped feature was visible in section on the west side of the cut for the new road at a distance of c 50 m south of the High Street. It was 1.7 m wide and 0.7 m deep. The fill was a dark silty material; no organic remains were noted. This feature could represent the severely truncated profile of the Antonine Ditch, but neither its date nor its purpose could be determined. Among other features noted along the west side of the cut was a possible stone-lined well.

16 KIRKINTILLOCH, UNION STREET (NS 652739) (ILLUS 33–34)

J H McBrien

INTRODUCTION

The existence of a fort at Kirkintilloch (illus 33) has long been suspected (Macdonald 1934, 289). Excavations in Peel Park by Sir George Macdonald in 1914 and by Professor Anne Robertson between 1953 and 1961 revealed many structural features and quantities of Roman pottery indicating the presence of a fort or fort-annexe (Robertson 1964). The Roman remains appeared much disturbed by the construction of a medieval castle ('The Peel') and by modern landscaping. In 1975 a ditch, possibly at the fort's south-west corner, was noted during the cutting of foundations on a building-plot in Union Street just west of the park (Keppie 1975). Excavations on the south side of Union Street in 1978–9 exposed a Roman ditch running east/west with a sharp return to the south, a feature reminiscent of the arrangement of ditch terminals outside the gates of several of the other Antonine Wall forts (unpublished, but see Robertson 1990, 79f; illus 33).

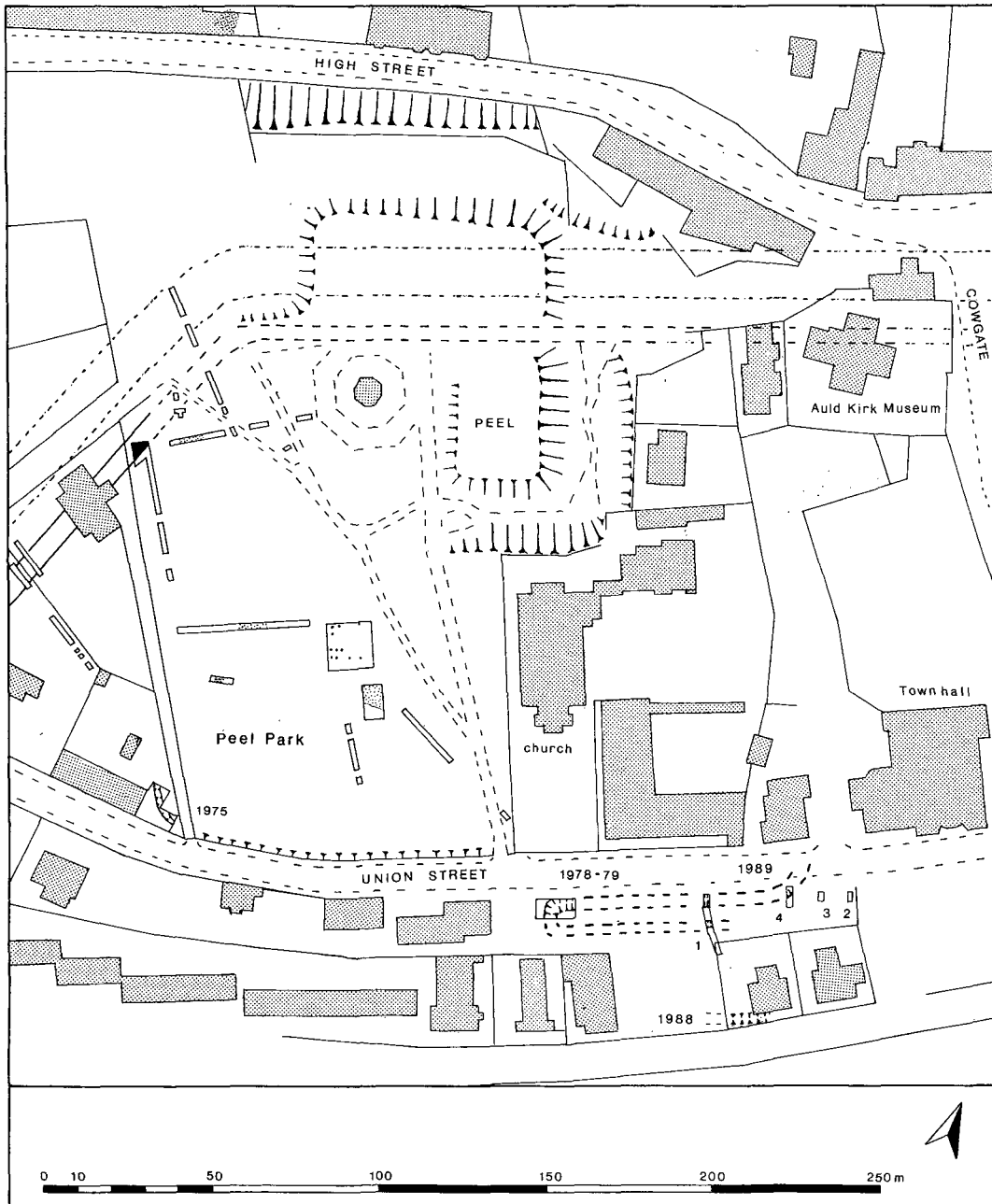
In 1988 the Scottish Urban Archaeological Trust carried out trial excavations (unpublished) on the site of 12 Regent Street, east of the site of the 1978–9 excavation (Robertson 1990, 79f). At the south limit of excavation, a Roman ditch was found running parallel to the alignment of that uncovered in 1978–9, but separated from it by some 30 m. Though the 1988 area of excavation was extended 20 m towards Union Street, no other Roman features were encountered.

DESCRIPTION

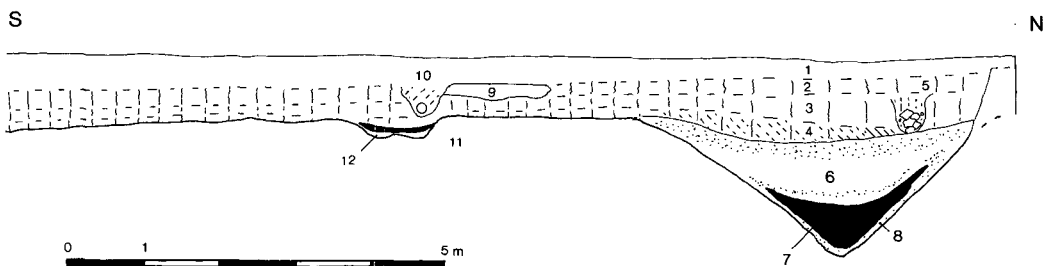
In 1989 demolition and clearance work, in connection with a large-scale redevelopment on the west side of Cowgate, took place in and around the tarmac-surfaced car park on the south side of Union Street. Although time on site was severely limited, it was hoped that it would be possible to confirm the presence of the Roman features previously identified, and to establish their relationship to one another and their extent. A number of trenches were opened, all by machine; for reasons of safety it was necessary to backfill each trench or pit after its recording was complete.

The first area opened (Trench 1) ran from the Union Street pavement, at a point approximately 40 m east of the 1978–9 excavation site, towards the north-west corner of the 1988 area of excavation (illus 34). A ditch c 4.75 m wide and at least 1.75 m deeper than the contemporary ground surface was located. Its lower fills became progressively darker in colour and more waterlogged. A high organic content was suggested by the odour of decaying vegetable matter. Primary silting (illus 34, layer 8) was overlain by highly humic organics (7), and grey silty soil (6); upper fill (4), disturbed by a field drain (5), was overlain by layers of field soil (2 & 3) and made-up ground (1). The alignment and general characteristics of this feature were consistent with those of the ditch excavated in 1978–9.

As excavation continued south, a further feature running east/west was found underlying the orange-brown silty loam. This proved to be a shallow ditch c 1.35 m wide and 0.35 m deep with an uneven W-shaped profile. The upper fill, identified below modern founds (9) and a pipedrain (10), was a medium grey silt up to 0.2 m deep overlying a dark grey, organic-rich silt (11) approximately 0.1 m thick. Once again the primary fill (12) was a fine light grey silt. The uneven bottom of this ditch suggested that it was unfinished. The centres of the two ditches were approximately 5.75 m apart.



ILLUS 33 Kirkintilloch: town centre with evidence for Roman remains. The trenches in the Peel Park were cut between 1953 and 1961 (Based upon the Ordnance Survey map © Crown Copyright)



ILLUS 34 Kirkintilloch: section of west side of Area 1989-1, from south to north

Further east on the line of the main ditch just described, a gentle break in slope downhill towards Cowgate was visible, about 25 m east of Trench 1, and it was hoped that this topographical feature might indicate the position of the eroded rampart of the fort, or that it might have been a natural feature which became a factor in the positioning of the fort on the ridge. Trench 2 revealed only natural till. In Trench 3, three features were identified, at the north and north-east limits of the excavation, cut into the till from near the middle of the developed soil profile. The basal fills of these features were excavated, but no datable artefacts were recovered. The central and west features were small pits with no apparent sign of use. Their purpose therefore remains unknown. The larger east feature was a subrectangular pit filled with a dark brown organic-rich silty loam, possibly a cess-pit. The level from which these three features were cut into the soil profile suggests a late medieval or early post-medieval date for them.

A fourth trench was opened approximately 7 m west of Trench 3 and 18 m east of Trench 1. Again, the modern overburden and cultivation soils were machined off until the natural till was reached at a depth of approximately 1.3 m. The till covered the south part of the trench, but in the north part were found the characteristic grey organic-rich silts which had filled the known Roman ditch further to the west. The lip of this feature ran SW/NE, with a slight indication of a curve. The excavated area was too small to allow the radius of the curve to be measured with any accuracy, but it appeared to be in the order of 8 – 10 m. This was almost certainly the curve of the south-east corner of the Roman ditch identified previously.

Because of the depth of the deposits, excavation of the ditch fills could be carried out safely only by machine. The profile of the ditch side was less steep than that observed in Trench 1, but may be the result of the oblique angle of the cut. During excavation of the ditch fills, a number of roughly dressed sandstone blocks up to 0.45 m in length were found within the grey silts and lying down the slope of the ditch. It appeared that they had been deliberately dumped into the ditch. The maximum depth reached within the limit of excavation was 2.3 m below modern ground level. Sample boxes were driven into the waterlogged deposits exposed in the section to retrieve a staggered column of ditch silts for botanical analysis (see below). There were no small finds.

DISCUSSION

The evidence recovered from Trenches 1 and 4, when added to what was already known, allows a more complete idea of the size and alignment of the Antonine fort to be proposed (illus 33). The ditch present in Trenches 1 and 4 can be identified with that found in 1978-9, as the inner

of at least two ditches defending the south side of the fort. The ditch identified in the 1978–9 excavations, which returned sharply to the south and from which was recovered much artefactual evidence, is most likely to have flanked a causeway outside the south gate of the fort. The south return may have turned again sharply east to form a second, outer ditch some 6 m beyond the first. However, the shallowness of the outer ditch found in 1989 (Trench 1) suggests that this planned double ditch was abandoned before completion. The ditch excavated in 1988 lies a little too far away to form part of a conventional defensive ditch sequence, but may define the southern limit of a small annexe attached to the fort's south side, east of the gate, which itself may be the reason why the second ditch was abandoned unfinished. Alternatively, the 1988 ditch may suggest that the size or shape of the fort was changed during its period of occupation.

Taken together, the 1975 observations and the evidence in 1989 from Trench 4 may provide us with the likely locations of both the south-west and south-east corners of the fort. If it is assumed that the fort's north-west corner was where the Antonine Wall turned sharply south-west in the park, and that the fort was a fairly regular quadrilateral, then it is possible to estimate its size as being approximately 130 m east/west by 110 m north/south giving an area of about 1.4 ha. This is comparable in size to the forts at Castlecary or Bar Hill, and is a large enough area to accommodate a *cohors quingenaria*, a unit of about 480 auxiliary infantry.

The dressed sandstone blocks recovered from the outer slope of the ditch in Trench 4 and some worked sandstone blocks found in the 1978–9 excavations could suggest the deliberate dismantling of stone buildings associated with the fort, and the use of the debris to partially backfill the ditches. This would be further evidence of the slighting of Antonine Wall forts before withdrawal. As the sandstone blocks in Trench 4 were clearly dumped from the outer side of the ditch, it is possible that there was a stone building nearby, perhaps an external bath-house. If this were the case, then it might provide a reason for the construction of a small annexe, one of the possible interpretations of the ditch found in 1988 and discussed above. It is to be hoped that future investigation, in the not too distant future, will contribute to our knowledge of this site before it is further damaged.

BOTANICAL REMAINS FROM THE INNER DITCH

Sheila Boardman & Camilla Dickson

INTRODUCTION

Three peat columns (each c 400 mm by 120 mm by 100 mm), representing the entire profile of the south side of the inner ditch as located in Trench 4, were submitted for palaeobotanical investigation. Of particular interest was whether these fills contained evidence for human sewage, as was found in similar deposits at Bearsden fort (Knights *et al* 1983; Dickson & Dickson, forthcoming). The profiles of the columns were cleaned and six sub-samples (25 ml) were collected from the more promising organic horizons. On the basis of plant remains recovered from these preliminary samples further investigations using plant macrofossils and pollen analysis were undertaken for two lower ditch horizons. These are believed to have accumulated during the Roman occupation. (See below, Appendix 4, which also includes a summary of the results from the assessment of the other ditch horizons.)

PLANT MACROFOSSILS

(APPENDIX 4, TABLE 1)

Sheila Boardman

with assistance from Camilla Dickson

Identifiable remains included cereal bran, small quantities of cereal chaff, and seeds and fruits from a variety of wild species. Also present were fragments of wood charcoal, occasional charred *Hordeum* (barley) caryopses and some smaller charred seeds, fruits and other fragments representing wild species.

The cereal bran generally comprised of hilar fragments with little remaining grain testa. The majority of the testa material from both samples represents either *Triticum* (wheat) or *Secale* (rye). Diagnostic transverse cells which separate these genera (see Dickson 1989) were not preserved on any of the material examined. Much of the bran was so degraded that it could be assigned only to *Triticum/Secale/Hordeum* (wheat/rye/barley). Individual finds of *Hordeum* bran were not recovered. *Avena* (oat) bran also appears to be absent although this ephemeral and virtually transparent material is more likely to be missed during sorting. Comparative evidence from Roman sites elsewhere in Britain and the continent of Europe suggests that wheat was the preferred staple of the Roman military, which they were prepared to transport over great distances, in place of the barley grown by the native inhabitants of North Britain (Dickson 1989).

This combination of bran and small chaff fragments may indicate a coarsely ground wheat flour (cf Dickson 1988). The possibility of its presence here in the human sewage was considered. At Bearsden it was possible to demonstrate using sterol analysis that the bran material had been consumed. The identification of the parasite ova present on the pollen slides showed that this was probably bread eaten by humans. The coprosterol tests carried out at Kirkintilloch were negative (Dr R Anderson, pers comm), and no parasite eggs were found, so it is possible that the bran represents flour being ground on nearby rotary querns, which blew into the ditch, rather than sewage.

Other possibly ground material includes *Bromus* sp. (brome/lop-grass) and cf *Agrostemma githago* (cf corncockle), represented by pericarp and seed fragments. These are similar to finds of *Agrostemma githago* (corncockle) and *Bromus hordeaceus* (lop-grass) from Bearsden which may have been ground along with the corn (Dickson & Dickson 1988). At Bearsden, much larger quantities of bran were accompanied by traces of lentils, beans, dill and coriander, plus the remains of native edible fruits: strawberry, blackberry and raspberry. Excepting *Corylus avellana* (hazel), which was represented by one charred nut shell fragment, other edible species were not found in the Kirkintilloch samples.

The narrower range of plant material may reflect adverse preservation conditions and the small quantities of material preserved from the Roman period, rather than poorer diet generally. The ditch silts were less organic and more mineral rich than those from Bearsden. Assessment of the overlying ditch fills, from above 900–950 mm, has shown a complete absence of the cereal remains associated with the Roman occupation and it is suggested that these levels are post-Roman (see Table 1).

A range of other wild species was present in the samples. Common arable weeds included *Stellaria media* (chickweed), *Cerastium fontanum* (common mouse-ear), *Persicaria maculosa* (redshank) and *Polygonum aviculare* (knotgrass), although these also occur in other disturbed and

open habitats. The pollen analysis (see below) suggests low levels of arable activity locally, and the one and a half charred barley grains hardly provide convincing evidence for widespread local cultivation at this time.

The extent to which local pastoral activity may be reflected by some of the remaining plant material is also problematic. Very local conditions may be represented by *Ranunculus flammula* (lesser spearwort), *Ranunculus* subgenus *Batrachium* (water buttercup/crowfoot), *Rorippa* spp. (water-cresses) and *Glyceria* sp. (sweet-grasses), which probably formed part of the ditch bottom and bank side vegetation. *Juncus* spp. (rushes) and *Poa* spp. (meadow-grasses) may have grown on the ditch banks or in the immediate vicinity of the ditch. These plants can also form part of the seed bank contained within the ditch silts. *Ranunculus acris* (meadow buttercup) was only present in one fill (0.95–1.0 m) and it is tempting to conclude here that some local grazing activity is likely, since this is a pastoral indicator. A range of other species present is also common in disturbed grassland, for example, *Stellaria*, *Cerastium*, *Rumex* (dock), *Galium* (bedstraw) and *Cirsium* (thistle) species, plus *Lapsana communis* (nipplewort) and *Leontodon autumnalis* (autumn hawkbit).

More acidic and boggy or heath conditions are indicated by *Calluna vulgaris* (heather), *Pteridium aquilinum* (bracken), *Potentilla erecta* (tormentil), *Eriophorum vaginatum* (cotton grass/hair's tail), *Carex* spp. (sedges) and *Sphagnum* sp. (bog moss). Rare burnt fragments of leafy *Calluna* (heather) twigs may have resulted from use at the fort. Nearby Lenzie Moss could have provided a source of heather.

Only a few identifiable charcoal fragments were found. These include taxa also represented by pollen at the site: *Quercus* (oak), *Betula* (birch), *Alnus* (alder), *Salix* (willow) and *Calluna* (heather). Additional species (either *Malus* [crab-apple], *Crataegus* [hawthorn], or *Sorbus* [probably rowan]) are represented by Pomoideae charcoal and wood. The charcoal probably represents debris from the fort, which blew into the ditch.

POLLEN ANALYSIS

Camilla Dickson

The analysed samples were taken from the two levels richest in larger plant remains. Although pollen too crumpled or degraded to identify attains 46% of the identified pollen in both samples, it is considered not to affect the interpretation in any serious way. Ditch silts from other Roman forts have produced similar poorly preserved pollen eg Dickson & Dickson (forthcoming). The pollen will represent part of the local and part of the regional vegetation as is discussed below. As the bran fragments identified from the larger plant fragments are frequently indicative of sewage, eggs of intestinal parasites were particularly looked for but were not seen.

Betula (birch) pollen attains 20% and 27% of the total pollen and Coryloid 19% and 14%. Coryloid consists of pollen of *Corylus* (hazel) and *Myrica* (bog myrtle); the best preserved Coryloid grains at this site resemble those of *Corylus*. Together with *Alnus* (alder) at 13% and 6% and *Quercus* (oak) both 7%, they are the main tree types. *Salix* (willow), *Ulmus* (elm), *Pinus* (pine) and *Tilia* (lime) are present as rare grains; *Tilia* grains must represent long distance transport as the tree is not native to western Scotland. The tree pollen attains 61% and 56% of total pollen and suggests a light secondary woodland beyond the cleared area of the Wall.

Poaceae (grasses) at 22% and 24% and low values for the pasture indicators, in particular

Plantago lanceolata (ribwort plantain) and *Ranunculus acris* group (meadow buttercup group), do not suggest heavy grazing. Other grassland types such as Liguliflorae (dandelion family), *Trifolium repens* (white clover) and *Succisa* (devil's-bit scabious) are present as rare grains. *Calluna* (heather) at 10% and 8% could derive from the nearby Lenzie Moss and from whole plants brought to the site.

Arable indicators show very low values. Pollen of the *Hordeum* group (barley group) includes that of *Glyceria* spp. (sweet-grass), plants of wet places, and *Elytrigia repens* (common couch), a plant of cultivated and waste ground. Other weeds of arable and waste places, *Artemisia* (mugwort), Chenopodiaceae (goosefoot family) and *Persicaria maculosa* type (redshank type) are present as traces.

Other habitats are represented. *Stellaria holostea* (greater stichwort) is a plant of woods and shady hedgerows; *Polypodium* (polypody) and Filicales (ferns) also suggest shady places. *Filipendula* (meadowsweet), *Valeriana officinalis* (common valerian) and *Sphagnum* spp. (bog mosses) grow in wetlands including fen woods, fens and bogs.

The most interesting pollen type is a single grain of *Malva sylvestris* (common mallow), an insect-pollinated plant with large grains which do not travel far from the parent plant. The plant is uncommon in western Scotland but its pollen was found at Bearsden fort (Dickson 1989) where it was recorded as single grains and clusters restricted to Roman levels and no seeds were found. Many medicinal uses are recorded for the plant in flower in the Roman and later periods and seeds have been found associated with Roman sites in the Netherlands and Germany. It is suggested that it may have been deliberately grown for preventive medicine.

Comparisons can be made with pollen from other forts on the western part of the Antonine Wall. At Mollins (Agricolan AD 80–90) and Bar Hill, both about 6 km to the east of Kirkintilloch, Boyd (1984) analysed turves containing well-preserved pollen. Up to 10 consecutive samples through each turf were analysed and it was shown that pre-Roman open woodland had regenerated from earlier, but unrecorded forest clearance. In the vicinity of Mollins possible deliberate clearance of oak was accompanied by increasing pastoral activity. By about AD 142, when the Bar Hill turves were cut, the landscape was open with a mosaic of heather and grass and was pasture-dominated. At Bearsden, about 11 km to the west of Kirkintilloch, pollen from turves cut from ramparts and ditches open at the time of the Roman occupation indicated some open woodland with well-grazed pasture and drier patches of heathland.

The Kirkintilloch samples show a similar land-use but with a little more oak remaining from the original oak-dominated woodland. Work in progress from long cores through Lenzie Moss, only 2 km to the south, and other sites in west central Scotland suggest that this pre-Roman clearance was extensive (S Ramsay, pers comm).

17 BEARSDEN, ROMAN ROAD (NS 547720) (not illustrated)

L J F Keppie

In November 1993 a watching brief was maintained in advance of housebuilding on a plot south of Roman Road, Bearsden, immediately east of the villa named Craigholme. The site lies c 20 m east of the presumed line of the outer of the two annexe ditches on the east side of Bearsden fort. After the ground surface had been scraped by machine to reveal a reddish-brown subsoil at a depth of 0.3–0.4 m, some cobbles and red sandstone slabbing were noted here and there; but the latter may relate to a bungalow which formerly stood on the site. A body sherd of a samian vessel was recovered, together with a sliver of a coarse ware jar. Sample areas were trowelled without positive result. No features were noted in section in the house foundations.

18 BEARSDEN, THORN ROAD (NS 540721) (not illustrated)

L J F Keppie

The building of a house extension at 14 Thorn Road in November 1988 necessitated the digging of drains and other services across the presumed line of the Antonine Wall, whose alignment could be easily projected from a stretch of stone base visible in the nearby garden of 10 Thorn Road. The base appeared to have been already much disturbed. Scattered stones noted on the spoil tips, possibly deriving from the base, were mixed with modern rubble.

19 GOLDENHILL, DUNTOCHER (NS 494728) (not illustrated)

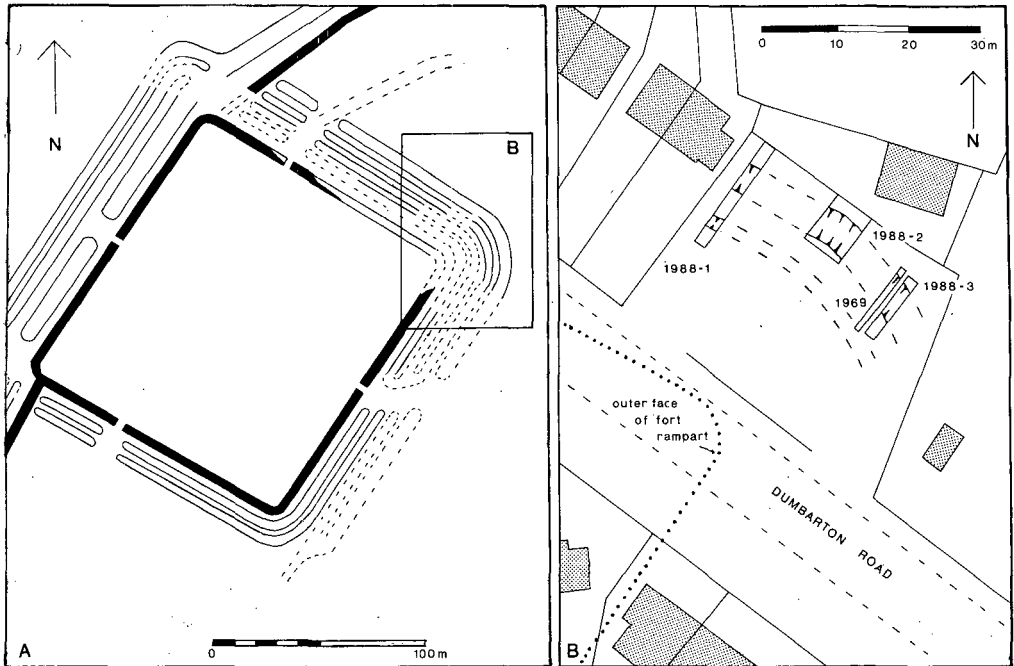
J H McBrien

An archaeological investigation of subsidence near the presumed line of the Antonine Wall on the west side of Golden Hill, Duntocher, was organized at short notice in May 1992, because of urgent Public Health and Safety issues. An oval depression on the hill-slope between the fort and its extramural bath-house measured c 4 m by 3.5 m, and was up to 0.75 m deep. It lay 11 m downslope from the short section of Wall base exposed by Professor Anne S Robertson in 1948–51 (Robertson 1957, fig 21). The projected rear face of the Wall base crossed the area of subsidence. Excavation revealed that this was the second occurrence of subsidence hereabouts, caused by settlement into a sub-surface feature, and that the base of the Antonine Wall had been disturbed more extensively than could be explained by the subsidence. The topsoil buried by the earlier subsidence was found to contain sherds of modern and abraded Roman pottery, and a number of rounded boulders, perhaps derived from the base of the Wall, but of insufficient quantity to represent a previously undisturbed section. It is possible that the subsidence in 1992 was caused by secondary settlement of the backfill of an unrecorded bell-pit of a coal- or ironstone mine; a number of these mines are known to have been dug in the local area from the Industrial Revolution onwards. No Roman features were encountered.

20 MOUNT PLEASANT, OLD KILPATRICK (NS 471731 & NS 463733) (not illustrated)

L J F Keppie

The laying of a gas pipeline in 1987 between the governor-station at Mount Pleasant, Old Kilpatrick, westwards along the line of the A82 Boulevard towards Helensburgh led to the digging by machine of a trench 0.8 m wide and 1.6 m deep across the presumed line of the Antonine frontier at two points: (1) close to the gas governor itself and (2) west of Mount Pleasant farmhouse, at which point the Antonine Wall and Ditch are descending towards their terminus at Ferrydyke, Old Kilpatrick. The alignment of the Antonine Ditch west of the farmhouse is clear: its hollow is visible north of the Boulevard in adjacent fields. However, at both points the ground proved to have been much disturbed. Indeed, examination of the local topography at (2) suggests that the Wall and Ditch may have long since been swept away here during terracing work for the construction of the A82.



ILLUS 35 Old Kilpatrick: excavation at Weir's Garage, 1988, site-location and trench plan. (Based upon the Ordnance Survey map © Crown Copyright)

21 OLD KILPATRICK (NS 461732) (ILLUS 35)

L J F Keppie

INTRODUCTION

The general plan of the fort which lay at the western terminus of the Antonine Wall at Old Kilpatrick was not established until 1913, though the construction of the Forth & Clyde Canal in 1790 had disturbed part of an external bath-house. In 1923, part of the fort site was zoned for local authority housing, and an excavation was hurriedly organized, under the direction of S N Miller (illus 35). Photographs accompanying the report (Miller 1928) show vividly the topography of the fort site, before the construction of the large bus garage which now sits squarely atop the western half of the fort and of the houses flanking Dumbarton Road. In 1930–1 additional trenching by Sir George Macdonald clarified the relationship between the Antonine Wall and the fort, and pinpointed the ditch system more precisely (Macdonald 1932).

One of the earliest buildings constructed on the north side of Dumbarton Road during this century was a small garage, to which Macdonald refers in his report (1932, 233f & Plate IX). He obtained access only to its eastern half. All four ditches passed below it (illus 35). In 1969, during the digging of a narrow north/south inspection pit within the garage (then Weir's Garage), a splendid altar to Jupiter was dug up from the fill of the outermost ditch on this side, whose alignment was thus confirmed (Barber 1971; Keppie 1983, 401, no. 14). The altar must have been tipped into the ditch from outside the fort to the north-east.

DESCRIPTION

In 1987 it was learnt that Weir's Garage, derelict for some years, had been bought for a housing development; an opportunity was allowed for prior archaeological investigation. After a brief inspection in January 1988, two days of work took place in March 1988, with the aid of a machine. The garage and its forecourt covered an area of approximately 40 m east/west by 30 m north/south, but substantial areas within this were unavailable for examination, because of the presence of electricity cables, a sewer, overlying concrete and old petrol tanks below the forecourt. Trenches were opened up (Areas 1988-1, 2, 3) across the assumed lines of the two outer ditches, which were found to lie at a depth of about 1 m below the modern ground surface. The overburden was greater than expected, given that the garage floors were on a level with adjacent gardens. Soil may thus have been imported to the site when the garage itself was built; it contained finds from the late medieval times to the present day. The underlying natural was mainly gravel, with some sand towards the north-west.

The outer ditch was located at three points (Areas 1988-1, 2, 3). It had a width of 4-4.5 m. No attempt was made to empty its fill whose upper levels comprised gritty buff sandy clay. The second ditch was located at one point only (Area 1988-1); it had a width of 2.5 m. Here again no attempt was made to cut a complete section. Small areas of ground beyond the outer ditch were examined, without result. An upcast bank, made up of gravel scooped out from the ditches, might be expected there, but the ground was completely flat. The ditches, where located, were tested with a probe in the hope of locating further items to add to the altar found there in 1969, but without success.

GENERAL CONCLUSIONS

L J F Keppie

Small-scale work, often undertaken randomly in response to threats as they occur, has always yielded important new details about the Roman frontier, pointing the way to further research. In 1985-93 the alignment of the Wall was established at many places, and the opportunity was taken to check the line against current Ordnance Survey sheets, which require modest revision in a number of cases. These excavations, in the face of housing and commercial developments, pipelaying, replacement of telegraph poles, and even subsidence, have testified to the extent of earlier damage, though it was often impressive that the Roman remains had somehow survived. The pace of destruction continues, especially during recent years in the eastern half of the Wall's course.

WALL AND DITCH

The work reported on here has added to our knowledge of the chief components of the frontier, and has indicated how frequently its builders responded to localized problems of terrain: the steepness of a slope, waterlogged or uneven ground. The stonework seen at St Mary's, Bo'ness (no. 1), constitutes the easternmost point known. At Beancross (no. 4) the Wall base was 4.3 m wide, with underpinning to ensure stability, and exhibited evidence of a change in constructional materials, perhaps between cartloads. At Nethercroy (no. 13) the width was 4.15 m, where it incorporated a culvert. There was a possibility at Tayavalla (no. 9) that a wooden frame of uncertain purpose rested on top of the base itself, held in place by the turf superstructure.

The superstructure did not usually survive, but, where it did, our awareness of its character

was enhanced. In particular, at Beancross (no. 4) it was found most unusually to have consisted of turf held in place by clay cheeks. For a more detailed discussion of the makeup of the superstructure between Watling Lodge and Bo'ness, see Bailey (this volume).

Details of the width of the berm were recorded: 7.8 m at St Mary's, Bo'ness (no. 2), and c 9.2 m at Nethercroy (no. 13) where the north slope of a natural rocky outcrop was utilized. The ditch was found to be c 8.6 m wide at St Mary's, Bo'ness (no. 2) and c 9.7 m at Beancross. At the latter location it had been only partly dug out, perhaps because of the marshy ground hereabouts; but excavation revealed the often mentioned but rarely seen ankle-breaking slot. At Lochpark (no. 11), the ditch was only c 5 m wide; the reason for this remarkable narrowness was not obvious. Recent studies have demonstrated that the ditch of the Antonine frontier attains its maximum width of 12.3 m generally only in the central part of the line, between Bar Hill and Falkirk (Keppie 1974, 157, 164; 1976, 76), where the berm is normally 6 m wide. To the west of Bar Hill and east of Falkirk, the ditch is often much narrower, being reduced to 9 m or less, with a berm of up to 9 m (Keppie 1974, loc.cit). For the most part, results obtained from work in 1985–93 conform to this model. However, at Nethercroy (no. 13) the berm was found to be c 9 m wide. *Nethercroy lies in the zone where a 'broad' ditch of 12.3 m would, at first sight, be confidently expected.* However, scrutiny of the results of individual sections over Croy Hill itself demonstrates a considerable variation in the width of the ditch, chiefly as a result of the difficulties of the terrain and the hardness of the underlying dolerite (Keppie 1974, 157, nos. 54–63). The data resulting from excavation at Nethercroy in 1988 are thus less surprising than they might seem at first glance.

The Military Way was located only once, at Nethercroy (no. 13). Set against a sharp southwards slope, it may have had a width there of just 3.5 m.

FORTS AND OTHER INSTALLATIONS

The work at Kirkintilloch in 1989 (no. 15) is of particular importance, leading to an improved appreciation of the outlines of the fort, by fixing the position of a ditch at its south-east corner. Taken together with earlier work, this allows an area for the fort of c 1.4 ha. Moreover, botanical analysis of samples removed from the inner ditch at the south-east corner provided a valuable picture of the environment of the area in Roman times. The results of pollen analysis suggest this was similar to that observed at other Antonine Wall forts, with light woodland, low-level agricultural activity and a little nearby pasture. The soldiers' diet included a coarse-grained wheat flour, possibly preserved here in human sewage, as at Bearsden.

The position of the ditches at the north-east corner of Old Kilpatrick fort (no. 21) was confirmed. The southern defences of the fortlet at Watling Lodge (no. 8) were examined close to the causeway leading from its south gate. The road through the gateway was resurfaced many times, into the Middle Ages and beyond. The opportunity has been taken here to publish for the first time notes and sketches by Mungo Buchanan of his own work at Watling Lodge in 1894 (Appendix 2).

No evidence was found for a fortlet in a long-suspected location at Nethercroy (no. 13). The butt-end of a ditch on high ground at Arnothill, Falkirk (no. 7), recalls a similar feature defending the 'ditched enclosure' at Wilderness West (see Hanson & Maxwell 1983a). Small-scale examination within the area of field systems east of Carriden fort (no. 1) prompted the preparation of a fresh plot from aerial photographs, greatly improving our knowledge of the epigraphically attested *vicus*-settlement. Finally, the defences of Garnhall 1 'construction camp' at Castlecary village were plotted at several points, and a more accurate estimate of its size was obtained.

APPENDIX 1

CASUAL FINDS ALONG THE WALL

ed G B Bailey

1 MUMRILLS ANNEXE, LAURIESTON (NS 916794) (illus 36)
P V Webster

Mr Thomson of Sandy Loan Crescent found the following sherds of Roman pottery in his rear garden in 1986. They are now in the possession of Falkirk Museum.

- 1 Jar in granular dark grey fabric, wheel-thrown and with some evidence of burnishing. Heavily sooted exterior.
- 2 Substantial portions of a jar in white fabric with light and dark grey inclusions.
- 3 Closely similar vessel to 2, but smaller rim and different radius.
- 4 Beaker fragment in a white fabric with grey-brown colour coat. A Cologne or Nene Valley product.
- 5 Two sherds of Dressel 20 amphora.

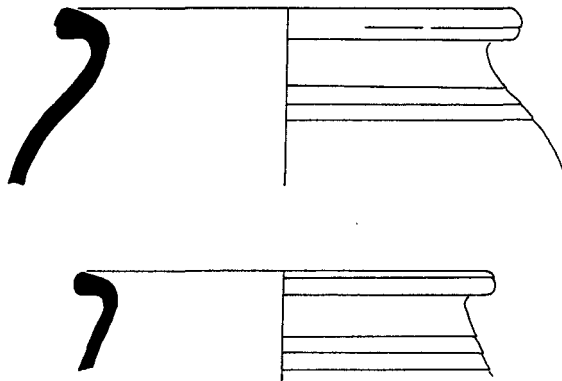
Jars such as nos 2 & 3 are derived ultimately from vessels popular with the military in the mid first century, see for instance Usk fortress type 11 (Greene 1993). However, flanged rims like this remained popular for some time; they appear in late Flavian and Trajanic contexts in North Britain (cf Gillam 1970, no 108) and, further south, may be even later (see Frere 1984, fig 93–4). On balance a Flavian or Flavian/Trajanic date would be most likely in Scotland.

Simple curved rims such as no 1 could be as early as the Flavian period (as at Chesterholm; Birley 1938, no 42), but the form is not unlike some BB2 jars reaching Scotland in the Antonine period. No 4 is most likely to be Antonine.

Taken as a whole the collection suggests Antonine activity, but that is to be expected given the location. Earlier activity, perhaps in the late Flavian or Trajanic period, seems a possibility but the case is unproven from this particular unstratified collection.

2 MUMRILLS ANNEXE, LAURIESTON (NS 916794) (illus 37)
M Henig

A cornelian intaglio, dark orange with black inclusions, was found in a private garden to the west of the fort at Mumrills in the area of the annexe. Measuring 12 mm by 9 mm, it depicts the goddess Nemesis, winged and wearing a chiton. She holds a branch in one hand while the other is raised towards her mouth. Sometimes



ILLUS 36 Rims of vessels 1–3 from Mumrills annexe; Scale 1:2



ILLUS 37 Intaglio from Mumrills annexe

Nemesis is portrayed pulling back her chiton in order to spit upon her breast, but details are not clear upon this gem. A few uncertain strokes at her feet might represent a wheel but again the cutting is too schematic for certainty.

Iconographically the best parallel from Britain is a green chalcedony (plasma) found at Newstead which has been dated to the first century (Elliot & Henig 1982). The Mumrills gem is certainly later as is shown both by the material which is much more opaque than the stones favoured in Flavian times, and by the coarser execution (Zwierlein-Diehl 1979, no 1572 is somewhat similar and set in a second-century ring).

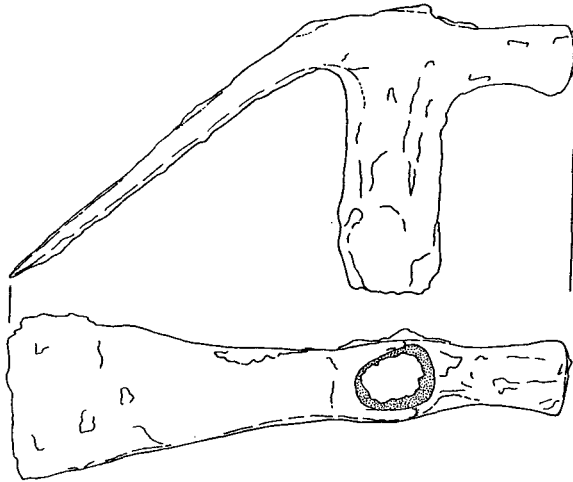
Nemesis, whose concerns were fate and retribution, was not a comforting deity to invoke and is thus not well attested epigraphically in Britain. An altar from Chester and a *defixio* from Caerleon are both *amphitheatre finds* (*RIB* 323, Caerleon; 2065, Hadrian's Wall. For the Chester Nemeseum and altar see Thomson 1975, 1669, pl xlvi). In addition there is an altar from Hadrian's Wall dedicated by a priest.

3 POLMONT ROAD, LAURIESTON (NS 912794)
G B Bailey

The upper torso and head of a statue of Hercules was found to the south of the main road through Laurieston. It is of a local sandstone and has been well executed in the style of the Antonine period. Hercules is shown bearded with thick locks of hair and a muscular body, holding a club in his right hand. The surviving piece is triangular in shape and measures 0.15 m across its base and 0.15 m tall (Bailey 1992a).

4 SOUTH CAMP, CAMELON (NS 863808) (illus 38)
G B Bailey

An adze-hammer was discovered during the construction of the Bluebell Apparel Works over the South Camp of the Roman fort at Camelton in 1979. It was donated to Falkirk Museum in 1986; although it had become heavily corroded in the interval, it is still a fine example of Roman work. The hammer-head or pin



ILLUS 38 Adze-hammer from Camelon south camp; scale 1:3

is conical and has a distinct neck, creating a balanced tool for working with. This resembles the adze-hammer found at Carlingwark Loch, which has a heavily burred head to the pin (Piggott 1953, 36), and one from Kingsholm in Gloucestershire (Manning 1985, pl 8 no. B14). By contrast, the implement found from Eckford was heavy and clumsy (Piggott 1953, 29). The collar length was at least 0.105 m and indicates a relatively short wooden handle. The eye is oval in section, becoming more circular towards the haft, and in front of it are the remnants of the characteristic ears or lugs. These help to confirm the Roman date of the object.

The blade is 0.15m long, with a width at the cutting edge of 63 mm. It is set at an acute angle to the haft, as are the examples from Carlingwark Loch, Eckford and Bull's Wharf in London (Manning 1985, pl 9, no B16). It is clear that this is deliberate and may be compared with the more perpendicular angle of an adze-hammer from Fishbourne (Cunliffe 1971, 133) and one from Pakenham (Manning 1985, B17). This acute angle of the blade and the short haft suggested by the long collar identify the Camelon adze-hammer as a cooper's adze (Salaman 1975, 24). It is thus unrelated to the axe-hammer already known from this site (Christison & Buchanan 1901, 408).

5 TAMFOURHILL (NS 858793)

J D Bateson

A worn billon tetradrachm of Alexandria from the reign of Claudius, c AD 45, found near the Antonine Wall, depicts Messalina as Demeter on the reverse.

6 BONNYFIELD (NS 818800)

J D Bateson

A denarius of Trajan dating to AD 112–117 was found during gravel extraction in 1990. On the obverse is the legend [IMP CAES NER TRA]IANO OPTIMO AVG G[ER DAC]; and on the reverse P M TR P COS [VI P P S] P Q R with a depiction of Mars advancing right holding a spear [and trophy]. It is worn and fragmentary (RIC 337). The site lies to the north of the Antonine Wall and may represent a 'native' settlement. Roman coins have been found on several previous occasions in the Bonny Valley.

APPENDIX 2

MUNGO BUCHANAN'S ACCOUNT OF EXCAVATIONS AT WATLING LODGE IN 1894 (illus 39)

ed G B Bailey

Portion of the Antonine Wall on the West of Lock 16,
of the Forth & Clyde Canal, now being feued for building. 1893.

18 Feby 1894. What I particularly noted at the villa marked X was that the late heavy Rains had washed the surface of the small remaining portion of the Military Way just at mark X & I was much struck with the distinctness of the paved way as a result of the washing. The stones tho' large were lying in mass quite regular, for about 10 feet or so, & close along side but further north lay a bing of small channel, which has evidently been shovelled there out of the way, and the like of which is not to be found in any other part of the excavations, the soil here is the Boulder Clay – A trench has been cut evidently for a water pipe-about 2'6" or so deep – commencing at the 'Wall' and was carried south to 'Tamfour Hill Farm' thro' the field in the direction of the arrow in Red on plan. I closely inspected it for indications of the Military Way (Et & Wt) not the slightest token could I find, & I searched it carefully. This same trench is carried through the line of found. of 'Wall' at that point of the Wall, where it takes a slight dip (at the debouch of the Military Way to the north) & I have to confess I could find no evidence of the found. of the wall here, or of any disturbances of the natural soil, though a few feet on either side (E & West) of this. the line of the stone foundation of the Wall is clearly defined, & many of the edge stones are exposed to view, through the washing away of the covering soil.

'B' a Stable is being built at this part. May/94

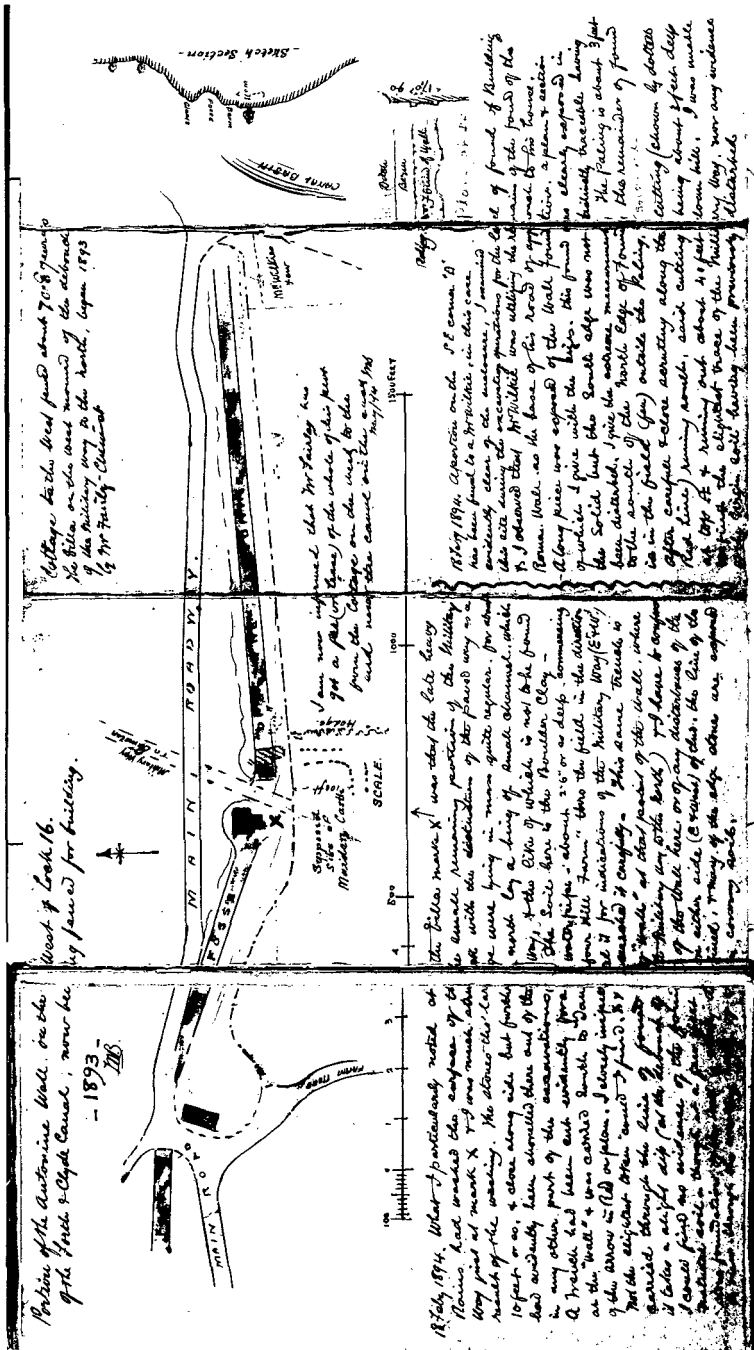
Cutting the Fosse at Stable gave this section at bottom.
It was where ditch rises up to the outgoing road.

Decr 1894 and April 95

Mr. Fairly has taken about an acre of ground in the field So of the boundary Hedge above his house to form a garden & when the gardener was trenching same he exposed what appeared to be a stone paved road (or found) which commencing about 20 feet south of the boundary hedge that runs in line with Ditch, continued going parallell with the Hedge which runs southward for a distance of about 100 feet, where making a sweep round to the west it continued this for a dozen feet & then was lost or destroyed, the severe frost of this winter stoped the operations & on enquiry of the Spring of /95 we were informed that no more evidence had been come across of such complete work, but that the whole area under the surface was a literal mass of stones, and in some places great heaps of broken Earthen-ware, some brown and some white or grey. I have heard somewhere that there had been a fort or tower hereabouts. Can this be evidence?

I have heard that a coin was found here but I could not get a sight of it, but I have several pieces of the Earthenware, which seems to have been but poorly burnt, and being of a light grey colour, convinces me that it has been made from clay in the district. (Falkirk Museum a67.11.)

This information is complemented by a copy of the 1897 Ordnance Survey map which was annotated by Mungo Buchanan in 1900.



ILLUS 39 Mungo Buchanan's notes on Watling Lodge

APPENDIX 3

ANALYSIS OF RAMPART MATERIAL AT TAYAVALLA

R Tipping

TREES	%
<i>Alnus</i>	24.5
<i>Betula</i>	13.5
<i>Quercus</i>	1.0
SHRUBS/DWARF SHRUBS	
<i>Corylus/Myrica</i>	33.5
<i>Calluna</i>	2.0
HERBS	
Gramineae <40 um	10.0
Cyperaceae	2.5
<i>Armeria</i> 'B-line'	1.0
Caryophyllaceae:Stellaria	1.0
Compositae Liguliflorae	1.0
<i>Papaver</i>	1.0
<i>Plantago lanceolata</i>	4.0
<i>Ranunculus</i>	2.0
Rubiaceae	1.0
<i>Rumex</i>	1.0
<i>Valeriana</i>	1.0
Total land pollen	100
AQUATICS AND SPORES	(% t.l.p.)
Filicales	41.2
<i>Lycopodium selago</i>	0.2
<i>Polypodium vulgare</i>	21.7
<i>Pteridium</i>	0.6
<i>Sphagnum</i>	4.0

APPENDIX 4

ANALYSIS OF BOTANICAL REMAINS FROM KIRKINTILLOCH

Sheila Boardman & Camilla Dickson

METHODS

PLANT MACROFOSSILS

Samples of between 25 and 50 ml of sediment were left to soak in a solution of 2% NaOH for one to three hours to disaggregate, then wet-sieved by hand down to 150 microns. The botanical remains were rehydrated in a solution of distilled water and alcohol (to prevent fungal growth) prior to initial assessment

and the detailed study. Sorting took place under a low power ($\times 10\text{--}40$) binocular microscope. Samples were checked at higher magnifications to ensure that smaller material had not been missed. Identifications were carried out using reflected and transmitted light microscopy at magnifications of up to times 1000. Determinations to species were checked against modern reference material. Nomenclature follows Stace (1991). Ecological data have also been taken from Clapham *et al* (1989).

POLLEN ANALYSIS

Standard preparation techniques and nomenclature follow Moore *et al* (1991). The specific identification of *Malva* pollen follows Culhane *et al* (1988); identifications were checked against a pollen reference collection. The Latin and English names also follow Stace (1991).

RESULTS

The two fully investigated horizons were as follows:

1.0–1.5 m: organic grey silt corresponding to black smear (containing microscopic charcoal fragments) in the ditch profile.

0.95–1.0 m: sandy silty clay from darker horizon (with microscopic charcoal) in the ditch profile.

The plant macrofossils are listed in Table 1. The taxa from the assessment samples are virtually the same as those from fully investigated samples. All are incorporated in Table 1. No cultivated species and very little other material was recovered from the upper ditch layers.

TABLE 1: KIRKINTILLOCH ROMAN FORT

Plant macrofossils from the inner ditch

Cultivated species

<i>Hordeum vulgare</i> L. var. <i>vulgare</i>	Hulled Six-row Barley	charred grain
<i>Triticum cf dicoccum</i> Schübl.	Cf. Emmer Wheat	spikelet fork, glume base, rachis
<i>Triticum/Secale</i>	Wheat/Rye	testa fragment (bran)
Wild species		
<i>Polytrichum</i> sp.	Hair Moss	leafy shoot
<i>Sphagnum palustre</i> L.	Bog Moss	leaf
<i>Pteridium aquilinum</i> (L.) Kuhn	Bracken	frond fragment
Cf. <i>Pteridium aquilinum</i>	Cf. Bracken	frond fragment
<i>Ranunculus acris</i> L.	Meadow Buttercup	achene
<i>Ranunculus repens</i> L.	Creeping Buttercup	achene
<i>Ranunculus flammula</i> L.	Lesser Spearwort	achene
<i>Ranunculus</i> subgenus <i>Ranunculus</i>	Buttercup	achene
<i>Ranunculus</i> subgenus <i>Batrachium</i>	Crowfoot	achene
<i>Quercus</i> sp.	Oak	charcoal
<i>Betula</i> sp.	Birch	charcoal
<i>Alnus</i> sp.	Alder	charcoal
<i>Corylus avellana</i> L.	Hazel	charred nut shell
<i>Chenopodium album</i> L.	Fat Hen	seed
Cf. <i>Agrostemma githago</i> L.	Cf. Corncockle	seed
<i>Stellaria media</i> (L.) Vill.	Chickweed	seed
<i>Stellaria cf. media</i>	Cf. Chickweed	seed

Wild species

<i>Stellaria graminea</i> L.	Lesser Stitchwort	seed
<i>Stellaria</i> sp.	Stitchwort	seed
<i>Stellaria/Cerastium</i>	Stitchwort	seed
<i>Cerastium fontanum</i> Baumg.	Common Mouse-ear	seed
Caryophyllaceae undiff.	Pink family	seed
<i>Persicaria maculosa</i> Gray	Redshank	achene
<i>Polygonum aviculare</i> agg.	Knotgrass	achene
<i>Rumex crispus</i> L.	Curled Dock	perianth, achene
<i>Rumex</i> sp.	Dock	achene
<i>Salix</i> sp.	Willow	charcoal
<i>Rorippa</i> cf. <i>palustris</i> (L.) Besser	Cf. Marsh Yellow-cress	seed
<i>Rorippa</i> sp.	Water-cress/Yellow-cress	seed
Brassicaceae undiff.	Cabbage family	seed
<i>Calluna vulgaris</i> (L.) Hull	Heather	flower, seed, leafy stem, charred leafy stem
Cf. <i>Calluna vulgaris</i>	Cf. Heather	seed
Cf. <i>Erica</i> sp.	Cf. Heath	seed
<i>Potentilla palustris</i> (L.) Scop	Marsh Cinquefoil	achene
<i>Potentilla erecta</i> (L.) Rauschel	Tormentil	achene
<i>Potentilla</i> cf. <i>erecta</i>	Cf. Tormentil	achene
<i>Potentilla</i> sp.	Cinquefoil/Tormentil	achene
Pomoideae		wood
Pomoideae		charcoal
<i>Lathyrus</i> sp.	Pea/Vetchling	leaf/stipule
Lamiaceae undiff.	Deadnettle family	nutlet
<i>Galium</i> sp.	Cf. Bedstraw	fruit
<i>Cirsium</i> sp.	Thistle	achene
<i>Lapsana communis</i> L.	Nipplewort	achene
<i>Leontodon autumnalis</i> L.	Autumn Hawkbit	achene
<i>Juncus squarrosus</i> L.	Heath Rush	seed
<i>J.</i> cf. <i>squarrosus</i>	Cf. Heath Rush	seed
<i>J. bufonius</i> L.	Rush	seed
<i>J. conglomeratus</i> L.	Compact Rush	seed
<i>J. effusus</i> L./ <i>conglomeratus</i>	Soft/Compact Rush	seed
<i>Juncus</i> sp.	Rush	seed
<i>Eriophorum vaginatum</i> L.	Hare's-tail Cottongrass	spindle
<i>Carex echinata</i> Murray	Star Sedge	nutlet
<i>C. panicea</i> L.	Carnation Sedge	nutlet
<i>Carex nigra</i> (L.) Reichard	Common Sedge	nutlet
<i>C. nigra</i>	Common Sedge	charred nutlet
<i>Carex</i> sp. (biconvex)	Sedge	nutlet
<i>Carex</i> sp. (trigonous)	Sedge	nutlet
Cyperaceae undiff.	Sedge family	nutlet
<i>Poa annua</i> L.	Annual Meadow-grass	caryopsis
<i>P.</i> cf. <i>trivialis</i> L.	Cf. Rough Meadow-grass	caryopsis
<i>P. trivialis/pratensis</i> L.	Rough/Smooth Meadow-grass	caryopsis
<i>Poa</i> sp.	Meadow-grass	caryopsis
<i>Glyceria</i> sp.	Sweet-grass	caryopsis
<i>Alopecurus pratensis/myosuroides</i>	Meadow Foxtail/Black-grass	caryopsis
<i>Bromus</i> sp.	Brome grass	caryopsis
Poaceae undiff.	Grass family	caryopsis

ARCHIVE, SITE RECORDS AND SMALL FINDS

The original notebooks and drawings from no 1 are in the National Monuments Record of Scotland, Edinburgh; from nos 2–11 are in Falkirk Museum, Callendar House; from nos 12–21 in the Hunterian Museum, University of Glasgow, with copies in NMRS. The few small finds from nos 2–11 are in Falkirk Museum (as are the finds reported on in the Appendix, except the coins which were retained by the finders), and those from nos 12–21 in the Hunterian Museum, University of Glasgow.

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REFERENCES

- Anderson, J 1818 *Plan of Callendar Park situate in the County of Stirling the Seat of William Forbes Esquire shewing the Deviation through the Park from the Parliamentary Line of the Edinburgh & Glasgow Union Canal*. Copies in Scottish Record Office, Edinburgh, and Falkirk Museum.
- Armit, I & Dunwell, A 1992 *Excavations on the Antonine Wall and Fort at Inveravon (parcel 007), near Grangemouth, Central Region, March–June 1991*, unpublished report, CFA, Edinburgh.
- Bailey, G B 1992a 'A Roman Shrine near Laurieston?', *Calatria*, 2 (1992), 1–4.
- Bailey, G B 1992b 'Frontiers of knowledge: another look at the eastern end of the Antonine Wall', *Glasgow Archaeol Soc Bulletin*, 28 (1992), 6–8.
- Bailey, G B this volume 'The Antonine frontier in Callendar Park', *Proc Soc Antiq Scot*, 125 (1995)
- Bailey, G B forthcoming 1 'The Roman fort at Falkirk on the Antonine Wall', *Proc Soc Antiq Scot*.
- Bailey, G B forthcoming 2 'Stream crossings on the Antonine Wall', *Proc Soc Antiq Scot*.
- Bailey, G B & Cannel, J forthcoming 'The excavation of Kinneil fortlet on the Antonine Wall', *Proc Soc Antiq Scot*.
- Bailey, G B & Devereux, D F 1987 'The eastern end of the Antonine Wall: a review', *Proc Soc Antiq Scot*, 117 (1987), 93–104.
- Barber, R L N 1971 'A Roman Altar from Old Kilpatrick, Dunbartonshire', *Glasgow Archaeol J*, 2 (1971), 117–19.
- Birley, E & M 1938 'Fourth Report on Excavations at Chesterholm-Vindolanda', *Archaeol Aeliana*, 4 ser, 15 (1938), 222–37.
- Boyd, W E 1984 'Environmental change and Iron Age land management in the area of the Antonine Wall, central Scotland: a summary'. *Glasgow Archaeol J*, 11 (1984), 75–81.
- Breeze, D J 1974 'Excavations at the Roman fortlet on the Antonine Wall at Watling Lodge', *Proc Soc Antiq Scot*, 105 (1972–4), 166–75.
- Briscoe, P & Thomson, J 1968 'Seabegs Place Farm', *Discovery Excav Scot*, 1968, 44.
- Burnham, B C, Esmonde Cleary, A S, Hassall, M W C, Keppie, L J F & Tomlin, R S O 1993 'Roman Britain in 1992', *Britannia*, 24 (1993), 269–309.
- Christison, D & Buchanan, M 1901 'Account of the excavation of the Roman Station of Camelon, near Falkirk, Stirlingshire, undertaken by the Society in 1900', *Proc Soc Antiq Scot*, 35 (1900–1), 329–417.
- Clapham, A R, Tutin, T G & Moore, D M 1989 *Flora of the British Isles*. Cambridge.
- Culhane, K J & Blackmore, S 1988 'Malvaceae', pt. 41, 45–74 in 'The Northwest European Pollen Flora', *Review of Palaeobotany & Palynology*, 57 (1988), 1–154.
- Cunliffe, B W 1971, *Excavations at Fishbourne*, vol.2: *The Finds*. Leeds.
- CUCAP Cambridge University Committee for Aerial Photography.
- Dickson, C 1988 'Experimental processing and cooking of emmer and spelt wheats and the Roman army diet', in D E Robinson (ed), *Experimentation and Reconstruction in Environmental Archaeology. Symposium of the Association for Environmental Archaeology No. 9*. Roskilde, Denmark.
- Dickson, C & Dickson, J H 1988 'The diet of the Roman army in deforested central Scotland', *Plants Today*, (1988), 121–6.
- Dickson, C 1989 'The Roman army diet in Britain and Germany', *Archäobotanik, Dissertationes Botanicae*, 13 (1989), 135–54.
- Dickson, C & Dickson, J H forthcoming 'Plant Remains', in Breeze D J *The Roman fort at Bearsden*. Soc Antiq Scot Monograph.
- Dunwell, A 1991 *Excavations at the Roman fort at Carriden, Bo'ness, Carriden to Mannerston Line Replacement*. Unpublished report. Centre for Field Archaeology, Edinburgh.
- Dunwell, A 1992 'Recent work on the Antonine Wall at Inveravon, Grangemouth, Central Region, 1991', *Glasgow Archaeol Soc. Bulletin*, 29 (1992), 3–6.
- Dunwell, A 1993 *Polmonthill, Grangemouth: Archaeological Monitoring of Alterations to a Ski Slope beside the Antonine Wall*. Unpublished report, Centre for Field Archaeology, University of Edinburgh, Rep 107.

- Dunwell, A & Ralston, I B M this volume 'Excavations at Inveravon on the Antonine Wall, 1991', *Proc Soc Antiq Scot*, 125 (1995).
- Dunwell, A, Coles, G M & Mann, S forthcoming 'Excavation of a section through the Antonine Wall near Glasgow Bridge, 1992', *Glasgow Archaeol J*.
- Elliot, J W & Henig, M 1982 'Engraved gemstones from the Roman frontier post at Newstead, Roxburghshire', *Proc Soc Antiq Scot*, 112 (1982), 295–9.
- Frere, S S 1984 *The Verulamium Excavations*, vol 3. London.
- Gillam, J P 1961 'The Coarse Pottery', in Steer 1961a.
- Gillam, J P 1970 *Types of Roman Coarse Pottery in Northern Britain*, 3rd edn. Newcastle upon Tyne.
- Glasgow Archaeological Society 1899 *The Antonine Wall Report*. Glasgow.
- Greene, K 1993 'The fortress coarse ware', in Manning, W H ed, *Report on the Excavations at Usk, 1965–76*. Cardiff, vol. 5: *The Roman Pottery*, 3–124.
- HMC 1893 Historical Manuscripts Commission: Thirteenth Report, Appendix Part 2, *The Manuscripts of His Grace the Duke of Portland preserved at Welbeck Abbey*, vol. 2. London.
- Hanson, W S 1979 'Croy Hill', in Breeze, D J ed *Roman Scotland: Some Recent Excavations*, Edinburgh, 19–20.
- Hanson, W S & Maxwell, G S 1983a 'Minor enclosures on the Antonine Wall at Wilderness Plantation', *Britannia*, 14 (1983), 227–43.
- Hanson, W S & Maxwell, G S 1983b *Rome's North West Frontier: the Antonine Wall*. Edinburgh.
- Horne, J 1781 *A Plan of the Third Lot of the Callendar Estate lying in the Parish of Falkirk & County of Stirling*. Edinburgh. Scottish Record Office (copy in Falkirk Museum).
- Jones, M J 1975 *Roman Fort Defences to AD 117*. Oxford (= *BAR Brit Ser*, 21).
- Keppie, L J F 1974 'The building of the Antonine Wall: archaeological and epigraphic evidence', *Proc Soc Antiq Scot*, 105 (1972–4), 151–65.
- Keppie, L 1975 'Kirkintilloch, Roman Ditch?', *Discovery Excav Scot*, (1975), 21.
- Keppie, L J F 1976 'Some rescue excavation on the line of the Antonine Wall, 1973–6', *Proc Soc Antiq Scot*, 107 (1975–6), 61–80.
- Keppie, L J F 1983 'Roman inscriptions from Scotland: some additions and corrections to *RIB I*', *Proc Soc Antiq Scot*, 113 (1983), 391–404.
- Keppie, L J F 1994 'Excavations at the Roman fort of Westerwood on the Antonine Wall, 1985–88', *Glasgow Archaeol J*, 19 (1994), 31–47.
- Keppie, L J F & Breeze, D J 1981 'Some Excavation on the Line of the Antonine Wall, 1957–80', *Proc Soc Antiq Scot*, 111 (1981), 229–47.
- Keppie, L J F & Walker, J J 1981 'Fortlets on the Antonine wall at Seabegs Wood, Kinneil and Cleddans', *Britannia*, 12 (1981), 143–62.
- Keppie, L J F & Walker, J J 1989 'Some excavation along the line of the Antonine Wall, 1981–85', *Proc Soc Antiq Scot*, 119 (1989), 143–59.
- Knights, B A, Dickson, C A, Dickson, J H & Breeze, D J 1983 'Evidence concerning the Roman military diet at Bearsden, Scotland, in the 2nd century AD', *J Archaeol Sci*, 10 (1983), 139–52.
- McCord, N 1981 'Beancross/Dollhouse', in Keppie & Breeze 1981, 230.
- Macdonald, G 1911 *The Roman Wall in Scotland*. Glasgow.
- Macdonald, G 1915 'Some recent discoveries on the line of the Antonine Wall', *Proc Soc Antiq Scot*, 49 (1914–15), 93–138.
- Macdonald, G 1925 'Further discoveries on the line of the Antonine Wall', *Proc Soc Antiq Scot*, 59 (1924–5), 270–95.
- Macdonald, G 1932 'Notes on the Roman Forts at Old Kilpatrick and Croy Hill, and on a Relief of Jupiter Dolichenus', *Proc Soc Antiq Scot*, 66 (1931–2), 219–76.
- Macdonald, G 1934 *The Roman Wall in Scotland*, 2nd edn. Oxford.
- Maitland, W 1757 *The History and Antiquities of Scotland*. London.
- Manning, W H 1985 *Catalogue of the Romano-British Iron Tools, Fittings and Weapons in the British Museum*. London.
- Maxwell, G S 1972 'Excavations at the Roman Fort of Crawford, Lanarkshire', *Proc Soc Antiq Scot*, 104 (1971–2), 147–200.

- Maxwell, G S 1974 'The building of the Antonine Wall', in Pippidi, D M (ed), *Actes du IXe Congrès international d'Etudes sur les frontières romaines*, Bucharest, 327–32.
- Maxwell, G S 1989 'Aerial reconnaissance on the Antonine Wall', in Kennedy, D ed, *Into the Sun: Essays in Air Photography in Archaeology in Honour of Derrick Riley*. Sheffield, 173–88.
- Maxwell, G 1991 'Dunipace: the discovery of a Roman camp', *Glasgow Archaeol Soc Bulletin*, 26 (1991), 9–11.
- Maxwell, G & Wilson, D R 1987 'Air reconnaissance in Roman Britain, 1977–84', *Britannia*, 18 (1987), 1–48.
- Miller, S N 1928 *The Roman Fort at Old Kilpatrick*. Glasgow.
- Moore, P D, Webb, J A & Collinson, M E 1991 *Pollen Analysis*, 2nd edn. Oxford.
- Nimmo, W 1817 *History of Stirlingshire*. Stirling.
- Piggott, S 1953 'Three Metal-work Hoards of the Roman Period from Southern Scotland', *Proc Soc Antiq Scot*, 87 (1952–3), 1–50.
- RCAHMS 1963 *Stirlingshire: an Inventory of the Ancient Monuments*. Edinburgh.
- RIC The Roman Imperial Coinage*, H. Mattingly et al. (ed) London, 1923–81.
- Richmond, I A & Steer, K A 1957 'Castellum Veluniate and civilians on a Roman frontier', *Proc Soc Antiq Scot*, 90 (1956–7), 1–6.
- Robertson, A S 1957 *An Antonine Fort: Golden Hill, Duntocher*. Edinburgh & London.
- Robertson, A S 1964 'Miscellanea Romano-Caledonica', *Proc Soc Antiq Scot*, 97 (1963–4), 180–201.
- Robertson, A S 1990 *The Antonine Wall*, 4th edn. Glasgow.
- Roy, W 1793 *The Military Antiquities of the Romans in North Britain*. London.
- St Joseph, J K S 1949 'The Roman forts at Carriden and Brownhart Law', *Proc Soc Antiq Scot*, 83 (1948–9), 167–74.
- St Joseph, J K S 1955 'Air Reconnaissance in Britain, 1951–5', *J Roman Stud*, 45 (1955), 82–91.
- St Joseph, J K S 1965 'Air Reconnaissance in Britain, 1961–64', *J Roman Stud*, 55 (1965), 74–89.
- St Joseph, J K S 1977 'Air reconnaissance in Roman Britain, 1973–76', *J Roman Stud*, 67 (1977), 125–61.
- Salaman, R 1975 *Dictionary of Tools used in the Woodworking and Allied Trades, c 1700–1970*. London.
- Shaw, J 1812 *Plan of Falkirk and adjoining Lands*, Scottish Record Office, Edinburgh (copy in Falkirk Museum)
- Sibbald, R 1707 *History and Description of Stirlingshire*. Edinburgh.
- Sommer, C S 1984 *The Military Vici in Roman Britain*. Oxford. (= *BAR Brit Ser*, 129).
- Stace, C 1991 *New Flora of the British Isles*. Cambridge.
- Steer, K A 1957 'The nature and purpose of the expansions on the Antonine Wall', *Proc Soc Antiq Scot*, 90 (1956–7), 161–9.
- Steer, K A 1961a 'Excavations at Mumrills Roman fort, 1958–60', *Proc Soc Antiq Scot*, 94 (1960–1), 86–132.
- Steer, K A 1961b 'Excavations on the Antonine Wall in Polmont Park and at Dean House in 1960', *Proc Soc Antiq Scot*, 94 (1960–1), 322–4.
- Stuart, R 1852 *Caledonia Romana*, 2nd edn. Edinburgh.
- Thomas, G D 1988 'Excavations at the Roman civilian settlement at Inveresk, 1976–77', *Proc Soc Antiq Scot*, 118 (1988), 139–76.
- Thompson, F H 1975 'The excavation of the Roman Amphitheatre at Chester', *Archaeologia*, 105 (1975), 127–240.
- Zwierlein-Diehl, E 1979 *Die antiken Gemmen des Kunsthistorischen Museums in Wien*, vol. 2. München.

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