

Excavations directed by J D Leach and J J Wilkes on the site of a Roman fortress at Carpow, Perthshire, 1964–79

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ABSTRACT

Excavations conducted between 1964 and 1979 revealed the plan of a Roman fortress of just over 11 ha (27.5 acres). The rampart, ditches and three out of the four gates, together with a number of buildings in the interior (the headquarters, the commander's residence and a granary) were investigated. Structural evidence suggests that occupation was confined to a single period, of short duration, and ceramic and numismatic evidence suggest that this occurred between c AD 180 and c AD 220. Post-excavation analysis and publication were funded by Historic Scotland.

THE FORTRESS AND ITS SETTING

SITE DESCRIPTION (ILLUS 1)

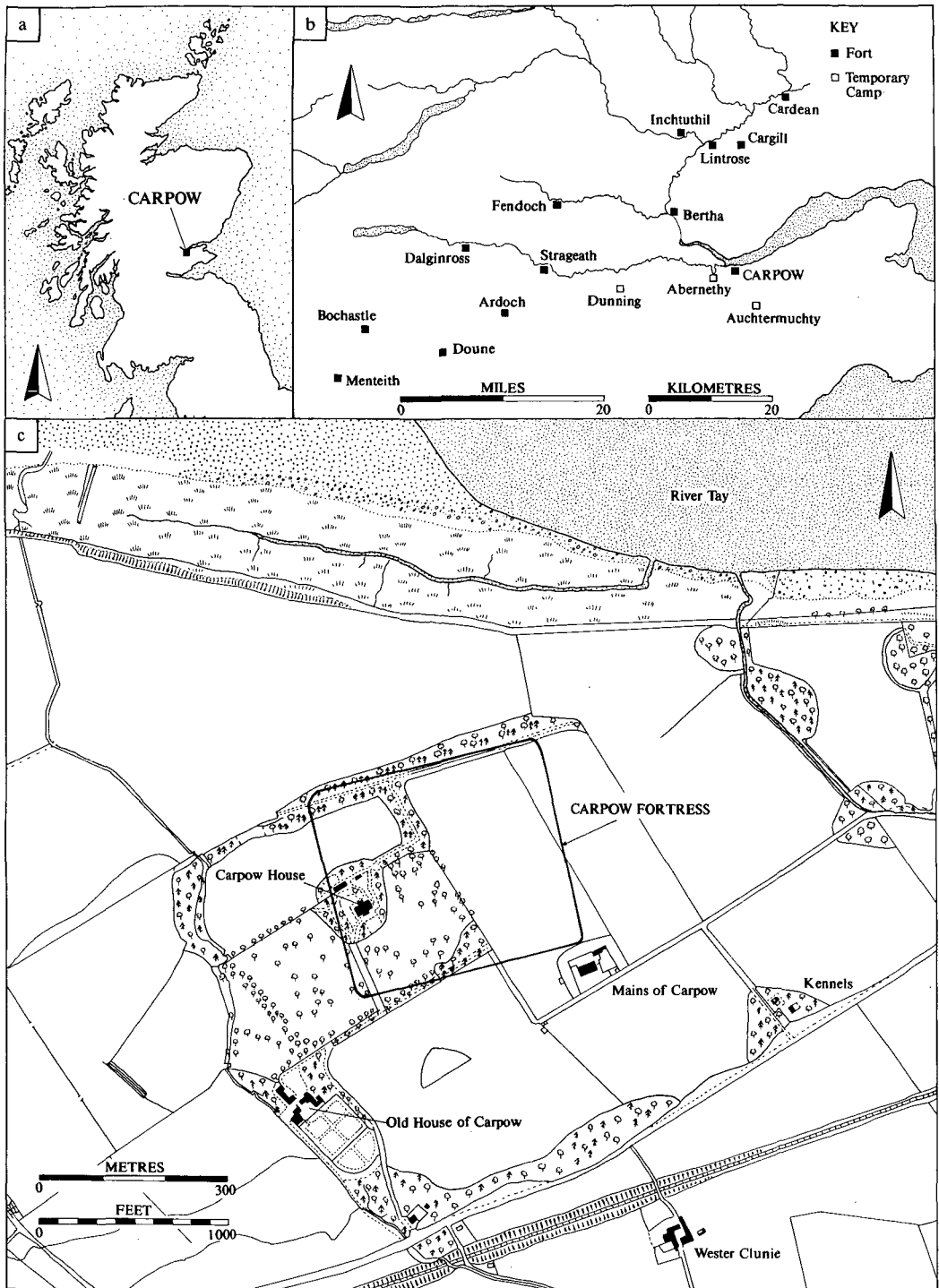
The site of Carpow (NGR: NO 208179) lies on the south bank of the river Tay 1.3 km east of the confluence with the river Earn. A short distance to the west of a stream which marks the boundary between Perthshire and Fife the low-lying fields give way to a glacial escarpment which rises around 30 m to a small, well-drained plateau. From the top are excellent views, north-westwards up the Tay valley towards the Hills of Moncrieffe and the distant horizon of the southern Highlands, and eastwards down the Firth of Tay, where Dundee and the modern road and rail bridges are clearly visible in normal conditions.

The situation of Carpow enjoys considerable natural protection. The approach from the south is barred by the ranges of the Ochils which close off the south side of Strathearn and which overlook the site of the fortress, rising steeply at a distance of less than 1 km to the south. On the west the broad valley of the lower Earn protects the site from sudden assault.

The position of Carpow in the strategically important area of Pictish Abernethy makes it likely that the site will have figured in more than one recorded incident of early Scottish history and some of these are suggested by Birley (1965, 184–5). The site is likely to have been included in a grant made by the Pictish king Nectonius (Nechtan) (died c 465) to Dairluggdach, who had been abbeß of Kildare in Ireland. It may well be that early in the 11th century Kenneth III used

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ILLUS 1 Location of Carpow fortress including (b) Roman forts and temporary camps in the Tay region and (c) environs of the site (Based on the Ordnance Survey map © Crown copyright)

Carpow as his base before he met the Danes at Loncarty, as may have William I of England in 1072 when he awaited Malcolm Canmore's acceptance of the Peace of Abernethy. Later, Carpow passed into the possession of Lindores Abbey, which lies 5 km away on the eastern outskirts of Newburgh in Fife, and subsequently into that of the Oliphant family who in 1745 were honoured with a visit from Bonnie Prince Charlie, an event which brought the forfeiture of the estate in the following year.

By 1783 Roman remains had been discovered at Carpow, reported by James Wedderburne of Inveresk in a letter published in Gough's 1806 edition of Camden's *Britannia* (vol 4, 47–9; cited by Birley 1965, 184). The context of the discoveries may have been extensive landscaping of the site undertaken by the new owner, Mr A Patterson, who had made his fortune in the West Indies. It seems likely that this work had the effect of removing Roman remains that lay close to the surface, especially in the north-west area of the fortress. A new house for the owner was then constructed towards the northern edge of the Carpow plateau with fine views to north-west and east. This Carpow House (destroyed by fire in 1961 and replaced with a modern bungalow a short distance to the south) replaced the older Carpow House, whose overgrown ruins lie adjacent to a steading, west of the drive leading to the later house.

EARLIER ACCOUNTS AND INVESTIGATIONS

The record of Carpow in the antiquarian and archaeological tradition of the 19th and early 20th centuries has been set out by Birley (1965, 184–7) in the introduction to his report on the 1961–2 excavations. The perception of Carpow which prevailed until the dramatic discoveries of those excavations was summarized by O G S Crawford in his 1943 Rhind Lectures:

Carpow can be quickly disposed of. It stands on a bluff one and a half miles north-east of Abernethy, overlooking the estuary of the Tay near the mouth of the Earn, and it is certainly the site of a coastal fort, but when I wrote the first draft of this book only the baths had been found, and no remains of the fort itself had come to light. Since then, Dr St Joseph, flying over the site in September 1943, has seen remains of the ramparts and subsequently identified them on the ground. Most of the outline of the fort is visible as a crop-mark, with two ditches round the south and east sides (Crawford 1949, 59; cf St Joseph 1951, 63).

By the time Crawford wrote there was a general acceptance of Richmond's (1922, 289, 294) view, based on the earlier suggestion by W F Skene, that Carpow was likely to be the *Orrea* of Ptolemy's Geography and *Poreoclassis* of the Ravenna Cosmographer. On the third edition of the Ordnance Survey's (1956) *Map of Roman Britain* the site bore the name *Horrea Classis*, denoting the stores base of a Roman fleet. Though the coin finds then reported included one of Faustina (no 11, below) and pointed to a second-century date, the situation of Carpow seemed to fit well with a sea base that Agricola might have used during an advance in which the army co-operated with the fleet. The argument for an Antonine occupation was advanced by Gillam (1958, 73), contending that Carpow's situation seemed to belong to a concerted deployment of forces at Ardoch, Bertha and Strageath and Dalginross (all in Perthshire) with the purpose of protecting the more settled population of southern Strathmore and Fife from their more turbulent neighbours to the north and west.

The picture altered suddenly in the late summer of 1961 when Birley exposed the remains of a stone headquarters building (*principia*) and, nearby, what was evidently a part of the

commander's residence (*praetorium*). From within and alongside the latter were recovered from stratified contexts the two coins which provided the key evidence for dating the site, a denarius of Caracalla of AD 202 (no 27, below) and another of Plautilla of AD 202–3 (no 30, below), both in mint condition. In addition, the presence of the Legio VI Victrix was established at the site by the discovery of 216 tiles bearing the legion's stamp with the hitherto unrecorded title LEG VI VIC B P F (*Leg(io)(Sexta) Vic(trix) B(ritannica) p(ia) f(idelis)*). Carpow, whatever the nature of any earlier occupation, was now securely linked with the operations of the emperor Septimius Severus against the northern peoples of Britain, begun in AD 208 and concluded, following his death at York early in AD 211, by his sons and successors Caracalla and Geta. For so long a mystery and absent from the archaeological record, when compared with operations of the Flavian or Antonine eras, the Severan presence in Scotland was now located on the map beyond reasonable doubt, along with the smaller base at Cramond on the Firth of Forth.

BIRLEY'S EXCAVATIONS IN 1961–2

The remains revealed at Carpow during the 1961–2 excavations may be described briefly. Digging started c 60 m north of what was generally believed to be the remains of the external bath-house of an auxiliary fort, where parch-marks had in the summer revealed to the farmer the outline of stone foundations. Trenching soon uncovered the stone footings of the rear range of a headquarters building of legionary size, c 155 ft by 133 ft (47 m by 40.5 m), of half-timbered construction on stone foundations and roofed with Roman tiles (*tegulae* and *imbrices*). The plan of the courtyard was traced, and found to be flanked by narrow rooms (*armamentaria*). Three openings in the rear wall (no trace of door fixings was found) led into the cross-hall (*basilica*), at the north end of which was found a rectangular stone-flagged dais (*tribunal*), below which was a strongroom (*sacellum*) entered by a step down at the north-east corner. Behind the cross-hall lay a range of nine rooms of unequal width and of 15 ft 6 in (4.7 m) depth. At the centre the largest room, measuring 20 ft by 18 ft 6 in (6.1 m by 5.6 m) projected 4 ft 6 in (1.37 m) beyond the outer (west) face of the rear wall and could be identified as the shrine (*aedes*), the focus of regimental loyalty and obedience to the imperial regime, containing the standards (*signa*) of the unit and the image (*imago*) of the reigning emperor. In the centre of the room the base of an altar was found cemented into the plaster floor. The walls of the headquarters were around a metre thick and constructed of freshly quarried blocks of local red sandstone facing a core of mortared rubble containing many large river cobbles. The inner face of the wall was rendered with plaster. The small quantities of stone and tile debris, along with masses of burnt daub, pointed to an orderly withdrawal following clearance of reusable material from the site.

At a distance of 150 ft (45.7 m) south of the headquarters building lie the remains of the 'bath-house' of Carpow, first investigated in the late 18th and early 19th centuries. The mounds of debris and the few visible traces of stone walls had until 1961 been identified as likely to be the external bath-house of an auxiliary fort located outside its western defences. The excavations of 1961–2 revealed the surviving foundations of a well-constructed building measuring 132 ft by 82 ft 6 in (40.2 m by 25.15 m), with walls 3 ft (c 1 m) thick constructed of similar material and in similar fashion to those of the headquarters building with which it was precisely aligned. Although the internal plan and many other features of a roughly symmetrical courtyard building were revealed, the function and purpose of the structure remains in doubt. As Birley (1965, 91) observes: 'there was probably an upper storey over most of the building while the courtyard appears to have been roofed. The drainage system and other remains rule out the building being nothing but a bath-house, and the presence of such a substantial structure in the central building

block off the *via principalis* ought to indicate the Legate's residence.' Although that term has passed into general currency much remains unclear regarding the structure, including the function of its many small rooms.

Most of the rooms open directly off a courtyard which lies across the east side of the building (the likely area of the main entrance from the *via principalis* was found to be heavily robbed), within which a screen of five square column bases, 4 ft square (1.22 m), served to divide it into a front and rear area. The floor of the courtyard was of stone flags laid on a thick make-up of rubble and small pebbles. There was no trace of any channel or gutter at the edge that might have carried away rainwater, while in the north-west corner a mass of rubble and plaster seems likely to belong to a collapsed stairway leading to an upper storey. In the south-east corner was a cement-lined rectangular basin, 7 ft 9 in by 5 ft 6 in (2.35 m by 1.67 m). This was probably a water tank and was constructed of cement-filled box-tiles. On the south side the seating of a lead inlet-pipe was found and the tank was drained by an opening in the north-east angle.

The courtyard was flanked by two pairs of symmetrical rooms, two larger (27 ft by 25 ft (8.23 m by 7.62 m) at the front (I and XVI) and two smaller behind (II and XV). One of the latter, on the south, contained a furnace that was stoked from outside the building. Behind the courtyard the rear range contained a complex of heated rooms (III, V–XIV) which formed part of a bath system heated by hypocaust. The two rooms (III and V) at the south end, one with a semi-circular apse (VI) projecting beyond the face of the rear wall were both heated by hypocaust, consisting of an upper floor of rubble concrete, 8 in thick (0.2 m), resting on pillars above a tile and plaster lower floor. At the centre of the range was a rectangular bath (VIII), 25 ft 6 in by 9 ft 6 in (7.8 m by 2.9 m). This was drained by a channel which led eastwards across the courtyard and out of the building. The bath had evidently been cleared during early excavations on the site leaving the concrete floor exposed to weather damage. The walls had originally been covered with plaster, some of it painted with simple geometric decoration. No trace of any water inlet could be found. Around the bath were three smaller rooms (VII, IX and X) whose function could not be determined. One (IX) may have been an oven, while another (X) contained remains that appeared to belong to an occupation later than the demolition and abandonment of the Severan fortress.

The hypocaust flue leading to Room XI had been blocked by the Romans and the floor had been of wood, raised above the soil by a series of posts. A large circular hole in the subsoil had been the scene of a severe and prolonged burning, whilst a thick layer of burned matter, including fragments of tile, pottery and amphora, lay all over the room. Above this deposit lay a quantity of antler, some of it carefully cut, together with building debris. Above all this lay the subsequent deposits from the (excavation of the) other rooms. Amongst the pottery from the secondary layer were found two mortarium rims of early fourth-century type, alongside other rubbish contemporary with the fortress (Birley 1965, 192).

The later occupation, it was suggested, might have occurred when 'someone, Roman or native, had come upon the scene, perhaps camping on the site during a hunting expedition' (ibid).

The three remaining rooms (XII, XIV and XV) at the north end of the range had been included in the original scheme of hypocaust heating but had also been subsequently modified through the insertion of raised wooden floors. A small room (XIII), 6 ft by 8 ft (1.82 m by 2.44 m), with slightly thicker walls than the rest, may have been a secondary construction attached but not bonded with the rear wall. The extra thickness of the walls may indicate an observation tower.

The three buttresses attached to the north wall have no obvious structural function but might have supported a balcony at the upper level. At the time of demolition the main roof timbers had evidently been removed, causing large numbers of roof tiles — of which around one in thirty bore the stamp of the Sixth Legion, as described above — to fall in a heap at the rear of the building between the apse (VI) and the tower (XIII).

In addition to these two buildings in the central range of the fortress the excavations of 1961–2 included some limited exploration of other features belonging to the fortress. In the vicinity of the commander's residence was found an open channel, probably a drain, running parallel with the east wall and 25 ft 6 in (7.77 m) from it. Beyond the north wall of the same building the east/west trench of a timber building was located at a distance of 11 ft 6 in (3.5 m), and a row of post-holes at a further 17 ft (5.2 m). A section (not located on Birley's published plan) was cut across the presumed line of the north rampart, in which were identified large timbers laid longitudinally, above which were traces of clay. (It is possible that the 'timbers' identified on this occasion were in fact displaced blocks of rampart turf, as revealed in several sections of the fortress defences cut during the 1964–70 excavations.) No trace of a ditch was located on this occasion. A section across the western defences (not located on the published plan) revealed traces of the rampart and a single ditch and, some 230 ft (70 m) to the west, the single ditch of what was probably an annexe attached to the south-east part of the fortress. It is conceivable from the reported dimensions that the 'inner ditch' located on this occasion may have been the outer and smaller of the closely spaced (c 7 m centre-to-centre) pair of ditches proved by later excavations to enclose the fortress on the east, south and west sides. Finally, the 'aqueduct channel' visible on aerial photographs (see illus 20) approaching the fortress from the south in the vicinity of the south gate (see below) was sectioned but no trace of wood or clay lining was found. Later excavation of the channel at the point where it passed through the south gate revealed regularly spaced iron collars which would have joined sections of pipe 2.4 m long (below).

Except for the overall dimensions and the shape of the fortress (the rectangular plan published in the report on the 1961–2 excavations had by the conclusion of the 1969 season been modified to that of a near parallelogram), the excavations described by this report strengthen the identification of Carpow as a Severan campaign base which was originally proposed by Birley at the time of the 1961–2 excavations.

AERIAL PHOTOGRAPHIC EVIDENCE (ILLUS 2–4)

The most significant addition to the evidence for the nature of the Roman occupation of Carpow has come not from excavation but from the aerial photographs taken by the late J K St Joseph, whose identification of the ditches from the air and on the ground in 1943 was signalled by Crawford (1949) in the publication of his 1943 Rhind Lectures. Subsequently, St Joseph was able to identify two large Roman military enclosures on the plateau of Carpow, both considerably larger than and of an earlier date than the Severan campaign base, for which the evidence was presented in a publication of 1973 (illus 4; St Joseph 1973, 222–3, with fig 13).

The east and west ditches of a temporary camp located to make the best use of the sloping ground which lies to the south of the Severan base can be traced. Sectors extending to 243 m on the west side and 296 m on the east have either been identified from the air or traced through trenching, but the line of neither the south nor north sides could be detected. It was established through excavation that this camp precedes other features on the site earlier than the fortress (ie the polygonal enclosure described below). On the east side the position of an entrance appears to

be indicated by a change in the alignment of the ditch. Comparison with other temporary camps suggested that this belongs to a series of three camps of c 46.5 ha (115 acres), the others being at Abernethy and Dunning, farther west in Strathearn (see *illus 1b*), which seem likely to relate to troop movements in the Flavian period.

The perimeter ditch of a second Roman enclosure preceding the Severan base at Carpow was traced outside the defences of the latter for a total distance of at least 740 m, consisting of three straight sections meeting at obtuse angles. In the middle section there were two entrances set 265 m apart, each protected by a *titulum*. Trenching revealed the V-shaped profile of a ditch 3.35 m wide and 1.35 m deep. This ditch appears to form the landward or southern limit of an enclosure which — if it were bounded on the north by the edge of the Carpow plateau, as was the Severan base — would have enclosed an area of c 28 ha (69 acres). Trenching at the intersection of the ditches established that this enclosure is later than the larger temporary camp described above.

A third feature of the Roman period was located by aerial photography on the opposite (north) bank of the Tay and consists of part of the defences of a Roman camp at Nether Mains Farm, St Madoes (NGR: NO 209 196), on level ground above an old river scarp (*illus 4b*). Around 58 m of the north ditch and, from a rounded angle, 88 m of the west ditch are visible, the latter including an entrance protected by *titulum*. The position of the remains indicates that at least a part of this enclosure has been eroded by the river.

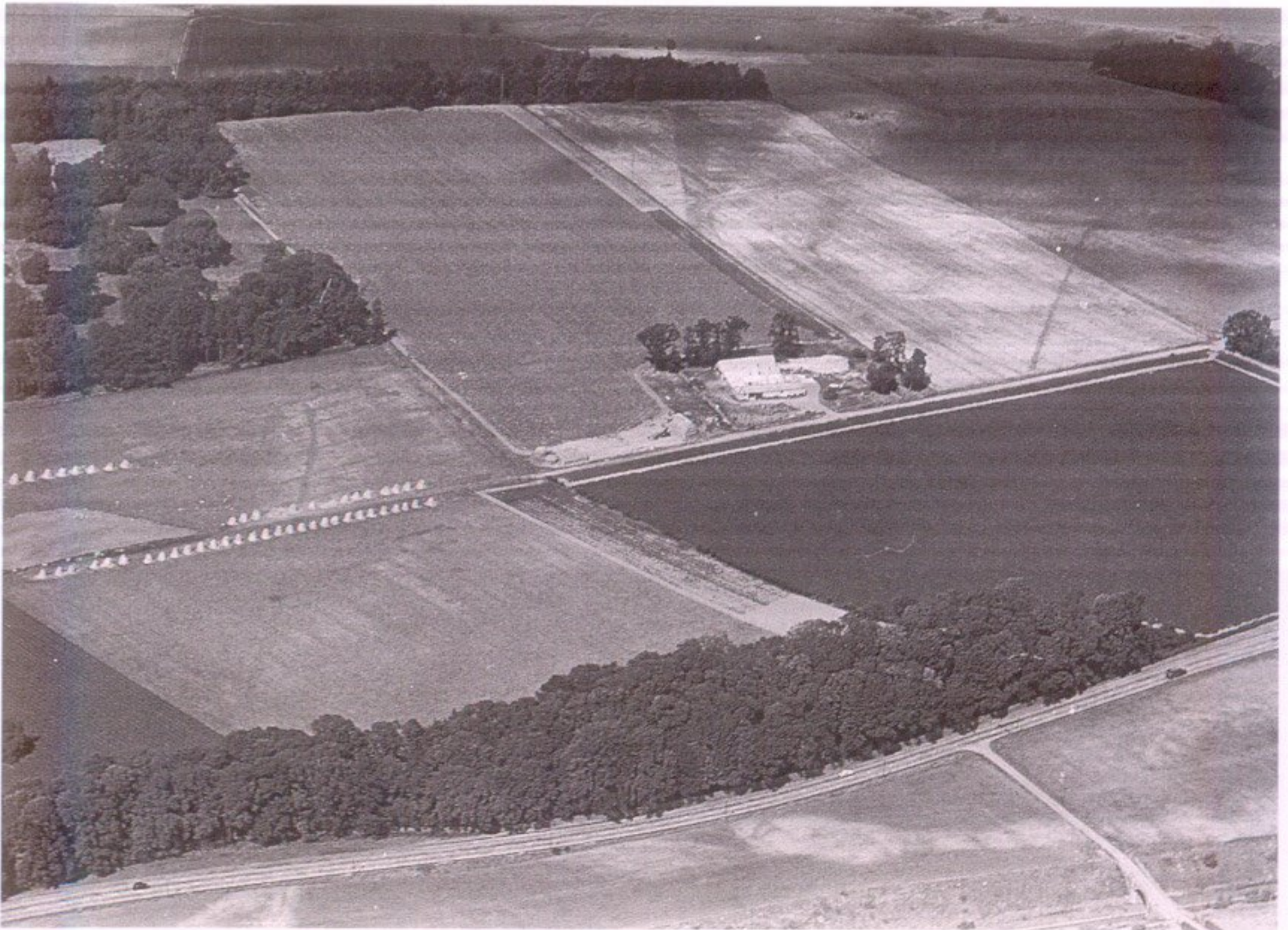
The existence of these two enclosures on the same ground as the Severan fortress indicates that Carpow may have been on more than one occasion an important centre for Roman military activity in this area of eastern Scotland, and may have served as a river crossing in both the Flavian and the Severan eras. As already noted, the temporary camp appears to belong to the same series as that at Abernethy, which lies 3 km to the west and from which a fragment of late first-century south Gaulish samian ware has been recovered, and can therefore reasonably be assigned to the Flavian series. The later polygonal enclosure does not belong to any known series of temporary camps and may perhaps have been placed to control a river crossing at this point, for which the camp at St Madoes served as bridgehead on the opposite bank. The historical context may be the early stages of the Severan campaigns, prior to the construction of the fortress. St Joseph cited the *as* of Caracalla struck in AD 209 (RIC IV (1) 254, no 441; cf RIC XXXX for revised dating) which depicts on the reverse a bridge of boats: 'Such a bridge would suit exactly the not too wide crossing (more than 1000 metres) of the shallow waters of the firth opposite Carpow' (St Joseph 1973, 117–18).

EXCAVATIONS IN 1964–70, 1975–6 AND 1979

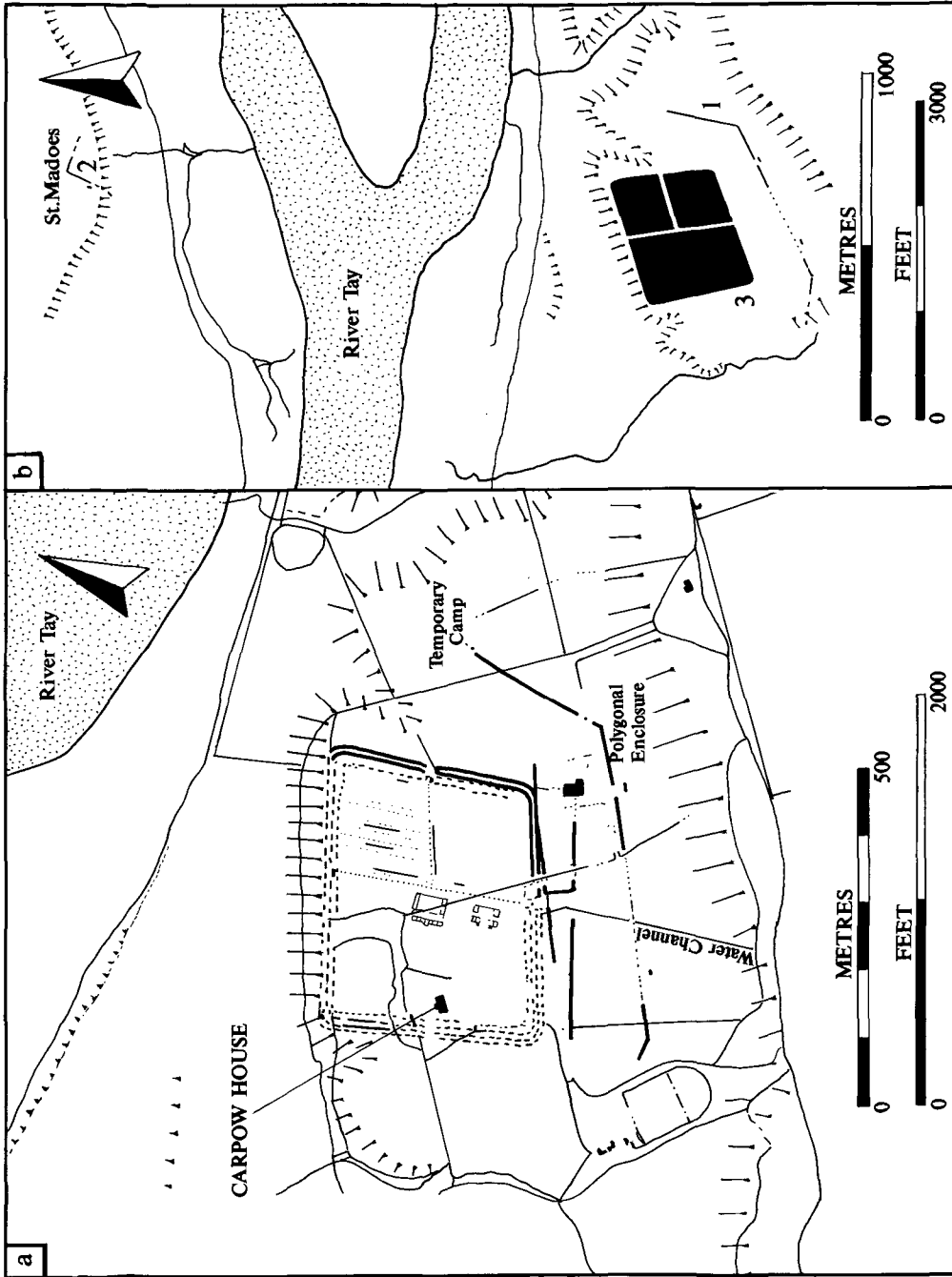
The excavations which followed Birley's work in the early 1960s extended intermittently to the end of the following decade. Excavations were undertaken and recorded in feet and inches until 1970, and again in 1979, but in metric units in 1975–6. In most areas of the site excavation consisted of removing plough-soil to a maximum depth of around half a metre, except where the parkland of Carpow House had caused a greater accumulation of topsoil above the natural sand and gravel which extend throughout the area of the fortress. Modern disturbance, including recent drainage, was encountered in several areas of the site but could usually be distinguished from ancient features without difficulty. Excavations were undertaken during late August and September, following the harvesting of crops, and the trenches were backfilled by tractor at the end of each season, except for the east gate trenches of 1964 and the south gate trenches of 1969, the latter lying within the park of Carpow House, which were left open for completion in the



ILLUS 2 Aerial view of Carpow from north-east; the ditches of the east defences are visible as a cropmark in the light barley-field (*Cambridge University Collection*).



ILLUS 3 Aerial view of Carpow and the river Tay from south; the east gate and inner and outer ditches are visible in the light barley-field (*Colin Martin*)



ILLUS 4 Plans based on aerial photographs (after St. Joseph) of (a) Carpow and (b) Carpow, St. Madoes and probable location of the Tay river crossing

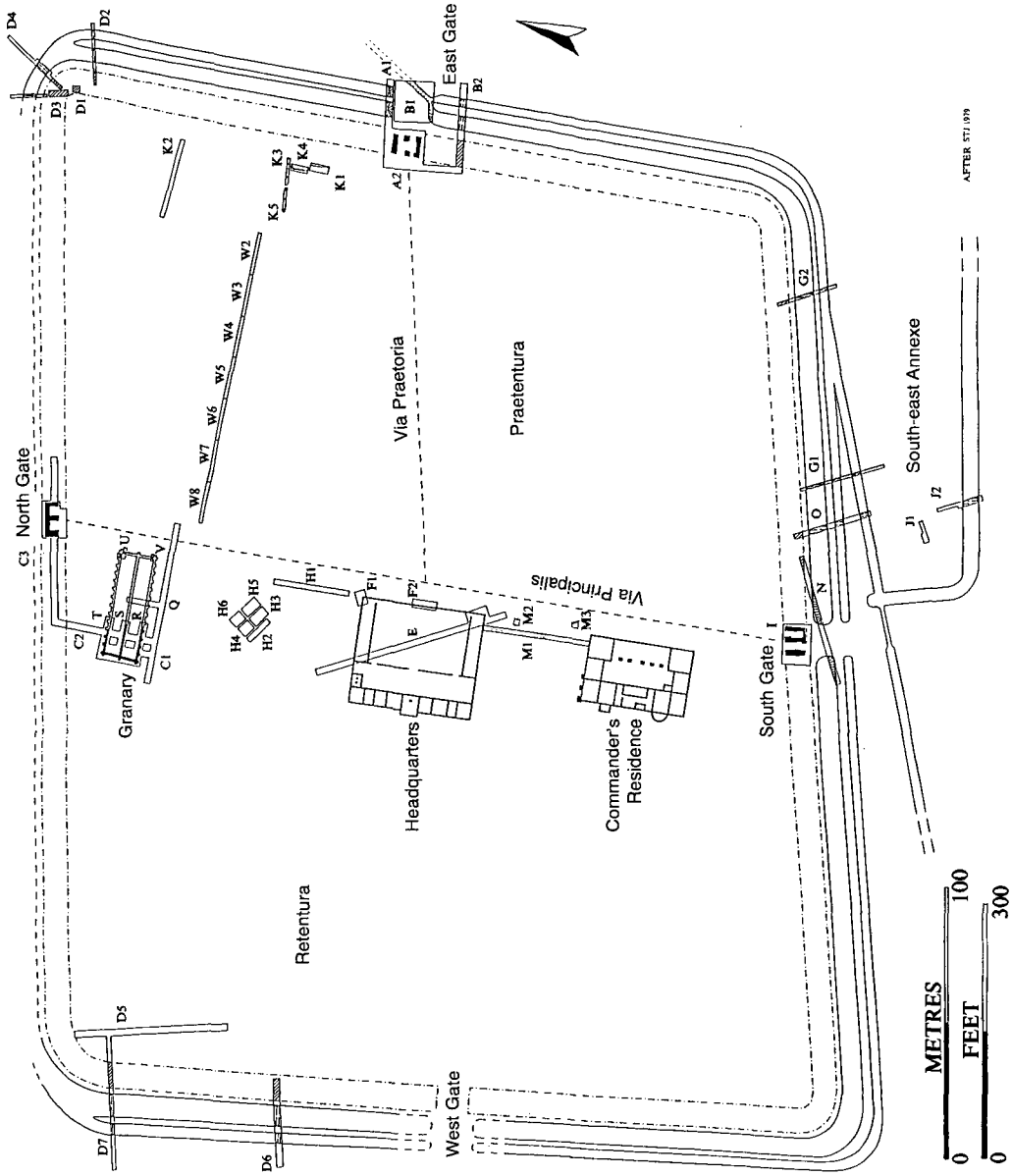
following season. Excavation was undertaken by hand because of the unpredictable level of the subsoil and because the ancient features to be recorded were often found to be cut into soft and easily penetrated subsoil.

EXCAVATION TRENCHES (ILLUS 5)

1964 (Trenches A1–3) A five-week season of excavations began with a trench (A1) 115 ft long and 8 ft wide (35 m by 2.4 m) across the butt-end of a double ditch system, as indicated by aerial photographs, on the north side of the presumed line of the *via praetoria*. A trench (A2) along the line of the field fence (since removed) which ran obliquely across the presumed location of the east gate was opened and subsequently extended to an area 36 ft 9 in (11 m) square which revealed the mortar and stone footings of the gate and several associated features at a depth of less than 1 ft 6 in (0.45 m). Discovery of the two large fragments of the monumental inscription from the gate (below) delayed the programme of excavation and the recording of structures in the excavated area (JRS 1965, 200–2, cf 220–8; DES 1964, 42–3).

1965 (Trenches B1 & B2) A five-week season of excavation completed the recording of the east gate structures and its associated features begun in the previous season. An area 50 ft (15.24 m) square (B1) in front of the gate was opened in order to investigate the causeway between the ditches, the continuation of the drain and water channel which ran through the passages of the gate and the continuation of a single ditch north-eastwards and diagonally across the front of the causeway indicated on aerial photographs. Finally a second section (B2) was cut across the defences, located 46 ft (c14 m) south of the east gate, which revealed remains of the turf rampart, and the full profiles of the inner and outer ditches. Cleaning and recording of the remains proved difficult on account of bad weather during the second half of the excavation (JRS 1966, 199).

1966 (Trenches C1–3) The site for the third season of excavations followed a suggestion from the farmer (Mr John Smith) regarding a foundation of mortar and stone encountered on several occasions during ploughing near the northern edge of the field covering the eastern area of the fortress. Here the plough-soil was particularly thin, in places barely one-third of a metre, and was easily removed during favourable weather which lasted for most of the three-week season. Two trenches 215 ft (c 65 m) long were excavated: one (C3) aligned with the east/west axis of the fortress in an area believed to lie within the line of the north defences; a second (C1) at 150 ft (c 45 m) to the south but aligned across the north/south axis. The two trenches were linked by a third (C2) aligned with the north/south axis. At the margins of the field, where there is a screen of trees, the ground falls away steeply to the floodplain of the Tay. This had hitherto been taken to indicate the line of the north rampart of the fortress. Around 50 ft (15.24 m) into the field, however, there were located the remains of a foundation of mortared stone and rubble resting on foundations of loose cobble (C3), similar in size and character to the remains of the east gate. The structure was E-shaped in plan, facing towards the interior of the fortress. At the time of excavation it was not realized that this foundation represented the north gate, an identification made only following the discovery of the true alignment of the northern ditches, along with that of the *via principalis* inferred from the front line of the headquarters, in 1967–8. Extensive trenching across this part of the site, where the plough-soil is shallowest, revealed few ancient features, but these included the lines of two cobble footings, parallel and 23 ft (7 m) apart (C2), which subsequently proved to belong to the granary whose remains were excavated and recorded in 1976. Several post-holes and small pits (C1) were recorded, some containing pottery, bones and other finds, but no significant alignments could be detected, and it seems likely that only large scale clearance of the site offers a possibility, and it can be no more than that, of reconstructing the barrack accommodation or other structures where aerial photographs revealed suggestive lines of pits on the north/south axis of the fortress (JRS 1967, 175), a point further investigated in the trial excavation of 1979.



ILLUS 5 Plan of Carpow showing principal features and locations of the 1964-79 excavation trenches

1967 (Trenches D1–7) The fourth season of excavation lasted four weeks and was confined to establishing the line of the defences in the north-east and north-west corners, in order to determine precisely the overall shape of the fortress. This was hitherto assumed to be near rectangular, but was now revealed to be a near parallelogram. In the north-east corner three trenches (D2–4; D1 which had been placed to reveal any remains of an angle tower contained no ancient features) in a radial pattern sectioned the line of the defences. The inner and outer ditches merged at the angle to form a single ditch on the north, although there remains some doubt if it was continued for the whole length of the north side of the fortress where the ground falls away steeply towards the river. In the north-west the west defences were sectioned just below the presumed site of the north-west angle (D7) and again at a point 215 ft (65 m) to the south (D6), that is roughly half-way between the north-west corner and the presumed site of the west gate (*porta decumana*). The trenches soon confirmed what had already been suspected, namely that landscaping of the grounds of Carpow House (see above) in the direction of the view up Strath Tay towards the Highlands had removed much of the Roman remains in this area. It is possible that the west gate lies in the vicinity of the site of the House, perhaps beneath the modern tennis court. The two sections confirmed the line of the inner and outer ditches on the west side and also the line of the turf rampart. Behind the line of the rampart, and roughly parallel with it, a north/south trench (D5) 165 ft (50 m) long, was placed to locate the ends of any barracks or similar structures in this area of the *retentura* but none was found, although traces of a few post-holes, amphora sherds and some pieces of burnt daub indicated that the area had been occupied with structures of some kind (JRS 1968, 177; DES 1967, 42–4; Wilkes 1971 for summary of results 1964–7).

1968 (Trenches E, F1, F2, G1 & G2) The fifth season of excavation lasted four weeks. The main focus of attention was the east and front part of the headquarters building (E, F1 & F2) which lay in the field outside the area of the 1961–2 excavations. In addition, the project to determine the outline of the fortress defences was completed with sections across the south defences, easily located in the south-east quarter through aerial photographs (G1 & G2). A trench (E) 205 ft (62.5 m) long was aligned north/south alongside the modern field boundary which crosses the headquarters diagonally. Part of the area had been disturbed by a modern drain which had removed all ancient levels, while the remains found were less well preserved than those in the parkland: two centuries of agriculture had eroded the subsoil and lowered the ground surface by around 0.5 m over the whole area. In addition to the main trench two smaller trenches (F1 & F2) were placed to locate the central section of the front wall alongside the *via principalis* (F2: 30 ft by 10 ft, or 9 by 3 m) and the north-east angle of the building (F1: 20 ft by 13 ft, or 6 m by 4 m). Two sections across the line of the south defences at an interval of 60 m (G1 & G2) revealed the inner and outer ditches, neither of which was excavated to its full depth. The front face of the turf rampart was also detected. Its line at the south-east angle can be detected on the surface and it appears to be well preserved in this area. As a result of these excavations the first definitive plan of the defences of the fortress was published in 1969 (JRS 1969, 202–3 and fig 27; DES 1968, 29–32).

1969 (Trenches H1–6 & I) The sixth season of excavation was directed towards two areas: the area north of the headquarters building (H1–6) and the site of the south gate (I). This could now be located through the accurate plan of the defences completed in the previous season, in the south-east corner of the parkland of Carpow House. In the former area a line of three post-holes (H1) was found, indicating a building aligned with the fortress. Unfortunately, this could not be explored further as it extended into an adjacent cove which borders the *praetentura* field on the north-east. In this area (H2–6) was found a circular channel cut into the natural gravel with a diameter of 40 ft (12 m). This may represent the remains of a native roundhouse, but no features were located within the circle which might have confirmed this (*Britannia* 1970, 273–4; DES 1969, 37–8).

1970 (Trenches J1 & J2 and K1–5) The seventh season of excavation completed the examination of the south gate begun in the previous season (Trench I). All the surviving masonry foundations were exposed

and associated channels cleared and recorded. Outside the fortress, the ditch of an annexe revealed on aerial photographs to be attached to the west part of the south defences was confirmed by section (J2). From the fill of this ditch a stamped brick of the Sixth Legion was recovered. A line of pits in the same area but closer to the south gate was tested by excavation (J1) but found to be of recent origin. In the northern half of the *praetentura* a series of small trenches (K1–5) was excavated to test the remains of rows of pits possibly associated with timber barracks aligned with the east rampart but none could be identified with certainty where the thin layer of plough-soil covered a sandy subsoil (*Britannia* 1971, 248).

1975 (Trenches M1–3) Excavations within the fortress were resumed for an eighth season with a three-week campaign in exceptionally dry conditions. A trench (M1) 2 m wide extended from the north wall of the commander's residence (*praetorium*) — explored in the 1961–2 excavations — to the south wall of the headquarters (*principia*), a distance of c 44 m. The trench was aligned c 5 m within (that is to the west of) the presumed line of the *via principalis* as inferred from the front of the headquarters building (*principia*) explored in 1968 and the established positions of the north and south gates. The site lay within the parkland of Carpow House and both topsoil and subsoil were strongly compacted, making the definition of ancient features difficult. It was possible to establish the presence of timber buildings, possibly three separate buildings, along with a stone-lined culvert. Two small trenches (M2–3) were placed a short distance to the east of the main section to confirm that the building alignments identified in the latter continued to the line of the *via principalis* (*Britannia* 1976, 299).

1976 (Trenches N–V) The ninth season of excavation extended over four weeks which, again, were very hot and dry. The work was directed to two areas: the causeway between the ditches immediately outside the south gate (N & O), and the northern area of the central range, between the headquarters building and the north gate (P–V). A single trench (N) aligned east/west with the defences sufficed to locate the butt-end of the ditches and to explore the channel and other features leading across the causeway towards the passages of the south gate. A north/south section (O) across the ditches, c 40 m east of the south gate, located the inner and outer ditches; this trench was continued more than 10 m south to examine a third ditch visible on aerial photographs and following a different alignment for a short distance. (This ditch was probably dug in error as it proved, as suspected, to have been immediately backfilled during the Roman occupation of the site.) To the north of the headquarters building the two lines of stone cobble footings revealed in a trench of 1966 were found to belong to a double granary aligned with both the *via principalis* and the *via praetoria* (as a consequence the building was six degrees off rectangular). The surviving foundations of walls and buttresses (Trenches P–V) were located and planned (*Britannia* 1977, 361).

1979 (Trenches W1–8) A 10th, shorter season of excavations was undertaken specifically to determine the extent to which normal agricultural activities were damaging remains in the eastern area (*praetentura*) of the fortress. The timing of the work was planned to coincide with a visit to the site by members of the XII International Congress of Roman Frontier Studies held at Stirling during the first week of September. The excavated trench lay east/west and was 350 ft (c 107 m) long by 6 ft (1.83 m) wide. (Successive sectors 50 ft in length were designated W1–8 but W1, the first 50 ft sector at the east end, was never excavated.) It extended across the northern (left) half of the *praetentura*, at roughly the mid-point between the *via praetoria* and the line of the north rampart. Subsoil was encountered at depths which varied from 1 ft (c 0.30 m) to 1 ft 6 in (0.46 m) and about 40 features of probable Roman date were exposed, including channels, pits and post-holes. This suggested that, except in the case of the stone footings of the gates and the granary, normal agricultural activities at the time were offering no significant threat to the surviving archaeological remains (*Britannia* 1980, 351).

DEFENCES

The line of the fortress defences had long been visible on the east (illus 4) and on the south between the south-east angle and the south gate. The lines of the inner and outer ditches and, where preserved, the turf rampart have been verified on the east side (three sections), at the north-east angle (three sections), on the west side between the north-west angle and the presumed site of the west gate (two sections), and on the south side (three sections). No trace of the defences has so far been traced on the north side. Here, it remains uncertain if the single ditch located at the north-east angle was continued along the crest of the steep slope down to the river, while no trace of the rampart was located in the vicinity of the north gate where the plough-soil is in barely 0.3 m deep in places, above a gravel subsoil.

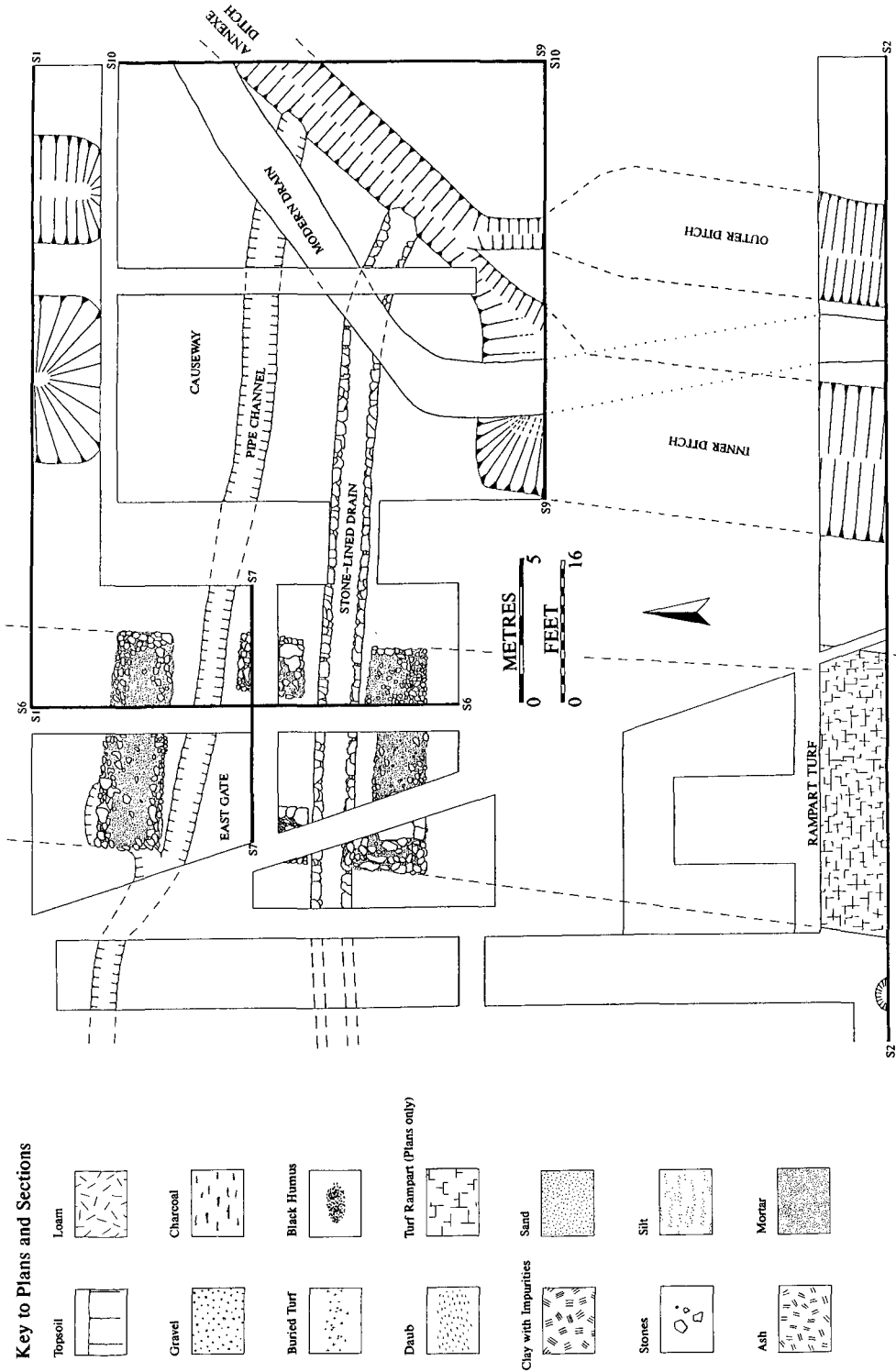
Given no indication that the defences did not follow a straight line on any of the four sides, the plan of the fortress may be reconstructed as a quadrilateral with opposite sides nearly but not precisely parallel (illus 5). The obtuse angles are in the south-east (103.5 degrees) and north-west (95 degrees) corners, with opposing obtuse angles in the north-east (79 degrees) and south-west (82.5 degrees). The internal dimensions along the two central axes are c 340 m east/west by c 285 m north/south. The area within the rampart is estimated to have been c 10 ha (24 acres); the area within the inner ditch can be calculated more precisely at 11.16 ha (27.57 acres).

INNER AND OUTER DITCHES (ILLUS 6-9, 11 & 12)

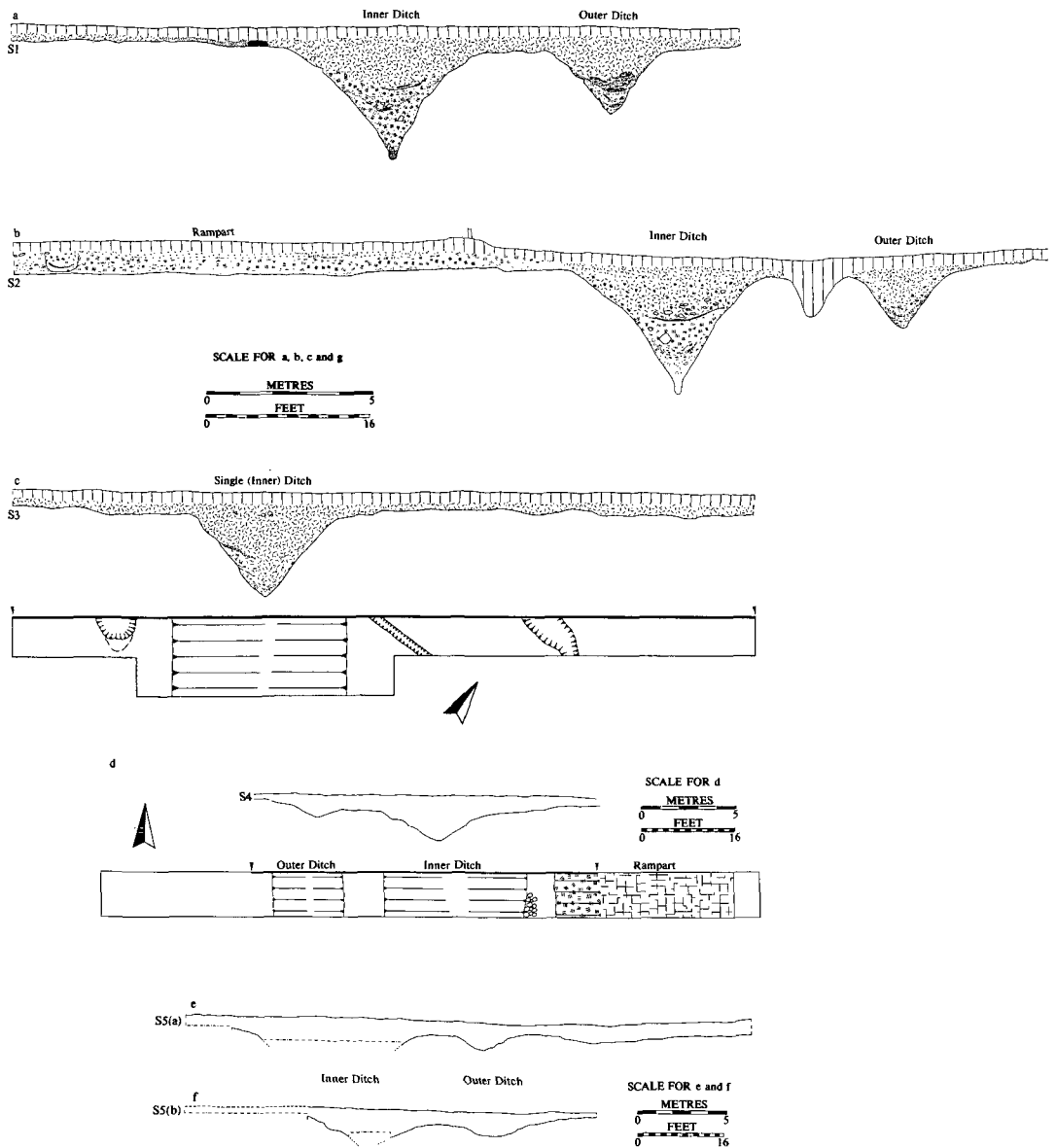
Long visible on aerial photographs, the ditches proved in almost all areas to be the best preserved elements of the fortress. The east, south and west sides of the fortress were defined by a closely spaced pair of V-shaped ditches, with the inner around twice the size of the outer, and with a consistent spacing of c 7 m. It remains a possibility that on the west side, between the presumed side of the west gate and the south-west corner, the outer ditch was either discontinued or pushed out to the west in order to create an annexe attached to the fortress (below). The character of the north defences remains to be confirmed, and may have included only a single ditch along the crest which overlooks the river Tay.

In most places the fill of the ditches was found to consist of clean soil, the result of a gradual accumulation rather than deliberate refilling. Stone debris from the east gate was found in the inner ditch to the north of the causeway (A1), above which was a level of charred wood. Generally the fill of the outer ditch was cleaner, except again at the east gate where a roof tile (unstamped) and the greater part of an amphora were recovered (illus 9). In the section south of the causeway at the east gate (B2, illus 7b) the inner ditch was found to contain a deposit of organic material, mostly of wood. This included several wooden stakes, 0.06 m thick and 0.9 m long, sharpened to a point at one end.

East On the north side of the causeway in front of the east gate a section (illus 7a) across the butt-end revealed the dimensions of the inner ditch as 5.5 m wide and 3.6 m deep and, at an interval of c 7 m centre-to-centre, the outer ditch as 3.6 m wide and 1.95 m deep. Both ditches had a V-shaped profile with unusually steep sides of around 60 degrees above horizontal. Both had been lined with clean yellow clay in order to retain their profile in the sand and gravel subsoil into which they were dug. A section across the ditches (illus 7b) located c 6 m south of the causeway at the east gate revealed similar dimensions and profiles to those recorded on the north side of the causeway (above).



ILLUS 6 Plan of the east gate with location of sections (S1, S2, S6, S7 & S10); and a key to conventions employed on all plans and sections



ILLUS 7 Plans and sections: (a) S1 (Trench A1) across ditches north of the east gate; (b) S2 (Trench B2) across rampart and ditches south of the east gate; (c) S3 (Trench D4) across the single (inner) ditch at the north-east corner; (d) S4 (Trench D7) across the rampart and ditches at the north-west corner; (e) S5a (Trench G1) across defences east of the south gate; (f) S5b (Trench G2) across ditches near south-west corner

North-east Excavation in the north-east corner of the fortress began with a fruitless attempt to locate any remains of an angle tower (D1, illus 11a). The only ancient feature was a collapsed mass of yellow clay that may have derived from the front facing of the turf rampart. In this part of the site the subsoil consisted of layers of pure sand between fine spreads of gravel. Three sections (D2–4, illus 11a) defined the uninterrupted course of the inner ditch around the north-east corner of the fortress, where it was 9ft 6 in (2.9 m) wide and

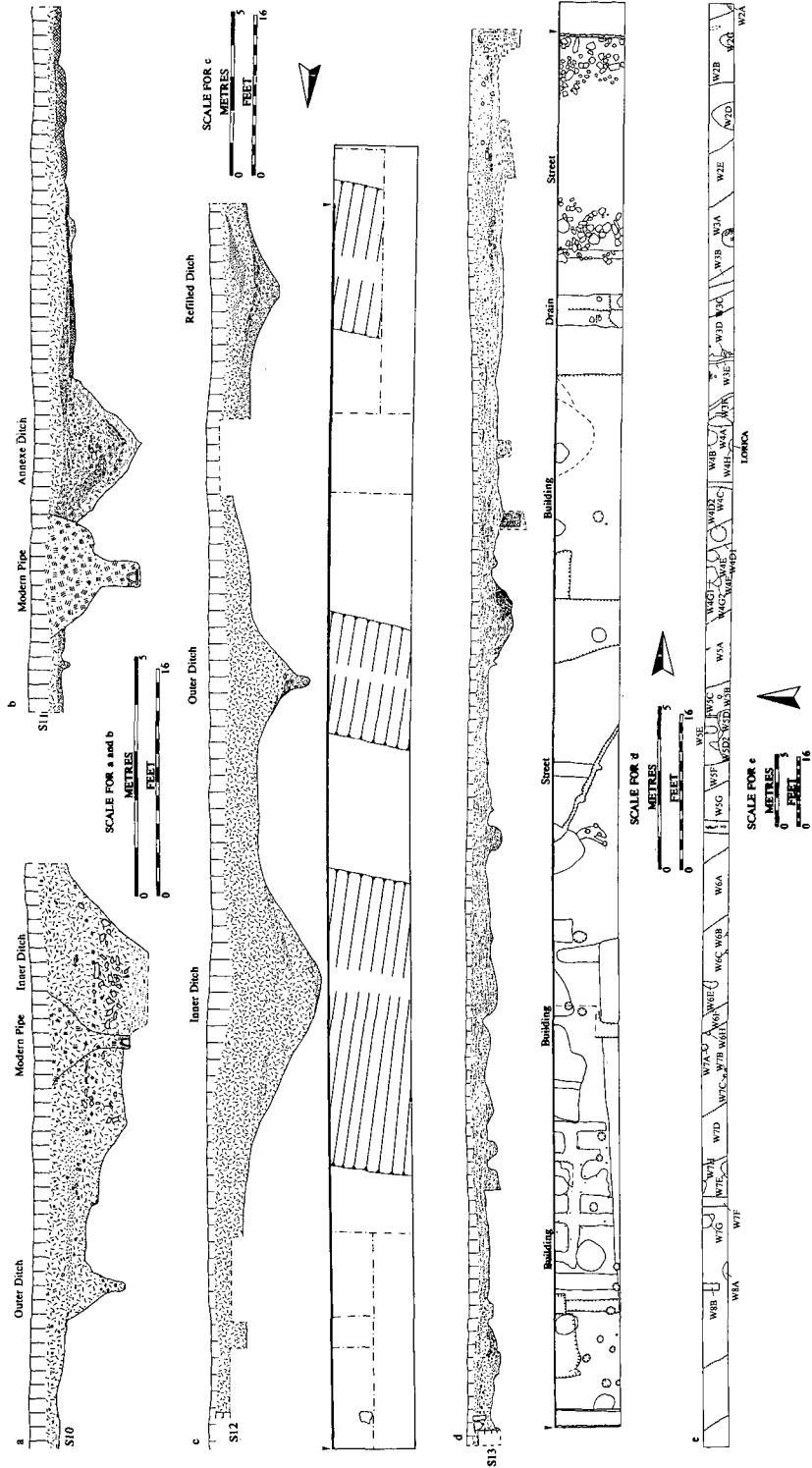
14 ft (4.27 m) deep (illus 7c). The outer ditch, which was revealed at its full depth of c 7 ft (2.13 m) on the east, had already ceased before the turn, having probably merged with the inner ditch. A section across the single ditch on the north (Trench D3, illus 11a) revealed some traces of iron-working in the upper levels of the ditch-fill (below). A layer of slag c 0.15 m deep extended across the width of the trench and contained at least one furnace-plug (below and Tylecote 1970). There was no indication of the date of this activity but it seems reasonable to assume it was debris of the Roman period which later filled up the ditches. The sections of the ditches in the north-east revealed that both were lined with yellow clay to retain their profiles, a work that had to be renewed on more than one occasion.

North-west Two sections in the north-west (D6 & D7, illus 7d & 11 b) revealed only the much reduced profiles (around half the dimensions of those on the east) of the two ditches, cut into a subsoil of red sand, the inner 2.4 m deep, the outer 1.2 m deep. Close to the north-west angle (D7, illus 7d) the inner ditch contained traces of clay lining, while its inner slope was here also stabilized by two lines of timber posts driven vertically into the side of the ditch, the front posts 0.3 m square and the other 0.15 m square. The ditches were somewhat better preserved in a section (D6, illus 11b) which was cut 90 m farther to the south, with the inner ditch 4 m and the outer ditch 2.1 m in depth below the modern ground surface. Here, the inner ditch retained traces of its clay lining.

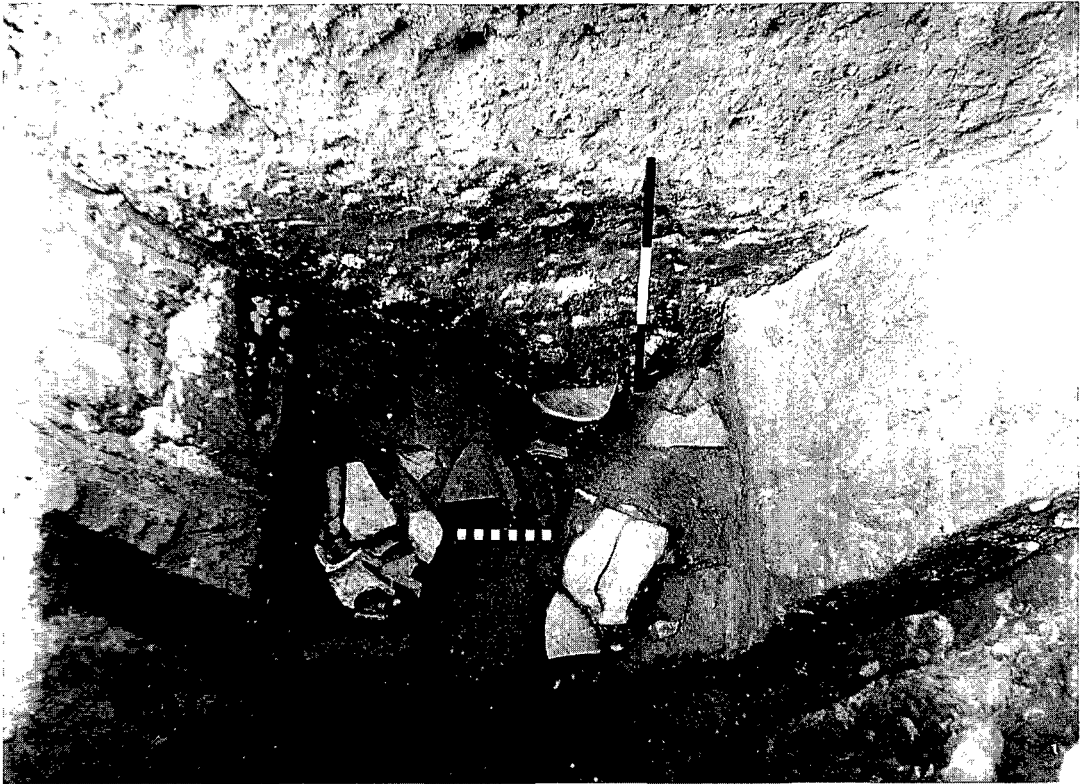
South Both the inner and outer ditches were located, but not excavated, in two trenches (G1–2, illus 7e–f & 12) across the line of the south defences, in an area where they were clearly visible on aerial photographs, for the purpose of completing the plan of the fortress. Enough was revealed to indicate that they were similar in size and spacing to those excavated on the east and west. A section was dug across the causeway of the south gate (N, illus 12). This was found to be 12 m wide between the ends of the inner and outer ditches. In this area extensive disturbance had been caused by the digging of a ha-ha fronting the park of Carpow House. Probably because of this no trace was found of the trench containing the water supply (below) which entered the fortress at the south gate (illus 20).

RAMPART

The line of the fortress rampart cannot be traced on the surface except in the area of the south-east corner, where it remains a prominent rise visible on the surface. A trench at the east gate (B2, section S2, illus 6 & 7) revealed it to be constructed of solid turf, at least in its lower part which survived, with a width of c 6 m and resting on a foundation of clean yellow clay deposited on the gravel subsoil. The berm between the front edge of the rampart and the inner ditch was 3.80 m. In this area no timber or stone were present in its construction. The front or rear profile of the rampart was not preserved in any of the sections cut across its line, while it would have had to reach the height of at least 3.6 m, given an equal slope for the front and rear face, in order to obtain a clear overview of the inner and outer ditches. The construction of laid turfs c 0.4 m square was recognized in a number of places (illus 10). On the west the front face of the rampart appears to have been retained with both clay and stone boulders, some of which were found on the inner slope of the inner ditch (D7, illus 7d), although here there was no trace of the laid foundation of yellow clay. In the north-east corner (D1 & D3, illus 11a) there were no remains of any angle-tower or similar construction, only a line of clay which had evidently come from the front face of the rampart. The rampart curves were also located in sections across or adjacent to the south defences between the south-east corner and the south gate (G2, N and O, illus 7f and 8c).



ILLUS 8 Plans and sections: (a) S10 across ditches south of east gate; (b) S11 across the continuation of the outer ditch as east annexe ditch; (c) S12 (Trench O) across ditches and backfilled 'third' ditch east of the south gate; (d) S13 (Trench M1) between the headquarters commander's residence; (e) Trenches W2-W8 across north *praetentura*



ILLUS 9 Fragments of amphora and tile in the inner ditch fill (Trench A1) north of the east gate

EAST GATE

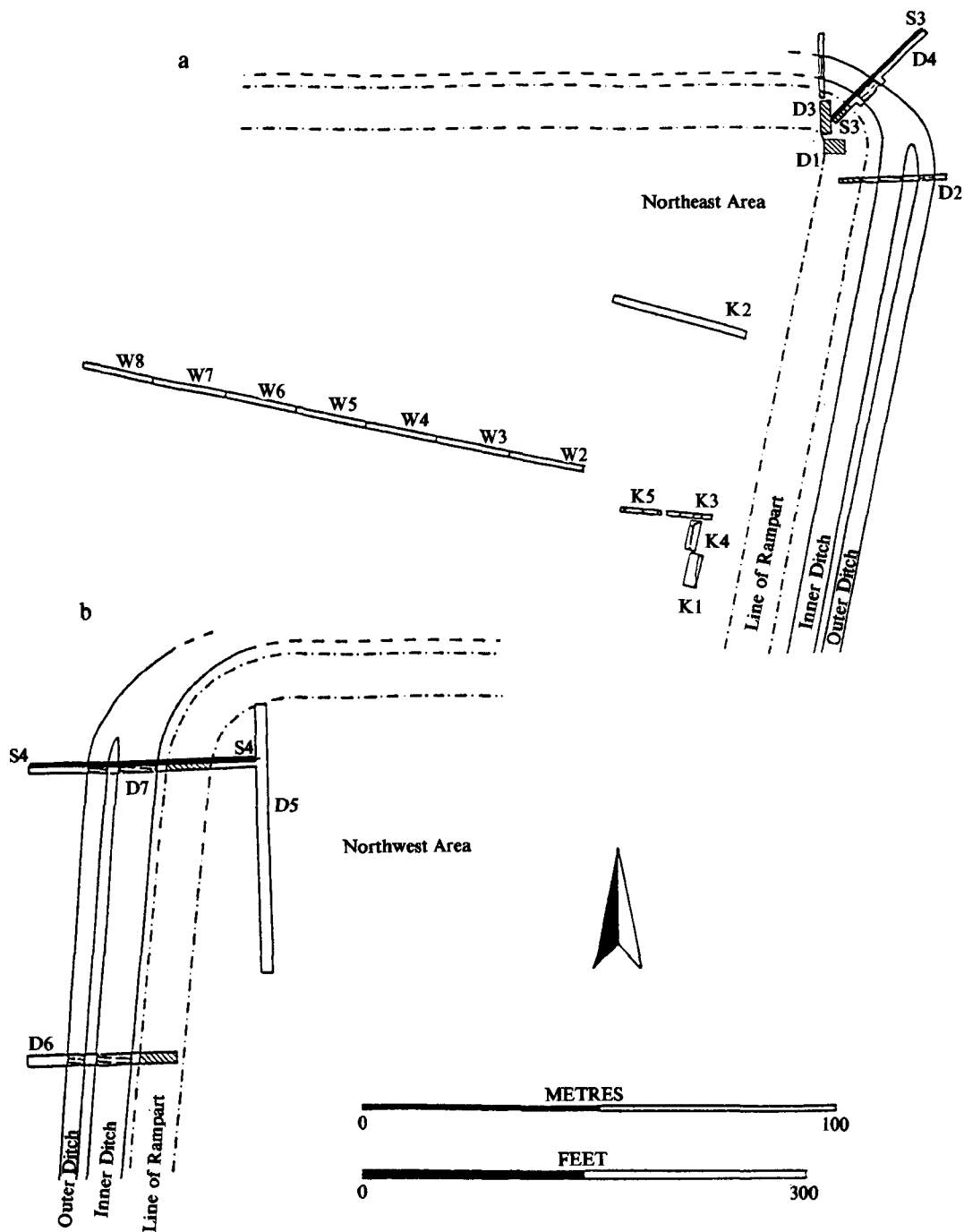
The east gate or *porta praetoria* was the first gate of the fortress to be excavated and was found to be a double-passage entrance occupying overall an area 11 m wide and 7.5 m from front to back (A2, illus 13–15). The construction consisted of two side foundations and in between the front and rear bases of a central spina. The footing rested on river cobbles packed into trenches from 1 to 1.5 m deep. At many points the foundation course of dressed masonry survived, blocks of red sandstone set in hard white mortar, with the outer faces dressed to a regular line down to the original ground level into which the blocks had been partly inserted. The plan of the gate was curiously irregular (illus 14), at least at the foundation level, and the same state of affairs was found also at the south gate (below). The foundation of the north side was near rectangular, at 7.5 m long by 2 m wide at the front, but 2.5 m wide at the rear, where it had partly subsided into a pit (illus 15). That on the south was of similar size, except that it had projections into the line of the south passage of the gate corresponding to the spina foundations. These were each 2.1 m square, but were not located symmetrically between the side foundations. As a result the widths of the two passages were the same at the front of the gate at c 2.4 m, but at the rear the north passage was 3.35 m wide and the south only 1.2 m. No trace of any fixtures or fittings were found in the gate indicating doors or other means of closure. No foundations for any guard chambers were located but it is possible that these were constructed on either side in timber.



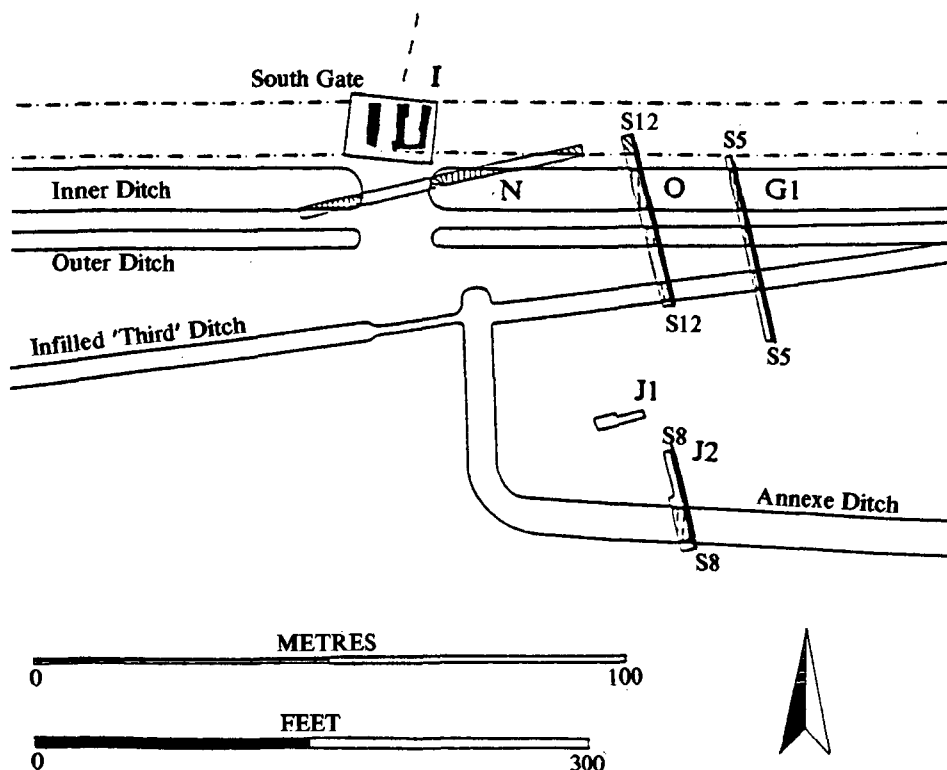
ILLUS 10 Rampart turves (Trench B2) south of the east gate

NORTH GATE

The remains of the north gate, or *porta principalis sinistra*, were not immediately recognized when exposed in Trench C3, partly because of the reconstruction of the fortress current at the time and partly because the excavated features did not resemble in plan a gate of any known form. Subsequent excavation of the south gate (below) and the establishment of the front line of the headquarters building (below) indicated that these features after all represented the north gate of the fortress. The stone foundations measured 12.15 m wide (east/west) by 9.10 m (north/south) and were E-shaped on plan, facing south into the fortress. Construction was similar to that of the east gate, with footings consisting of river cobbles packed into trenches 1 m deep, on top of which was spread a thick layer of white mortar that served as bedding for the first masonry course. The two side foundations and that of the spina — here a single construction, unlike that of the east gate — were 1.35 m wide. The same red sandstone was employed as at the east and south gates,



ILLUS 11 Trenches (D1-7, K1-5 & W2-8) and sections (S3-4) in (a) the north-east and (b) north-west areas of the fortress



ILLUS 12 Trenches (G1, I, J1-2, N & O) and sections (S5, S8 & S12) in the area of the south gate

though here the blocks were much smaller (0.15 m by 0.2 m), being similar to those used in the buildings of the central range (below).

SOUTH GATE (ILLUS 18 & 19)

The remains of this double-passage gate — the *porta principalis dextra* — had suffered some damage from the action of tree-roots, but all its principal elements could be identified. The structure overall occupied an area 12.15 m wide and 9.10 m from front to back, and was similar in plan and construction to the east gate. The foundation trench to hold the river cobbles had been dug deeper for the side foundations than for the spina. Most of the first masonry course of sandstone blocks set in mortar remained *in situ*, revealing that the south gate was also similar to the east gate in respects of its irregularity of plan. No foundations for guard chambers were found. The west passage was 3.8 m wide and the east 3.2 m. It appears that the superstructure on the west side was only 4.4 m from front to back, while the spina and superstructure on the east side extended at least 1.8 m further north into the interior of the fortress. The south gate differed from the east gate in that the front and rear spina rested on a single foundation of cobbles and mortar, although too little of the masonry course survived to indicate the dimensions of the two spina foundations.

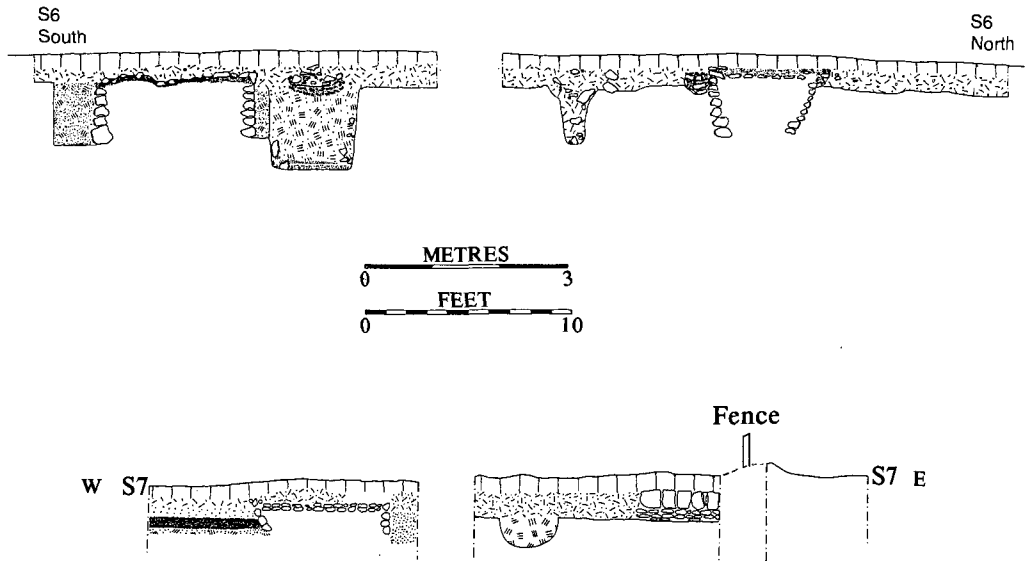
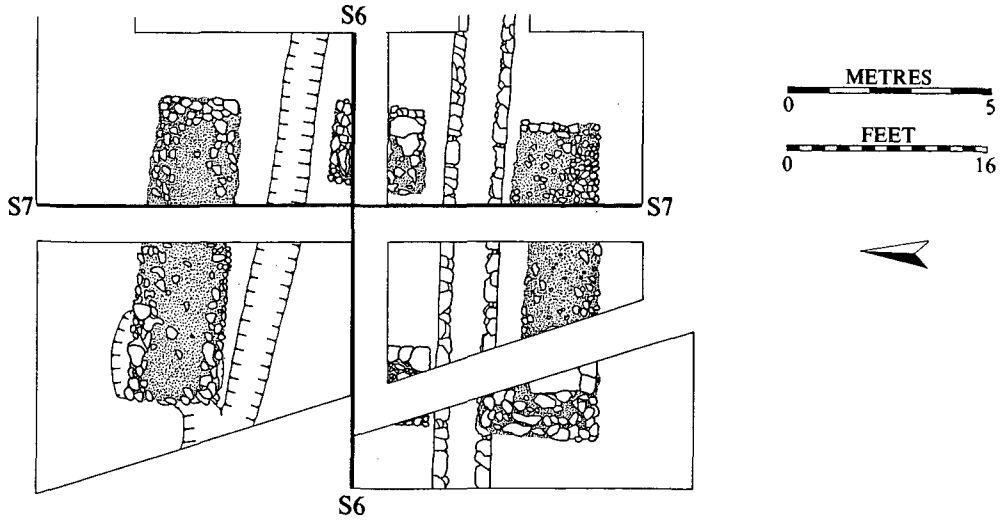


ILLUS 13 Remains of the east gate, from south (Trench A2)

OTHER ASPECTS OF THE GATES

Although three of the four gates of the fortress were excavated (the west gate, or *porta decumana*, is not likely to be available for investigation in the foreseeable future) there is much that remains uncertain regarding their design and construction. The three gates are double-passage entrances but of curiously asymmetrical or irregular plan. Why this should have occurred, given the reasonably precise alignments of elements in the fortress with the axes of the *via praetoria* and *via principalis*, remains a mystery. The design of the north gate may have been similar to that of the other two but, curiously, the passage appears to have been closed off; perhaps the structure had never been intended to serve as an entrance to the fortress. A solution to this problem may yet be obtained through excavation of any ditch or causeway which may have existed in front of the gate. Excavation at the north-east angle suggests that there might have been a single ditch along the north side of the fortress.

The absence of guard chambers can be paralleled elsewhere. During a visit to the site of the east gate in 1965 Sir Ian Richmond suggested a parallel with the north-west gate at Bewcastle, an out-post fort north of Hadrian's Wall. This also lacks foundations for guard chambers and has been dated to the early third century. Search was made where conditions allowed for traces of any timber structures which could have formed part of the gates, either contemporary with or preceding the stone phase of construction. On the east side of the north gate (illus 16 & 17) the pits of four posts, each of c 0.18 m square, survived to a depth of 0.6 m in the subsoil. These



ILLUS 14 Plan and sections (S6 & S7) of the east gate

would have formed a square structure with sides 2.75–3.0 m in length. All trace of the rampart in the vicinity of the north gate had disappeared but the posts could have belonged to a tower set above the rampart, thus accounting for the relatively shallow depth of the post pits in the subsoil for such a structure, rather than to the uprights of a guard chamber at ground level. At the north

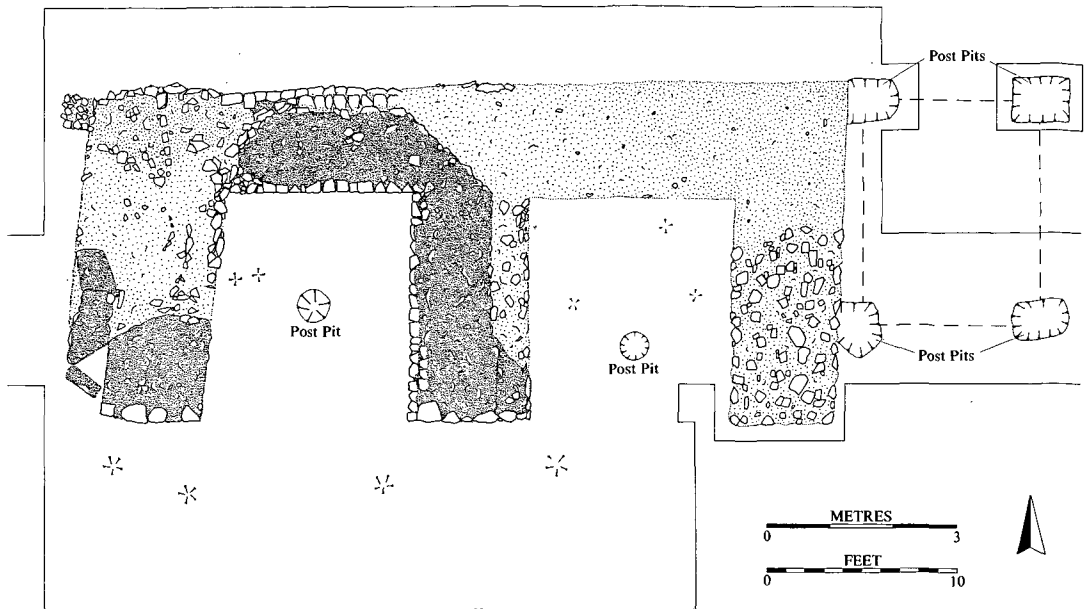


ILLUS 15 North pier of the east gate from east (Trench A2), showing partial collapse into and earlier pit(?) (*McManus Galleries: Dundee Arts & Heritage*)

gate two pits 0.9 m deep contained posts 0.15–0.2 m in size; these were located near the centre of the two passages through the gate. Their purpose is unclear, unless they relate to a threshold or similar feature which served to secure the wooden doors that may have closed the gate. On the south side of the east gate two posts — one 0.4 m by 0.3 m the other 0.2 m square, and set in similarly shallow pits — are likely to belong to a similar rampart-tower to that suggested above for the north gate. Some possible post-pits were located in the vicinity of the south gate but the presence here of tree roots made the investigation of such features both inconclusive and unrewarding.

ANNEXES (ILLUS 5 & 20)

Ditches revealed on aerial photographs indicate the existence of defended annexes attached to the south and west sides of the fortress. The excavations of 1961–2 located a ditch 72 m beyond the line of the western defences between the (then) assumed position of the west gate and the south-west corner of the fortress. The ditch of an annexe on the south side, between the south gate and the south-west corner, was also apparent on aerial photographs (illus 20). This can be traced to form the south-west angle of an enclosure east of the south gate on a line parallel with, and 36 m beyond, the southern defences. The ditch was sectioned (J2, illus 12) and found to be 2.4 m deep with a V-shaped profile, similar to that of the outer ditch of the fortress. The existence of a similar annexe attached to the south of the fortress on the west side of the south gate is indicated by the



ILLUS 16 Plan of the north gate

line of a single ditch running east/west on the same alignment (illus 20), but no investigation of this was undertaken.

On the east side of the fortress it appeared from aerial photographs that the line of the outer ditch on the south side of the east gate did not end but, instead, continued across the line of the causeway after a turn of 40 degrees, and then followed a natural incline leading towards the bank of the river a short distance downstream from the fortress (illus 3). Excavation (illus 6 & 8b) revealed that in fact both defensive ditches of the fortress ceased, but their lines were continued via a channel c 0.3 m across which then widened to form a V-shaped ditch, 2.1 m across and 1.8 m deep, on the new alignment heading for the river bank. At some period during the Roman occupation this ditch appears to have been deliberately filled and a gravel road surface laid above it. The purpose of this extension of the outer ditch may have been to protect the triangular area which it defined — together with the northern sector of the east defences and the bank of the river — and to provide a secure unloading area between the fortress and the river.

Within the area of the south annexe described above, but continuing some distance to the west beyond it, a single ditch appears on aerial photographs to branch off at the narrowest of angles from the outer ditch to the west of the south-east angle, and to follow a line a little more to the south than that of the south defences of the fortress (illus 20). This ditch was sectioned c 20.5 m beyond the line of the outer ditch and was found to have a V-shaped profile, c 3 m wide and 1.5 m deep (O, illus 8c). The filling consisted of rammed and compacted gravel, which left no doubt that it been deliberately filled and the ground firmed up after having been open for only a short period.

This ditch is not likely to have been part of an annexe or similar enclosure but was probably an incorrect alignment of the south defences, which included the intended location of the south gate, and had continued for some distance before the error, if indeed it was indeed such, could be corrected. In the sector of c 15 m where it crossed the front of the south gate, the ditch narrowed



ILLUS 17 The north gate from south-west (Trench C3); post-pits are indicated by survey rods

to a small channel. This channel may have been part of a marker trench which directed the work of those who dug the ditch to its full depth, and which survives here in front of the gate where the ditch was interrupted by a causeway.

CENTRAL RANGE

HEADQUARTERS BUILDING (ILLUS 21 & 25)

The mortared stone foundations of the headquarters building or *principia* — measuring overall 47 m north/south and 39.6 m east/west — were first located and partly excavated in 1961–2 (above). The front of the building was examined in 1968 (E, F1 & F2, illus 21) and further details regarding its construction were obtained by excavation in 1975 on its south side (M1, illus 25 & 8d).

The front area examined in 1968 lay beyond the east boundary fence of the park of Carpow House, in a field that had been in agricultural use for many years. The ground surface here is from 0.6 m to 0.9 m below that of the park, while the area has in modern times been disturbed by a system of field drains. At the south-east corner of the headquarters (E: A–B, illus 21) only the foundation of cobbles set in clay remained of the outside wall of the building but three blocks of



ILLUS 18 Plan of the south gate

the lowest masonry course of an inner partition wall were found *in situ*. These belonged to the partition wall which enclosed the corridor room (*armamentarium*) on the south side of the forecourt of the headquarters (illus 22). This wall appeared to have stopped 0.9 m short of its junction with the front wall of the headquarters, perhaps an indication of a doorway into the room at the corner of the forecourt. A row of at least four posts, 0.15 m square and 1.35 m apart, was set parallel with the front wall and 0.9 m from it; these are likely to represent a stairway to an upper gallery or loft above the corridor room.

At the north-east corner of the headquarters (F1, illus 21d) a platform made of cobbles set in clay was raised against the east front of the building. This may indicate a covered veranda fronting the line of the *via principalis*, though no posts for the supporting pillars of such a structure could be located. Finally, an examination of the central sector of the east wall, over a span of 9 m, revealed only a cobble foundation 1.05 m wide (F2, illus 21a; there was no indication

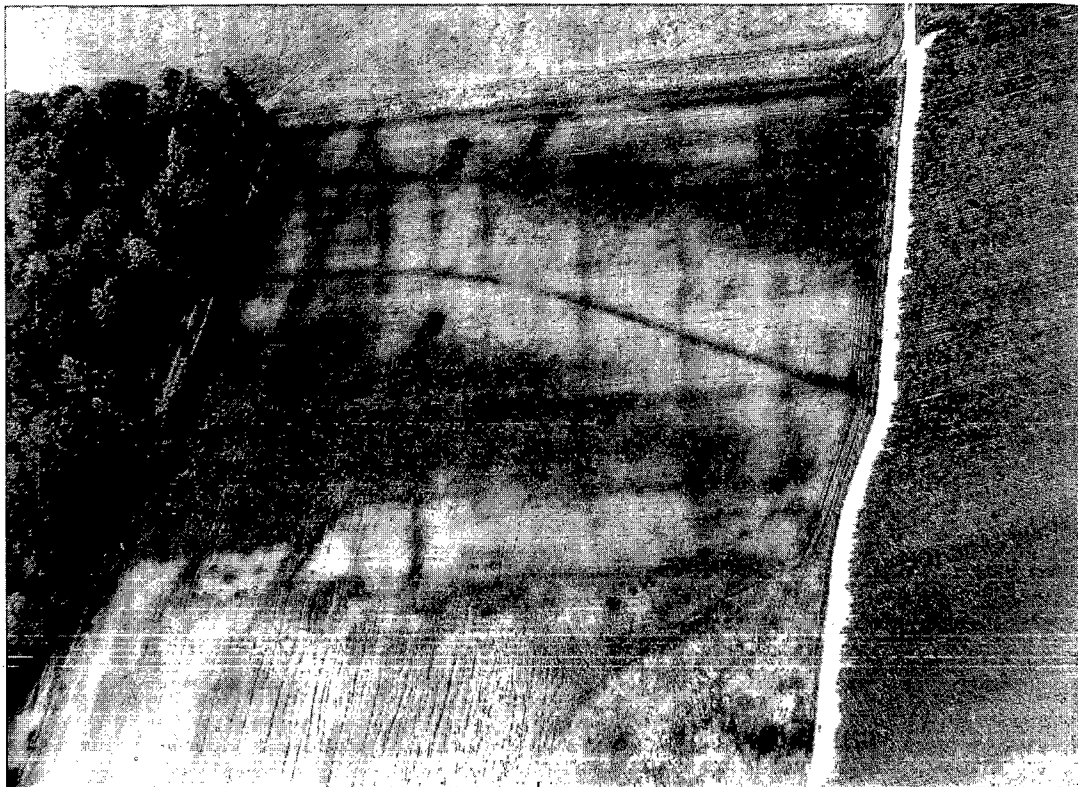


ILLUS 19 The south gate, from north (Trench I) (*H Adamson*)

of the main entrance to the headquarters, which would have faced the junction of the *via praetoria* and *via principalis*.

The central sector of Trench E (illus 21) provided a diagonal section across the forecourt of the headquarters building. This revealed that, as anticipated, almost all the ancient levels had been truncated by ploughing or field drains. A few patches of cobbles may represent the metalled surface of the open forecourt but no other remains came to light until the wall of the north corridor room (*armamentarium*) was reached. This was 0.6 m thick and with four courses of masonry still *in situ* (illus 21e). The dressed blocks of red sandstone which faced a core of mortared rubble had been laid directly upon a cobble platform which continued across the width of the room to the main outside wall of the headquarters. The latter was 0.9 m thick and represented by five courses preserved *in situ*, resting on a foundation of glacial cobbles set in clay within a trench extending to 0.7 m below the Roman ground level. The north corridor room was found to be 4.27 m wide, 0.6 m wider than the room on the south. The raft of cobbles which served as a foundation for its walls extended 6.4 beyond the building, indicating the presence of a street or alley along the north side of the headquarters.

The survival of the remains at the north-west angle of the forecourt enabled the sequence of building operations to be reconstructed. First the foundation trench for the outside wall was dug; this was filled with cobbles which were then covered with a thick layer of white mortar. Next, a cobble spread was laid across the width of the corridor room and then continued outside the north wall of the building. Finally, the masonry courses of the corridor room wall were laid. It remains



ILLUS 20 Aerial photograph of the area outside south gate, from west; visible features include the aqueduct channel, and the annexe ditch east of the gate, crossed by the misaligned 'third' ditch (*Cambridge University Collection*)

uncertain whether this wall was carried up to the full height of the building in a timber-framed wattle-and-daub construction or whether the surviving four courses were simply the base for the timber posts of an open veranda. The evidence recovered so far indicates the former arrangement. The headquarters as a whole certainly included an amount of half-timbered construction with wattle-and-daub. This much is attested by quantities of burnt daub and nails recovered from demolition levels outside the south wall during the 1975 excavation (M1, illus 25).

The section against the outer face of the south wall revealed the foundation trench to be cut through layers of gravel into what appeared to be a stratum of permanently wet sand 0.75 m thick. The foundation cobbles in this area were stabilized on a bed of wooden planks which rested on oak piles (0.095 thick, 1 m long and set 0.2 m apart) driven through the level of wet sand into the firmer gravel subsoil which lay below. Samples of the timber were removed for analysis (below).

On the south side of the building a raft of cobbles 5 m wide was found adjacent to the south wall, indicating that, as on the north side, an internal street or ally ran alongside the wall of the headquarters.

COMMANDER'S RESIDENCE

Except for small test excavations to tie in the outline of the building with the survey of the fortress, no further investigations were undertaken on the site of the building identified as the

commander's residence or *praetorium*. This stone building measured 40 m by 25 m and lay 44 m south of the headquarters; its front wall was on the same alignment as that of the latter building, as established in 1968 (F2, illus 21a). No evidence was recovered from excavation in the vicinity of the building to challenge the conclusion — based on the excavations of 1961–2 (above) — that this structure represents the commander's residence, or that it was a free-standing stone structure not directly linked with any other building in the area.

STRUCTURES NORTH OF THE HEADQUARTERS (ILLUS 23 & 24)

Investigations in the area north of the headquarters building sought any traces of other structures in the central range (illus 23a). The raised platform or street described above was found to extend for 6.4 m (E: C–E, illus 21e) from the wall of the headquarters. Beyond this a line of three post-pits, each 0.6 m in diameter, contained posts 0.15–0.18 m square (H1, illus 23), indicating the south wall of an adjacent building. Excavation in 1966 (C1, illus 23) recorded a line of seven post-pits, 0.2 m across and 0.45 m deep. These were on precisely the same east/west alignment as the previous group, at 75 m north of the headquarters and 4.6 m south of the granary (below). The east wall of the building represented by these post-pits would have faced onto the *via principalis* and was indicated by a line of two other post-pits, while a shallow channel suggests the western edge of the road itself. In Trench C2 (illus 23) a line of north-south post-pits was observed south of the granary (illus 24). In this area all the ancient features had been degraded by agriculture to shallow cuttings or depressions in the soft subsoil of sand and gravel.

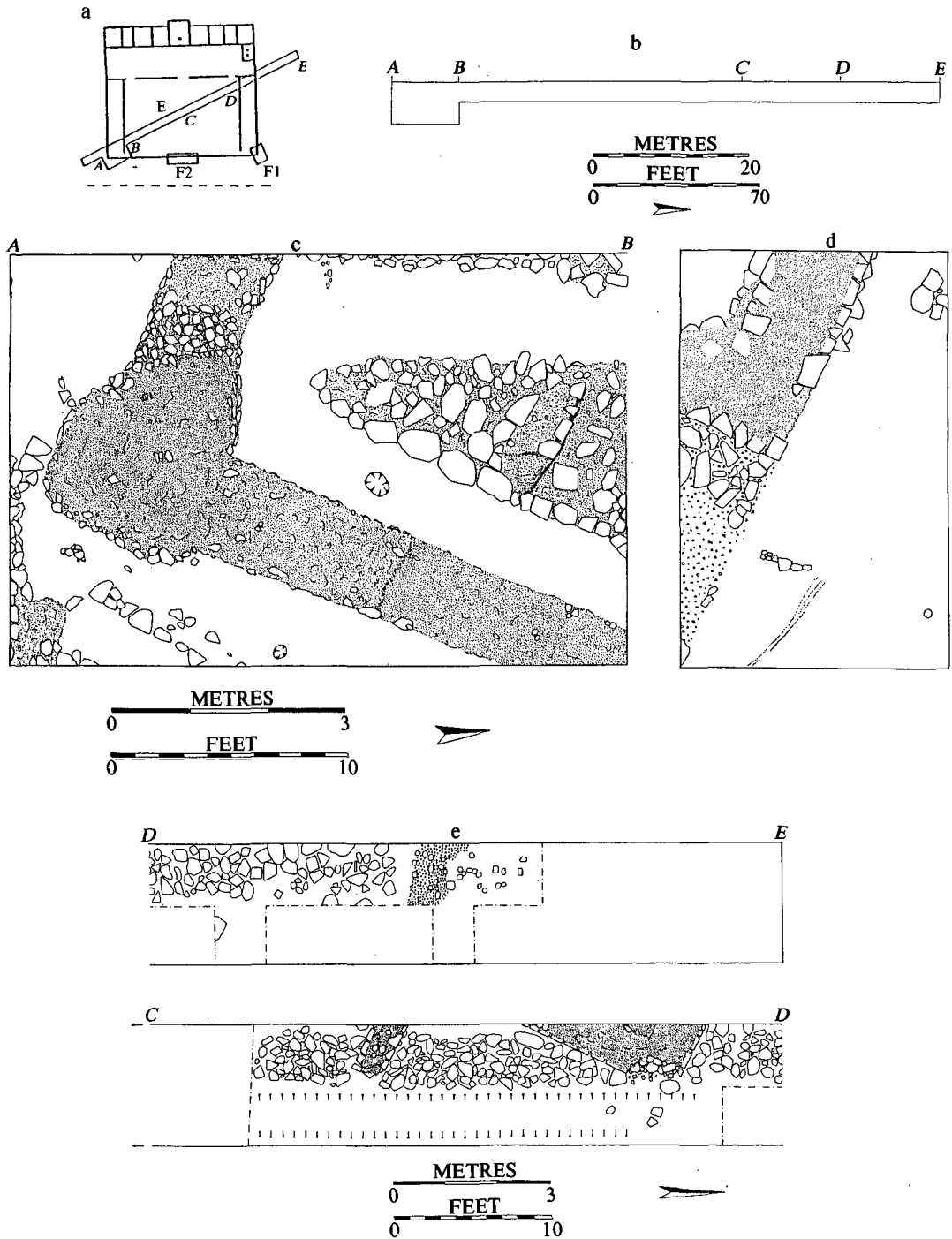
STRUCTURES SOUTH OF THE HEADQUARTERS (ILLUS 25)

In 1975 a section (M1, illus 25) was excavated across the interval between the two stone buildings on a line 5 m west of the *via principalis*. The trench lay within the tree-covered park of Carpow House where, though the ancient remains had been less affected by modern agriculture, the subsoil consisted of compacted but well-drained gravel in which ancient features could only be recognized with some difficulty. The street make-up outside the south wall of the headquarters was 11 m wide. Around 2 m south of the street lay a deposit of yellow clay, much disturbed, with impacted fragments of wattle-and-daub. This puzzling feature was further explored by a small trench 2 m square (M2, illus 25a and b) a short distance east of the first trench. This revealed that the clay had served as a bedding for a stone-lined drain, with an internal width of 0.44 m, on an east/west line parallel with that of the south wall of the headquarters.

In the remaining 33 m of the main trench (M1), extending towards the commander's residence, some 18 posts were identified, most of which held timbers no larger than 0.18 m square. The posts were grouped in three areas of the trench, at distances from the south wall of the headquarters of 14–16 m, 26–32 m and 35–43 m. The make-up for a second east/west street 4 m wide lay precisely half-way between the two buildings (at 20–24 m from the headquarters). This indicated that there were probably three buildings in the area, one to the north of this new street, and two others to the south.

A second small trench (M3, illus 25) was opened in an attempt to establish the eastern limit of buildings in this area, fronting the *via principalis*. Unfortunately, recent disturbance and ground conditions prevented this, although there were indications that the building line on the east was the same as that of the commander's residence and the headquarters.

It was not possible to determine whether these structures had been permanent installations of the fortress rather than temporary structures, removed following completion of the stone



ILLUS 21 Headquarters building: (a) location of Trenches E & F1-2; (b) relative location of areas within Trench E; (c) south-east corner of headquarters (Trench E: A-B); (d) north-east corner of headquarters (Trench F1); (e) north-west area of headquarters courtyard (Trench E: C-E)



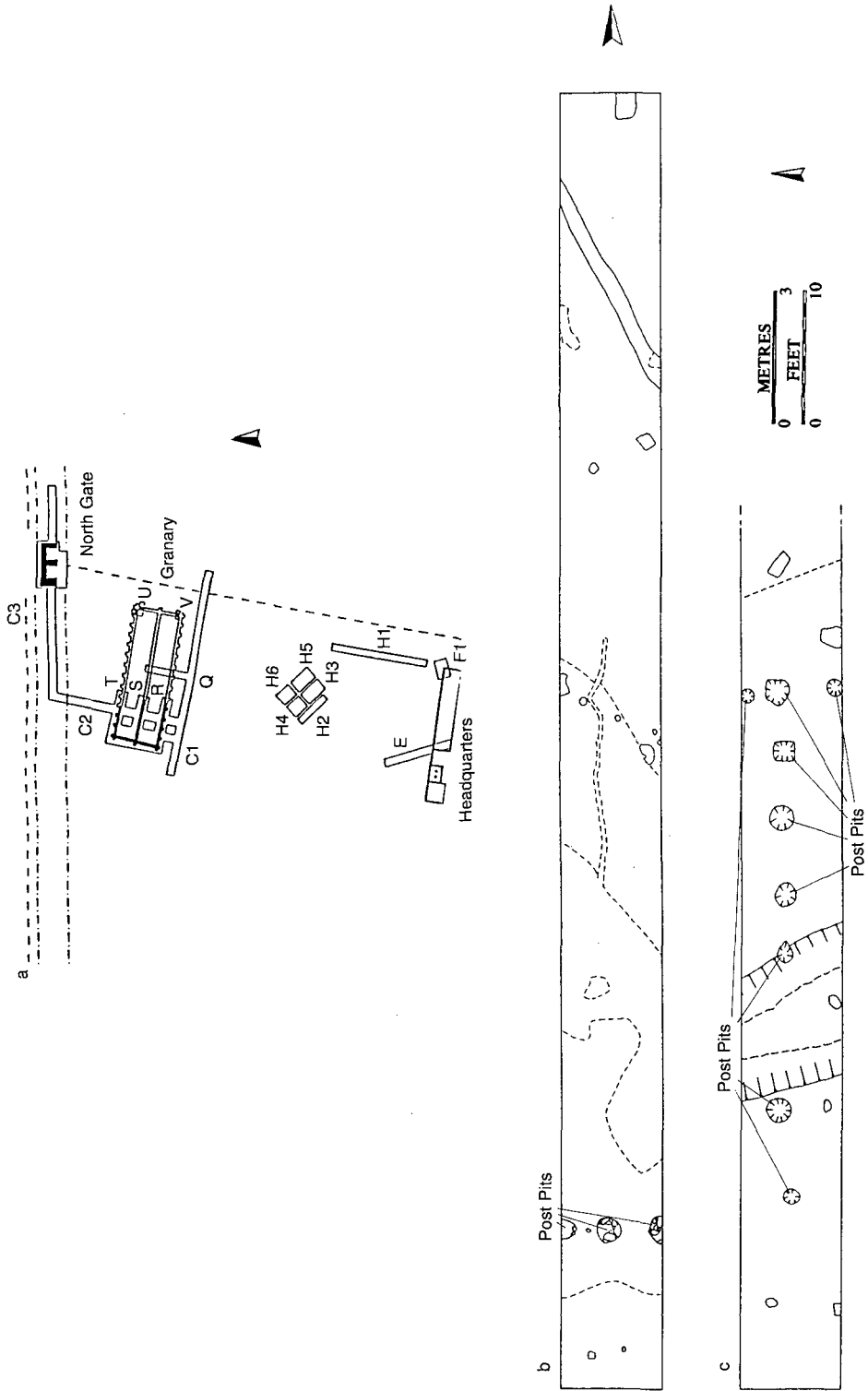
ILLUS 22 South-east corner of headquarters, from north (Trench E: A–B). Facing stones of the wall of the south *armamentarium* are visible in the right foreground

buildings. A layer of masonry chippings overlying and apparently in the upper fill of some of the post-pits outside the north wall of the commander's residence suggests that at least some of these posts belonged to temporary structures. In the area north of the street quantities of burnt wattle-and-daub and nails, many bent from extraction, appear likely to have come from the headquarters building itself.

GRANARY (ILLUS 26 & 27)

One of the exploratory trenches of 1966 (C2, illus 23) in the northern area of the fortress revealed two foundation lines of river cobbles 7 m apart and on the same east/west alignment. (They lay 4.5 m north of a line of seven posts recorded in the same season in Trench C1 and which probably represent the line of the next building to the south, as described above). In the same trench, pottery and animal bones were recovered from the filling of a pit to the north. The discovery of the remains later identified as those of the north gate prevented further examination of the structure to which these features belonged. Ten years later a series of trenches in the area (P–V) revealed the foundations of a buttressed storage building, most likely a granary or *horrea*, which were often located in the central range of a Roman camp (illus 26).

The building measured 40 m by 14.5 m, while enough of the foundations survived to indicate that the walls are set 6 degrees off a rectangle, indicating a precise alignment with the principal axes of the fortress represented by the lines of the *via praetoria* and the *via principalis* (illus 23a & 27). The building was strengthened by buttresses 1 m wide and projecting 0.75 m to the outside of the walls at intervals of 3 m. The end walls of the building were similarly supported by buttresses, one near each corner and a third at the centre. The cobble foundations, which indicated walls up to 1 m in width, survived for about a third of the building at the west end (P–T). It proved possible to locate the corners of the building at the east end (U & V), facing onto the *via principalis*, and as a result to determine the overall dimensions of the building with reasonable certainty. The granary was divided into equal halves by a longitudinal partition. This



ILLUS 23 North part of the central range: (a) location of trenches; (b) Trench H1; (c) Trench C1



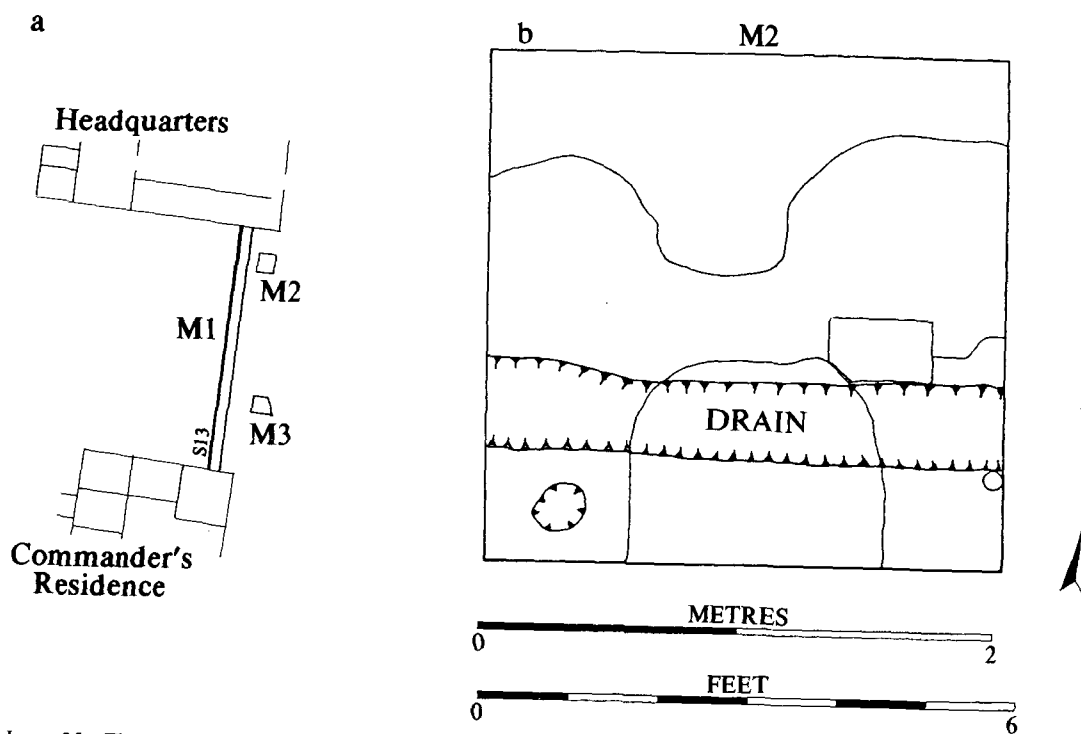
ILLUS 24 Line of north/south post-pits south of the granary (Trench C1–2)

rested on a cobble foundation of the same width as those of the outside walls and, presumably, supported the ridge of a single roof. No indication was found of any entrance or of any loading ramp which the building is likely to have had.

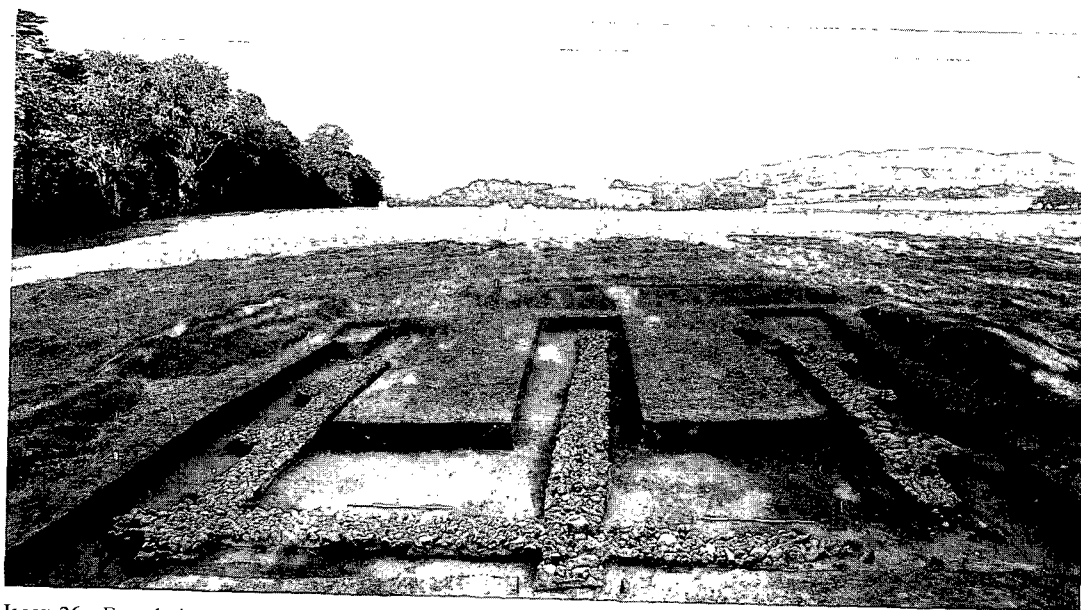
FRONT AND REAR BARRACK AREAS

FRONT BARRACK AREA (ILLUS 28 & 29)

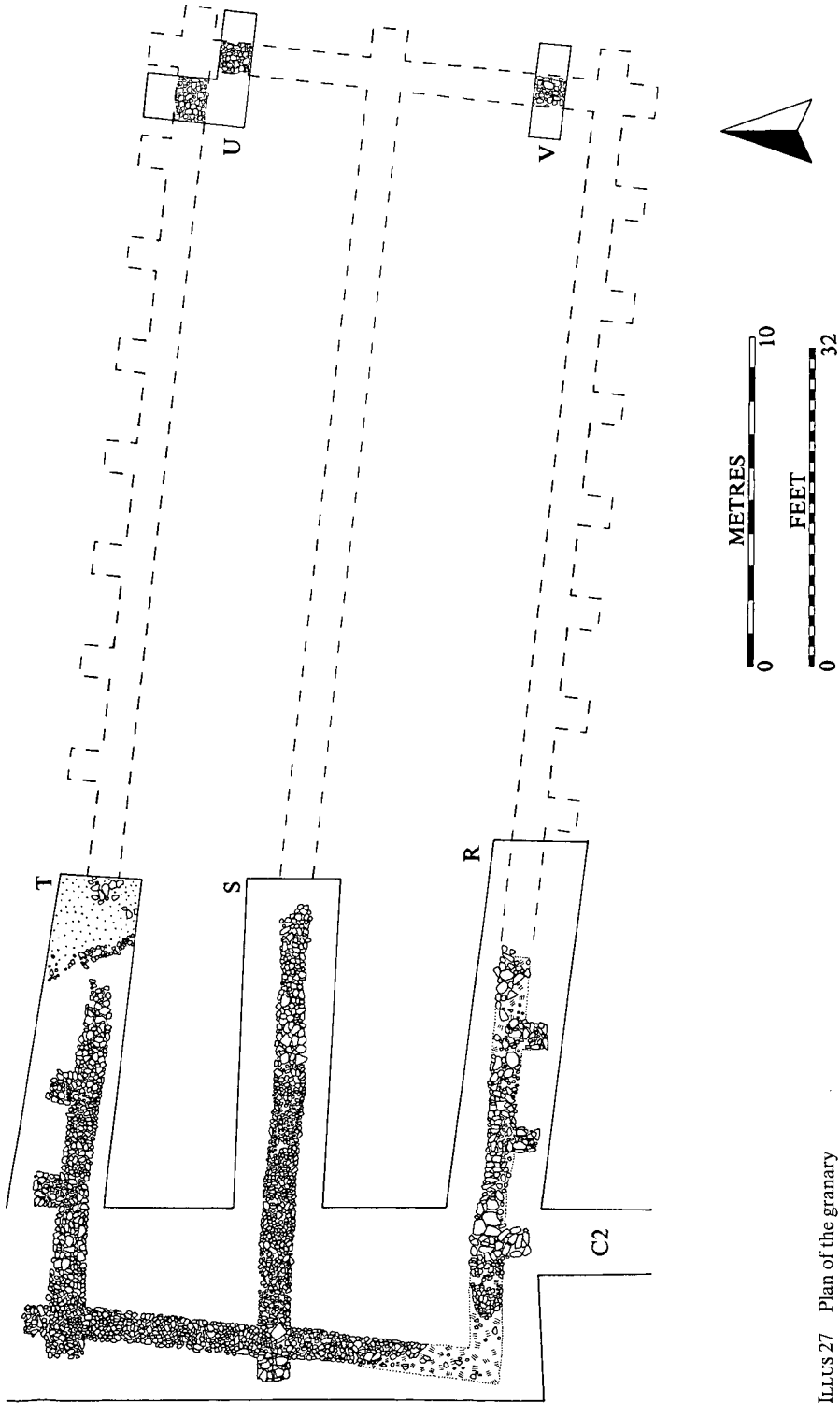
Two seasons of investigations were undertaken to investigate the remains of buildings and other features which could be seen on aerial photographs (illus 28) in the northern part of the front barrack area or *praetentura*. These features included regular lines of pits, aligned north/south, and also the solid lines of possible construction trenches. From the evidence of these photographs it was possible for St Joseph (1973, 117–18) to reconstruct an arrangement of six barracks, or buildings of a similar character, which were 70 m long and arranged in facing pairs. In 1970 five trenches (K1–K5) were excavated in the area adjacent to the east defences (illus 11a). In one of these (K1, illus 29) a north/south channel was located along with four probable post-pits, in no regular arrangement. The channel may have been a construction trench but could equally have been a surface drain similar to those found in later work (below). The linear features, whether drains or construction trenches, probably indicate the eastern limit of a building adjacent to the east rampart, with an intervallum road (*via sagularis*) in the intervening space. A second trench (K2) was opened on the same line, but closer to the north-east corner, at c 85 m north of the line of the *via praetoria*. This revealed three slots on a north/south alignment and spaced at 4.2 m and



ILLUS 25 The central range between the headquarters and commander's residence: (a) location of Trenches M1-3 and S13; (b) Trench M2.



ILLUS 26 Foundations of the granary, from west (Trenches P-V)



ILLUS 27 Plan of the granary

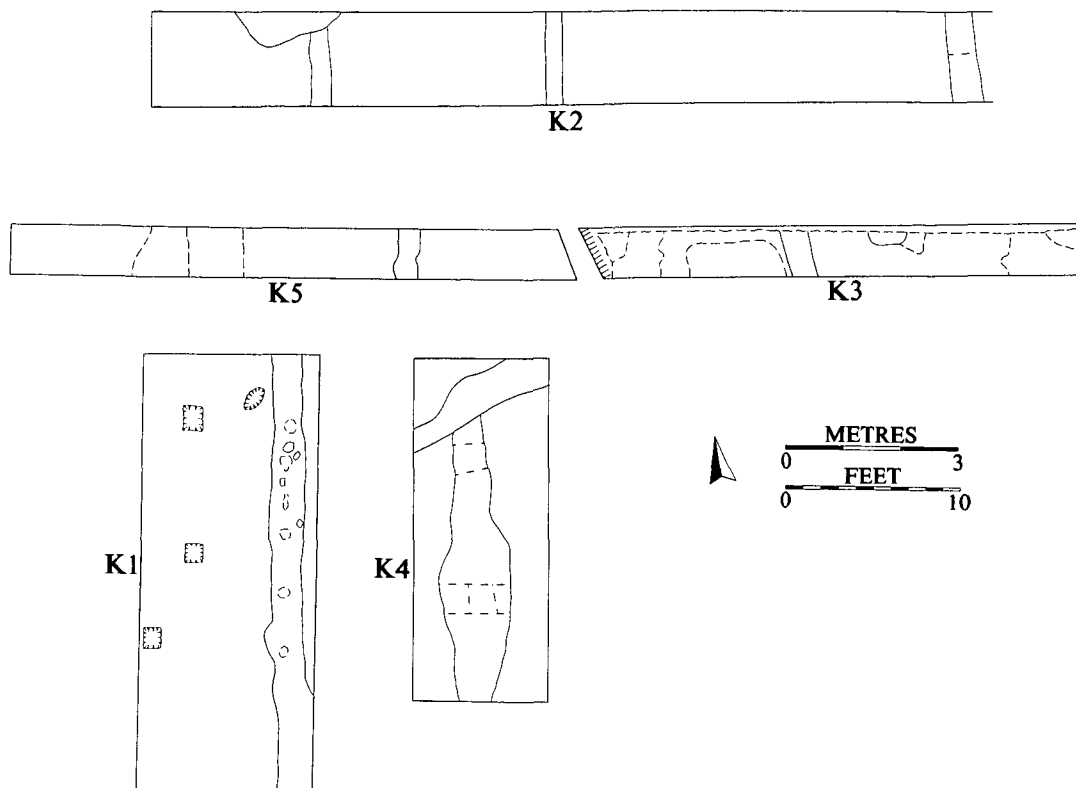


ILLUS 28 Aerial view of the eastern area or *praetentura* of the fortress; visible features include the ditches, east gate, and north/south alignments of channels and pits (*Cambridge University Collection*)

7.4 m from east to west, perhaps representing the next barrack on the west. Subsequent trenches (K3–5) to confirm a possible reconstruction of these buildings proved inconclusive due to soil conditions and modern disturbance, including recent burials of farm animals.

Despite the evidence of aerial photographs and these limited excavations, the internal arrangement of buildings in the *praetentura* of the Carpow fortress remains a significant gap in our understanding of the nature and the military function of the site. The excavations of 1970 and subsequent years gave rise to some concern that the normal activities of agriculture were removing the traces of these structures at a rate that should at least be monitored. At the same time it was concluded that small trenches were unlikely to yield the amount of evidence that was required, given the condition of the subsoil over the site. For this reason an exploratory excavation was carried out in 1979 across the northern *praetentura* to assess the extent of the threat posed by agriculture. Originally a trench 131 m long by 1.83 m wide was envisaged, but in the event a sector of 106.5 m was excavated (the trench was divided for recording purposes into seven sectors of 15.25 m, W2–W8 proceeding from east to west; illus 8e & 11a). The plough-soil was between 0.3 m and 0.45 m deep above the now familiar underlying sands and gravels. In the surface of these subsoils three types of feature were identified: channels, post-pits and rubbish pits.

Three channels (in W4, W5 & W 7F) occurred at intervals of 25 m and 27.75 m. They contained pottery and burnt daub and appear to represent the dark lines visible on aerial



ILLUS 29 Trenches (K1–5) in the eastern area or *praetentura*

photographs. They were evidently not construction trenches and, from the evidence of silting, are more likely to have been gullies or drains leading to the main drain of the fortress along the line of the *via praetoria* (like the example near to the east rampart noted earlier, in Trench K1).

Nine possible post-sockets or post-pits (in W2–4 & W7) were recorded but with no regular relationship, either between each other or between the three channels described above. Most contained Roman material, including burnt daub, nails, animal bone and a bronze scabbard-tip. Quantities of Roman material were also recovered from pits (in W2 & W4–8), including the exceptional find of a linen tunic remnant with bronze scale-armour attached (below). Most of these pits survived to a depth of about 1.5 m and had rounded profiles. The fills were mainly of clean soil, though most contained charred material and burnt daub in their uppermost levels. The excavation of all these features was complicated by numerous depressions in the subsoil which were probably the result of modern agriculture.

The results of this investigation of the *praetentura* have at least confirmed the existence of (though not further delineated) the structures deduced from the aerial photographs. The north/south buildings, which were certainly barracks to judge from the finds of military equipment, were constructed not with continuous sleeper trenches but with timber uprights in individual post-pits. The channels or drains between the buildings can be traced with little difficulty. On this evidence it must be doubted whether even a large-scale clearance would yield a sufficiently precise plan of these structures or, in short, justify the expense of such an operation at the present time.



ILLUS 30 Road metalling of the *via praetoria* inside the east gate, from north-east (Trench A2)

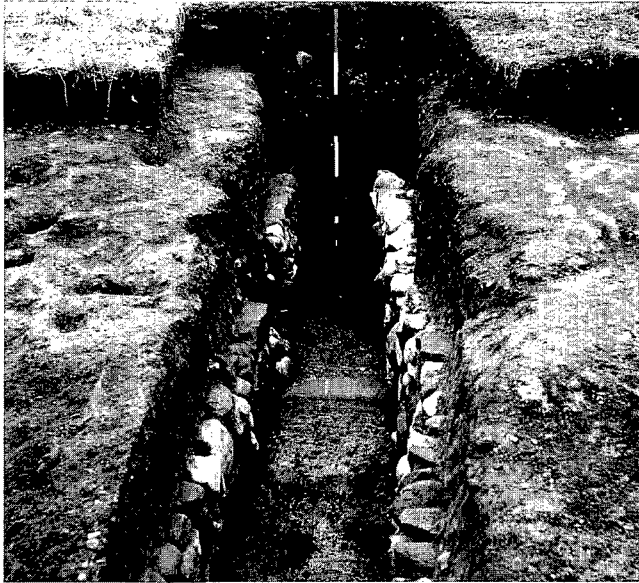
REAR BARRACK AREA

Only a part of the rear barrack area of the fortress, or *retentura*, is currently available for excavation. The remainder is occupied by woodland or by the landscaped environs of the successive Carpow Houses (illus 2 & 3). The north-west part of the site has evidently been subject to extensive landscaping since the development of the estate in the late 18th century. In 1967 a north/south trench (D5) was excavated for a length of 61 m on a line 12 m within the west defences to investigate any traces of structures in the area (illus 11b). Unfortunately, it proved necessary to remove a large overburden of soil, the result of landscaping, over most of the area of the trench. Some traces of what may have been channels or construction trenches were noted but none was on an alignment corresponding with the axes of the fortress. Several pits were excavated containing fragments of amphora and unburnt clay daub.

OTHER INTERNAL FEATURES

ROADS (ILLUS 30)

The principal roads within the fortress were surfaced with fine gravel or small pebbles above a compacted bedding of sandstone chippings. This was evident in the sector of the *via praetoria* preserved at the east gate (illus 6), where its width could be estimated at 9 m. In this area also the subsidence of the road metalling into the drain which ran through the south passage of the gate preserved a small area of the original surface of small pebbles. A similar construction was evident in the small area of the *via principalis* preserved at the south gate (I, illus 18 & 19). Within the fortress as a whole no trace of any road surface or bedding was found in the areas currently under cultivation. The make-up for a road or possible platform was located on both the north and south sides of the headquarters building (E & M1; above), and the metalling of an east/west road across the central range was preserved midway between the headquarters and the commander's residence (M1, illus 8d).



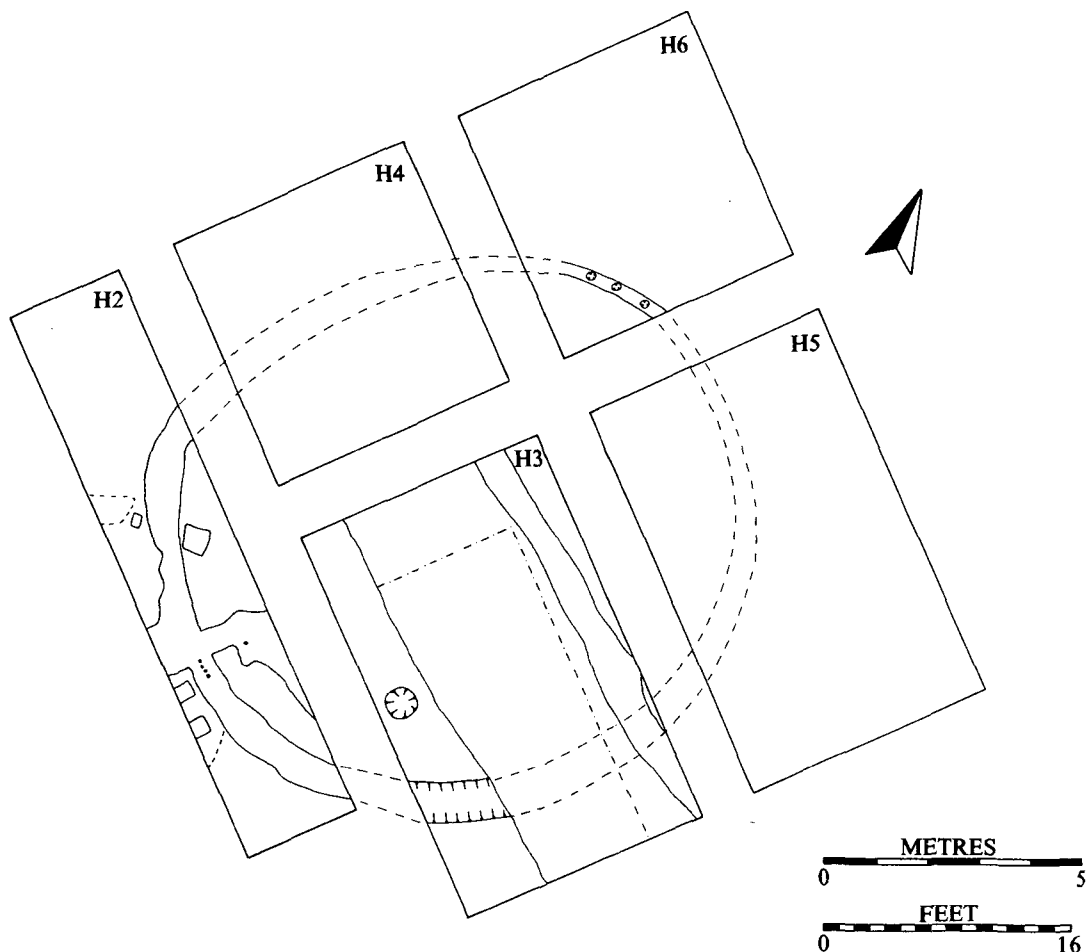
ILLUS 31 Stone-lined drain outside south passage of east gate from west (Trench B1).



ILLUS 32 Pipe channels in the east passage of the south gate, from north (Trench I)

DRAINS (ILLUS 31)

A well-constructed drain, 0.45 m wide and up to 1.2 m deep, was found running through the south passage of the east gate in Trench A2. The drain is visible on aerial photographs running beneath the metalling of the *via praetoria* from the direction of the headquarters building (illus 28), where its line was also located (below). Beyond the east gate it was traced to an outflow in the continuation of the outer ditch (B1, illus 31). The drain was formed by a trench dug into the sand and gravel subsoil; its sides and floor lined with yellow clay and the sides further strengthened



ILLUS 33 Plan of a possible hut circle (Trenches H2-6)

with a lining of river cobbles and sandstone blocks embedded in the clay. No clear evidence was found for a drain cover. Some fragments of stone in the fill may have belonged to covering slabs but the use of timber planks cannot be ruled out. At the east gate the drain was found to be choked with road metalling, above which the road surface itself was found to have subsided. Towards the centre of the fortress the drain was again located, in Trench F2, on a corresponding line parallel with the east/west axes of the fortress, that is 0.6 m south of the centre point of the front (east) wall of the headquarters. Here, the width of the drain trench was found to be 0.9 m, but it was not possible to examine the lower levels because of persistent ground water. What was probably a branch of the same drain was located in the central range on the south side of the headquarters, close to its south-east corner (M2, illus 25a & b). It lay by the outer edge of the metalling that ran along the south side of the building. The width of the drain here was 0.44 m and it was found to flow into what was probably a settling tank or cistern of at least 1.5 width, lined with yellow clay and cobbles. Further west from this point (M1, illus 8d) the drain was found to continue as a smaller channel on the same line along the edge of the road.



ILLUS 34 The hut circle after excavation, from south (Trench H2)

WATER SUPPLY (ILLUS 20 & 32)

The principal buildings of the central range, and possible other areas of the fortress, were supplied with water carried in buried wooden pipes, made in lengths of c 2.4 m and joined by iron collars with an internal diameter of 0.8 m. Iron collars indicating such a pipeline were found *in situ* outside the front (east) wall of the headquarters building in Trench E. The main supply appears to have entered the fortress under pressure at the south gate and probably originated in one of the many springs on the higher ground south of the fortress. In Trench I the iron collars of at least two pipes were found *in situ*, with one pipeline passing through each of the two passages of the gate (illus 18 & 32). The curving line of a feature interpreted as an aqueduct channel is visible on aerial photographs leading towards the gate (illus 20). A section trench cut outside the gate in 1962 revealed a ditch '8 ft 6 in wide and 2 ft deep' but no clay lining or other material was recorded (Birley 1965, 196). This suggests that a sealed pipeline would have extended to some distance outside the fortress. Finally, at the east gate (A2 & B1), the unlined channel which passed through the north passage of the gate may well have contained a water supply for the harbour installation presumed to have existed on the river bank below the fortress.

HUT CIRCLE? (ILLUS 33 & 34)

During investigations north of the headquarters — for the purpose of locating buildings in the central range — a shallow, curvilinear channel in the subsoil was noted. On further investigation

(Trenches H2–6) this was found to describe a circle of 11.4 m diameter. The size and character of the feature suggested a construction of non-Roman character, perhaps a single hut circle or roundhouse, but no structural features were found within the area of the circle (most of the area was cleared for this purpose). Two fragments of local pottery found in the vicinity (unstratified) may reasonably be associated with this building. Neither these nor any other evidence exists to indicate whether the circle had preceded or followed the Roman occupation of the site.

INSCRIBED AND SCULPTURED STONES

The most notable finds from the Carpow fortress were the two large fragments of the dedicatory inscription presumed to come from the outer façade of the east gate. Both were found in 1964, lying on the road surface in front of the south passage of the gate (illus 35). Because of their wider significance the two fragments, both in local sandstone (Lower Old Red Sandstone), were published immediately in these *Proceedings* by the late R P Wright (1966), drawing on the advice of Sir Ian Richmond. Although the reconstruction and interpretation of the text remain a matter of debate (Wright 1971; 1974), the description of the fragments given here is based on Wright's published account.

SCULPTURED PANEL FROM THE EAST GATE (ILLUS 35 & 36)

- 1 The left-hand panel is $33\frac{1}{4}$ in (850 mm) wide, 38 in (940 mm) high and $7\frac{1}{2}$ in (200 mm) thick and has broken away from the inscribed area. The principal element of the sculptured panel is a pelta springing from a central boss which terminates in beaked heads. In the upper part, outside and to the left of the pelta, is the standing figure of Victory, partly broken away from the surface, who holds in her left hand a palm branch and stands upon a globe. Within the upper area of the pelta the figure of a *capricorn* faces left. In the lower part of the field are two confronting winged horses or *pegasi* and below these is the damaged figure of what appears to be an eagle with outstretched wings. On the horizontal margin below the pelta are three letters $1\frac{1}{4}$ in (32 mm) high:]P FE[CIT].

The above elements can be matched in the repertoire of sculpture elsewhere in the military zone of Roman Britain. The combination of *pegasus* and *capricorn* is the familiar emblem of the Legio II Augusta, whose base was at Isca (Caerleon) in South Wales, but which is known to have been involved in construction and reconstruction of military works in northern Britain. The inscription may have been a record of the craftsman responsible for the stone or possibly the date of its production.

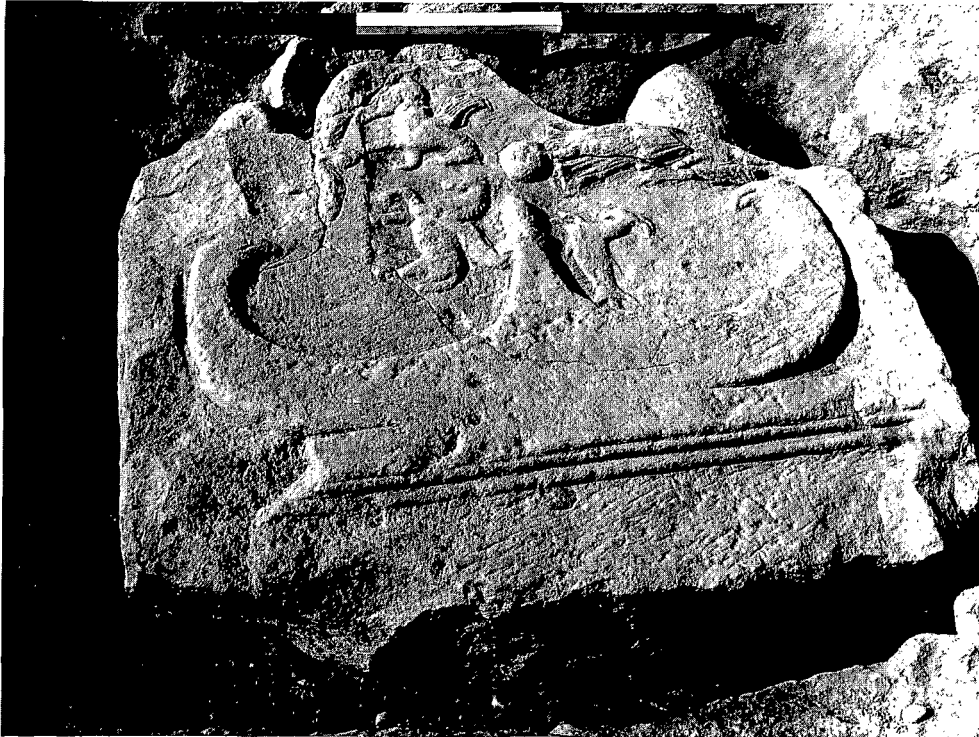
INSCRIPTION FROM THE EAST GATE (ILLUS 37 & 38)

- 2 The inscribed fragment is $26\frac{3}{4}$ in (650 mm) wide, $22\frac{3}{4}$ in (570 mm) high and $8\frac{1}{4}$ in (210 mm) thick. The surface of the stone is weathered and flakes have broken away from the left-hand margin. Yet much of the vertical surface tooling has survived and the horizontal guidelines for the text can be traced. The letters were originally picked out in red paint and traces can still be seen in the letters M, P, E and S. On the upper edge of the stone there is a dowel hole $6\frac{4}{5}$ in (173 mm) from the right-hand end, $1\frac{1}{2}$ in (39 mm) in diameter and $2\frac{7}{10}$ in (53 mm) in depth.

Part of the projecting moulding, for a length of 10 in (254 mm), frames the top of the die and indicates that the inscribed letters come from the first and second lines of the text. The left-hand sculptured panel (described above) also carries a vertical section and the top-left angle of



ILLUS 35 Sculptured panel found on road surface in south passage of the east gate, from east (Trench A2)



ILLUS 36 Sculptured panel from the east gate (*McManus Galleries: Dundee Arts & Heritage*)

the same moulding which forms the left-hand margin of the die, and similarly preserves the first 5 in (127 mm) of the surface. At the edge the lower serif and half of the vertical stroke of the initial letter of the first line are preserved, indicating the I of Imp(erator). This serves to link the sculptured panel with the inscribed fragment and indicates that only 5 in. (127 mm) is missing between the letter I and the M which is partly preserved in the first line on the latter. The dimensions of the sculptured panel and the line spacing on the inscribed fragment indicate that the text consisted of four lines, with the heights in lines 3 and 4 being less than the $5\frac{9}{10}$ in (150 mm) of lines 1 and 2. If the (. . .)S of the second line is a nominative then IMP must be expanded to Imp(erator), in the nominative singular. The initial letter E of the next word presents a difficulty and no reasonable alternative has been suggested to the formula Imp(erator) e[t] d(ominus) n(oster) suggested by Wright (1966) in his original publication of the fragments. What seems certain is that the text, as far as it is preserved, relates to a single reigning emperor. Given the historical context of the Carpow fortress that is likely to be Severus' elder son and successor Caracalla, whose period of sole rule began after the death of his brother and co-emperor Geta, in February 212. We may repeat Wright's (1966, 204) own conclusion: 'as a provisional solution we may suggest that the text recorded Caracalla as sole emperor between the death of Geta in February 212 and the Roman evacuation of Scotland'.

The text may be partly restored thus:

IMP E[T] D N M AVR ANTONINVS
[PIV]S F[ELIX . . .

This restoration required an inscription die c 14 ft (4.27 m) long, to which must be added the two sculptured panels c 2 ft 6 in. (0.76 m) wide, making a total monument 19 ft (5.8 m) long which could be fitted into the outer façade of the double-passage east gate with an overall width of 11 m.

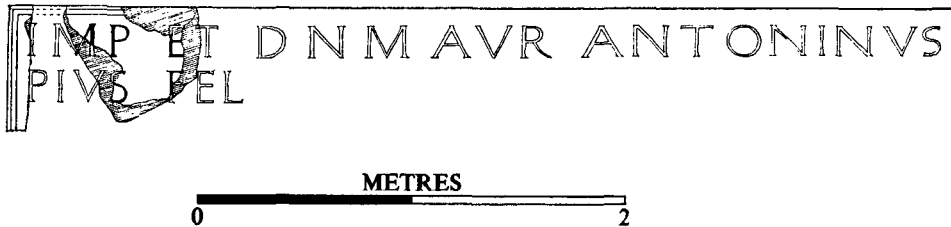
OTHER INSCRIBED STONES FROM THE EAST GATE (NOT ILLUS)

In 1965 excavations at the east gate produced further inscribed stone fragments, in the same sandstone as the two large fragments found in the preceding season. Of these, three appear to belong to the same imperial inscription which had been set in the outer face of the east gate, but in each case the size of the fragment was too small for certainty. In all, 10 further carved and inscribed fragments are described here.

- 3 A fragment 9 in (229 mm) by 6 in (152 mm) by $5\frac{1}{2}$ in (139 mm), with the left side dressed to abut against its adjacent slab, reading V (an inverted M can be ruled out), now $4\frac{1}{2}$ in (114 mm) high but missing the top and with an original height of c 6 in (152 mm). From the fill of the inner ditch on the south side of the east gate causeway (B1).
- 4 A fragment, probably from the same slab as no 1, measuring $5\frac{1}{2}$ in (139 mm) by $6\frac{1}{2}$ in (165 mm) by 4 in (102 mm) and which bears the left-hand portion of a superscript bar $3\frac{1}{2}$ in (89 mm) long. From the fill of the inner ditch on the south side of the east gate causeway (B1).
- 5 A fragment 9 in (229 mm) by 7 in (177 mm) by 5 in (127 mm) in a stone of coarser texture with the letters AV and an intervening space of up to 5 in (127 mm). Only the lower part of the right stroke of A



ILLUS 37 Inscription fragment from the east gate (*McManus Galleries: Dundee Arts & Heritage*)



ILLUS 38 Reconstructed text of the east gate inscription (*R P Wright*)

and the lower part of the V survive. Below the letters is a short section of quarter-round moulding. From the filling of the inner ditch on south side of east gate causeway.

- 6 Five fragments of moulded border, of which four appear likely to have belonged to one of the slabs on the east gate inscription found in 1964.

Thus, nos 3 and no 4, together with four of the pieces of moulded border described at no 6, are all likely to have come from one of the inscribed slabs found in 1964, while no 5 and the fifth piece of border described at no 6 belong to a second slab of coarser grain, which still might have been part of the same inscription. The border on the lower margin of this fragment is $3\frac{1}{4}$ in (82.5 mm) wide and has a single rounded moulding, in contrast to that on the upper margin which is $3\frac{1}{2}$ in (85 mm) wide and is rectangular in profile.

- 7 A slab of reddish sandstone 20 in (510 mm) by 21 in (530 mm) by 9 in (229 mm), with the die made uneven through heavy wear and damaged by diagonal gashes. The letter L can be traced, with a short foot in relation to its height. After a space of 8 in (203 mm) is a worn groove which may have formed the vertical stroke of a letter. From the fill of the stone-lined drain in the south passage of the east gate.
- 8 A small fragment $6\frac{1}{2}$ in (165 mm) by 4 in (102 mm) by $2\frac{1}{2}$ in (39 mm) which carries the roughly cut loop of a P or the upper loop of a B or R. From the fill of the inner ditch on the south side of the east gate causeway.

Both no 7 and no 8 belong to a different inscription from the 1964 text. The slab represented by no 7 appears to have been deliberately laid to support the road surface into which the two larger fragments of the 1964 text had fallen and sunk. It would therefore appear to belong to an earlier inscription which sustained damage during an intermediate stage of reuse.

SCULPTURED AND INSCRIBED FRAGMENTS FROM THE SOUTH GATE (ILLUS 39 & 40)

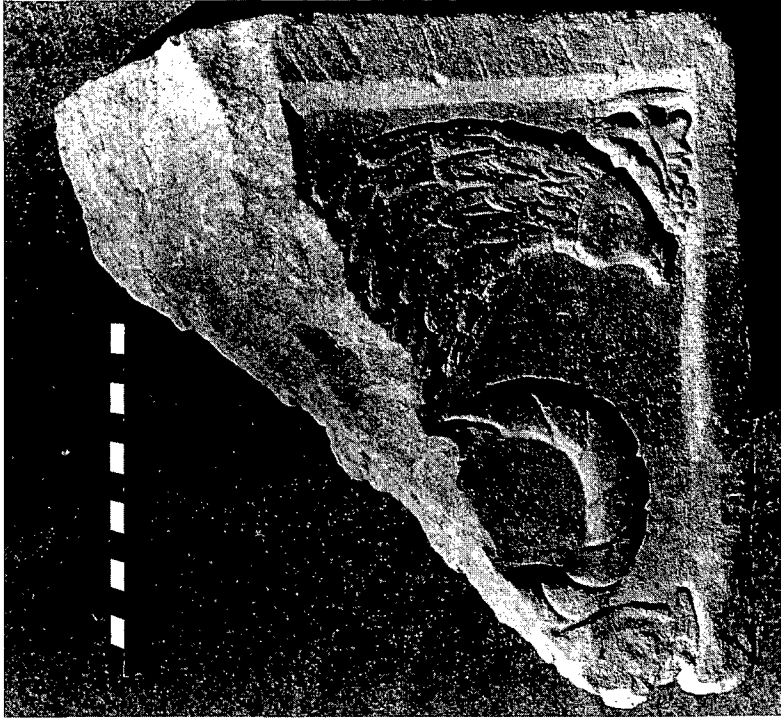
Three fragments in reddish sandstone, one from the side-panel and two from the text of the inscription, were found in the filling of a pipe-channel in Trench I during the excavation of the south gate.

- 9 The upper part of the right-hand sculptured panel, 470 mm wide by 470 mm high by 22 mm thick (illus 39). A pelta is formed by the head of an eagle, with the neck plumage carefully rendered. In the corner is a vine leaf and a bunch of grapes. In front of the eagle is a rounded cable-moulding above another leaf with a ling stem. The frame of the panel is a flat moulding and differs from the lower margin of the inscription die (see no 10, below).
- 10 A fragment bearing part of the last line of the inscription and a section of the margin with three round mouldings, 350 mm high by 250 mm wide by 180 mm thick (illus 40). When complete the letter A was 105 mm high, and might possibly have belonged to LEG II AVG in a text comparable with that of the east gate (above).
- 11 Fragment 170 mm by 70 mm by 100 mm with a small ivy leaf-stop (*hedera*) followed by part of a vertical letter which might be L. Comparison with letters on the east gate text indicates that the wide cut of the letter groove forms the left part of the vertical letter and the narrower the right part. The position of the leaf-stop rules out the letter T, while the space after makes an I unlikely.

COINS

N M McQ Holmes

The catalogue which follows this discussion contains all of the 37 Roman coins known to have been found within or in the vicinity of the fortress at Carpow, and includes all the details of each coin which are known to the writer. Fifteen of these coins were found during the series of archaeological excavations between 1961 and 1979, and a further 17 are recent metal-detector finds from near the boundaries of the scheduled site. The remaining five coins comprise two recorded as long ago as 1823 (catalogue nos 11 & 37), one recorded in 1918 from House of Carey,



ILLUS 39 Fragment of sculptured panel from the south gate (scale 1ft)
(*McManus Galleries: Dundee Arts & Heritage*)



ILLUS 40 Inscribed stone fragment from the south gate (scale 6 in)

near Abernethy (no 5) and two third-century provincial issues from a garden (nos 35 & 36). All these items are included in order that the various published records may be brought together in one place. The last-mentioned five coins are, however, omitted from this assessment of the possible significance of the series of finds from the area. The two early finds are not sufficiently well identified and have no provenance; the denarius from House of Carey may or may not be associated directly with Roman occupation at Carpow; and the two provincial coins are at least as likely to be modern as ancient losses.

The remaining 32 coins form a group of closely provenanced and mostly accurately identified finds which should help to shed some light on both the dating of the occupation of the fortress and the nature of the coinage which circulated amongst the troops stationed there. Table 1 summarizes these finds according to emperor/empress and metal.

TABLE 1

Summary list of coin finds from Carpow fortress and environs

	Gold	Silver	Copper Alloy
L. RUBRIUS DOSSENUS		2	
VESPASIAN		2	
TRAJAN		2	
HADRIAN			1 sestertius
ANTONINUS PIUS		1	
ANTONINUS PIUS & MARCUS AURELIUS	1		
DIVA FAUSTINA I		1	
FAUSTINA II		1	
DIVA FAUSTINA II			1 sestertius
LUCILLA		1	
COMMODUS		1	
SEPTIMIUS SEVERUS		7	
JULIA DOMNA		3	
CARACALLA		3	
PLAUTILLA		1	
GETA		2	
early third century?		1	
unidentifiable		1	

Discounting the two unidentifiable denarii, there are one gold, 11 silver and two copper-alloy coins issued before the accession of Septimius Severus, and 16 silver denarii of Severus and his family. A number of questions may be asked of this assemblage. Is there any suggestion in the coin series that military occupation of the site began before the traditionally accepted date of AD 208? What indications are given of the chronological and denominational range of coins which circulated among the soldiers of Severus's army? Do the coins offer any clues to the date of the army's withdrawal from the fortress? Supporting evidence for any assertions may be sought in the records of third-century hoards from Scotland and of the site finds from the only other known Severan permanent station in Scotland — the fort and supply base at Cramond, on the Firth of Forth.

Of the 14 coins which pre-date the reign of Severus, only the two Republican denarii of 87 BC (nos 1 & 2) would seem out of place in an early third-century context. These two coins were found fairly close together by a metal-detectorist at Balgonie Farm, and it is not possible to say definitely whether they were associated directly with the occupation of the fortress. Both display considerable wear, however, and it is not impossible that they were brought to the site by a soldier

in Severus's army. A single denarius of 83 BC formed part of the Falkirk hoard of 1933, which is generally considered to have been largely a Severan assemblage (Robertson 1982, 208, no 1).

The nine denarii from Vespasian to Commodus display moderate to severe wear on the surfaces, consistent in each case with circulation into the early third century by comparison with coins of similar age from hoards such as Falkirk (Robertson 1982) and Edston (Holmes & Hunter 1997). The rare aureus of Antoninus Pius and Marcus Aurelius (no 10) displays rather less wear, but a gold coin is unlikely to have experienced as much general circulation. It is notable that only two copper-alloy coins have been recovered, these being sestertii of Hadrian and Diva Faustina II (nos 8 & 14). Although it is necessary to be aware of possible differential rates of corrosion between silver and copper alloy within the buried environment, there is nothing in the present condition of these two sestertii to suggest that extreme deterioration of base metal may lie behind the low recovery rate.

Comparison with the coin series from Cramond may be useful here, although Roman military occupation at this site commenced during the Antonine period, and a simple comparison of numbers of pre-Severan coins is therefore of no significance. Since excavations began at Cramond in 1954, 22 of the 41 coins found which date from the period AD 69–193 (Vespasian to Commodus) are of silver and 19 of copper alloy (Holmes forthcoming). This contrasts with the figure of just two base metal coins among the 12 from the same period at Carpow. Although the overall totals are small, there is a suggestion that base metal issues made up a fairly small percentage of coins in use at Carpow, and this in turn argues against Antonine period occupation. Both the sestertii found there are in fairly worn condition, which would be consistent with circulation until around the start of the third century.

There is thus no significant indication in the numismatic record that occupation at Carpow began earlier than the reign of Septimius Severus although, equally, a Roman presence during the reign of Commodus cannot be ruled out on the evidence available. A study of the finds of denarii of Severus and his family may, however, shed further light, especially if the evidence from Cramond is also taken into account.

The historian Dio Cassius recorded that Severus took a great deal of money with him when he left Rome to conduct campaigns in Britain (cited in Robertson 1984, 427), and it seems logical to assume that much of this would have been in the form of newly minted coins issued for himself and his family, destined for payments to the army. It is not surprising, therefore, that Severan denarii figure prominently among finds from both the permanent bases associated with the Scottish campaigns. At Carpow, 16 of the 30 confirmed and identified finds were Severan denarii. At Cramond the picture is distorted by the effects of earlier phases of occupation, but 21 Severan denarii have been found there since 1954, along with the 41 earlier coins mentioned above (Holmes forthcoming).

The 16 coins of this reign from Carpow were all minted between AD 193–5 and c AD 207, the latest being a mule with obverse of Severus and reverse type of Julia Domna (no 23). (The only exception to this is the undatable denarius fragment of Julia (no 26), which can only be placed within the period 196–211.) Despite this, in every case where condition is recorded, little or no wear is displayed. At Cramond the picture is very similar, with all but one of the 21 Severan denarii having been minted before AD 208 — with a high concentration among issues of 201–5 — and again none of them shows more than a minimal sign of wear in circulation (Holmes forthcoming).

If all these coins were brought to Scotland in military pay chests in AD 208, it appears that most of them must have belonged to issues already several years old but apparently not yet put into circulation; and there is no evidence to suggest that further supplies of coinage minted in AD

208 or later reached the campaigning armies in any quantity. Although it is possible that the money which the army brought with it did comprise stockpiled old coinage, and that this proved sufficient to finance the campaigns without further additions, it would seem on balance that the evidence points to a start of occupation rather earlier than AD 208, and fails to support the theory of a continuing military presence much after the death of Severus in 211, as has been postulated (Wright 1974).

Although history records that Severus and his sons arrived in Britain in AD 208, the writer has argued in his report on excavations at Cramond that occupation of that site by the army of Severus may have begun at the very beginning of the century, with the arrival of the imperial family in Scotland in AD 208 perhaps prompted by the progress, or lack of such, of the military campaigns. Many of the almost unworn pre-208 Severan denarii from Cramond came from contexts associated archaeologically with the clearance of the site at the time of its final abandonment by Caracalla, with no examples of either more worn Severan coins or specimens struck after that year. This suggests that a continuation of occupation much after the death of Severus is unlikely (Holmes forthcoming). The coin series from Carpow suggests a similar hypothesis, with the added improbability of the more northerly base continuing to be occupied after the abandonment of the rearward supply base.

CATALOGUE OF ROMAN COINS (NOT ILLUS)

- 1 L. RUBRIUS DOSSENUM, AR denarius (16.0 by 17.0 mm, 2.97 g, die axis 1.0): 87 BC: Crawford 348/1. Mostly very worn. Metal-detector find, 1996, Balgonie Farm (NGR: NO 196 172). Returned to finder.
- 2 Another similar to above (17.5 by 17.0 mm, 3.11 g, die axis 7.0). Mostly very worn. Metal-detector find, 1996, Balgonie Farm (NGR: NO 197 173). Returned to finder.
- 3 VESPASIAN, AR denarius (18.0 mm, 2.50 g, die axis 6.0): AD 70: RIC 10. Much worn. From 1968–9 excavations: Trench E, in gravel on cobbles within south corridor in the *armamentarium* at south-east corner of the *principia*. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 7. McManus Galleries: Dundee Arts & Heritage 70/328/1.
- 4 VESPASIAN, AR denarius (18.0 by 17.0 mm, 2.24 g, die axis 6.0): AD 72–3: RIC 42. Some flattening and abrasion; worn. Metal-detector find from Jamesfield Farm. Returned to finder.
- 5 TITUS, AR denarius; no further details recorded. From House of Carey, near Abernethy. Macdonald 1918, 246; Leach & Wilkes 1976, 57, no.1. Present whereabouts unknown.
- 6 TRAJAN, AR denarius (18.0 by 19.0 mm, 2.90 g, die axis 6.5): AD 98–9: RIC 9. Moderate wear. Metal-detector find from Balgonie Farm (NGR: NO 189 173), 1995–6. Returned to finder.
- 7 TRAJAN, AR denarius (18.0 by 17.5 mm, 2.83 g, die axis 6.0): AD 103–11: RIC 128. Light surface corrosion; fairly worn. Metal-detector find from Jamesfield Farm (NGR: NO 205 182), 1995. Returned to finder.

- 8 HADRIAN, AE sestertius (30.0 by 28.5 mm, 21.48 g, die axis 6.0): AD 134–8: RIC 743(d). Green patina; slight surface damage on obverse; fairly worn. From 1961–2 excavations: over cobbled foundation outside north-west angle of ‘legate’s residence’. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 3. National Museums of Scotland (X.C14910).

- 9 ANTONINUS PIUS, AR denarius (17.5 by 17.0 mm, 2.12 g, die axis 6.0): AD 139: RIC 58. Some pitting and abrasions; moderate wear. Metal-detector find from Jamesfield Farm (north of Roman fortress). Returned to finder.

- 10 ANTONINUS PIUS & MARCUS AURELIUS, Au aureus (17.5 by 18.5 mm, 6.86 g, die axis 6.0): AD 139: RIC 414/411 (a) mule. Reverse slightly off-centre and a little scratched; moderate wear on highest points. Metal-detector find from Jamesfield Farm. Perth Museum and Art Gallery.

- 11 FAUSTINA I or II: no further details recorded. Small 1823, 176; Macdonald 1918, 232; Leach & Wilkes 1976, 57, no 2. Present whereabouts unknown.

- 12 DIVA FAUSTINA I, AR denarius (18.0 mm, 3.49 g, die axis 12.0): AD 141–61: RIC (Ant. Pius) 353b. Worn. From 1968–9 excavations: in fill of Roman drain between centre pier and west wall of south gate. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 8. McManus Galleries: Dundee Arts & Heritage 70/328/6.

- 13 FAUSTINA II, AR denarius (18.0 by 16.0 mm, 2.40 g, die axis 12.0): AD 145–61: RIC (Ant. Pius) 515(a). Moderate wear. Metal-detector find from between fortress and Jamesfield Farm (NGR: NO 204 182), 1995–6. Returned to finder.

- 14 LUCILLA, AR denarius (19.0 mm, 3.23 g, die axis 6.0): AD 164–9: RIC (M. Aurel.) 759. Fairly well worn. From 1968–9 excavations: in debris (drain fill) between centre raft and west wall of south gate. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 9. McManus Galleries: Dundee Arts & Heritage 70/328/5.

- 15 DIVA FAUSTINA II, AE sestertius (31.0 by 29.0 mm, 20.11 g, die axis 6.0): AD 176–80: RIC (M. Aurel.) 1715. Green patina; some flattening; slight accretion; fairly worn. From 1961–2 excavations: destruction deposit in courtyard of ‘legate’s residence’. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 4. National Museums of Scotland X.C14911.

- 16 COMMODUS, AR denarius (17.0 mm, 2.51 g, die axis 1.0): AD 186: RIC 139. Obverse very slightly off-centre; light surface pitting; Moderate wear. Metal-detector find from Jamesfield Farm (NGR: NO 207 182), 1994. Returned to finder.

- 17 SEPTIMIUS SEVERUS, AR denarius (17.0 mm, 1.74 g, die axis 11.5): c AD 193–5: RIC 350A (mint of Alexandria). Both sides off-centre; moderate wear. Metal-detector find from Jamesfield Farm, 1992. Returned to finder

- 18 SEPTIMIUS SEVERUS, AR denarius (18.0 by 16.5 mm, 2.75 g, die axis 12.0): AD 198–200: RIC 135B; Hill 1977, no 380 (AD 199). Both sides slightly off-centre; slight wear. Metal-detector find from Jamesfield Farm (NGR: NO 205 182), 1995. Returned to finder.
- 19 SEPTIMIUS SEVERUS, AR denarius (19.0 mm, 1.76 g, die axis 6.5): AD 200: RIC 150; Hill 1977, no 444. Slightly chipped; very slight wear. Metal-detector find from Jamesfield Farm, 1992. Returned to finder.
- 20 SEPTIMIUS SEVERUS, AR denarius (diameter, weight and die axis unknown): AD 201: RIC 153; Hill 1977, no 528. 'Very good condition.' Metal-detector find 1978 'on a trackway at northern defence of legionary base' (NGR: NO 2081 1809). Robertson 1984, 408 (identified by L Thoms). McManus Galleries: Dundee Arts & Heritage 1980/712.
- 21 SEPTIMIUS SEVERUS, AR denarius (19.0 by 18.5 mm, 2.63 g, die axis 7.0): AD 202: RIC 185; Hill 1977, no 560. Slight surface corrosion; virtually unworn. From 1979 excavations: unstratified find. McManus Galleries: Dundee Arts & Heritage 1996.350.
- 22 SEPTIMIUS SEVERUS, AR denarius (19.0 mm, weight and die axis unknown): AD 201 +: RIC 284; reverse of Hill 1977, no 432, of AD 200, but obverse legend belongs to AD 201–10 Corroded, but little wear. From 1976 excavations: found approximately halfway down fill of inner ditch, close to outer slope, c 40 m east of south gate. Robertson 1984, 408 (identified by R Reece). McManus Galleries: Dundee Arts & Heritage 1978.1103.
- 23 SEPTIMIUS SEVERUS, AR denarius (18.0 mm, 3.19 g, die axis 6.0): AD 207: hybrid with reverse of Julia Domna (SEVERVS AVG PART MAX / FORTVNAE FELICI): obverse of AD 200–1, reverse of 207 (Hill 1977, no 920). Almost unworn. From 1968–9 excavations: in debris between west wall and central foundation of south gate. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 10. McManus Galleries: Dundee Arts & Heritage 70/328/3.
- 24 JULIA DOMNA, AR denarius (diameter, weight and die axis unknown): AD 196–211: RIC (Sept. Sev.) 574?; Hill 1977, no 606? (AD 203). Condition unrecorded. From 1966 excavations (Trench B, fill of pit 66DB; for pottery from this pit see pottery catalogue nos 7, 13, 15, 20, 22, 34, 39, 40 & 44 (below). Robertson 1974, 116 (coin not seen by Prof Robertson); Present whereabouts unknown.
- 25 JULIA DOMNA, AR denarius fragment (0.93 g, die axis 12.0): AD 196–211: RIC (Sept. Sev.) 572; Hill 1977, no 660 (AD 204). About one-third of coin; slight wear. Metal-detector find from Jamesfield Farm, 1991. Returned to finder.
- 26 JULIA DOMNA, AR denarius fragment (0.74 g, die axis 6.0): AD 196–211: RIC (Sept. Sev.) 572–4? Much edge damage and chipping; some surface corrosion; probably little wear. Metal-detector find from Jamesfield Farm (NGR: NO 205 182), 1995. Returned to finder.
- 27 CARACALLA, AR denarius (18.5 mm, 3.35 g, die axis 11.0): AD 202: RIC 65; Hill 1977, no. 562. Reverse slightly off-centre; very slight wear. From 1961–2 excavations: over cobbled foundation outside north-west corner of 'legate's residence'. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 5. National Museums of Scotland X.C14896.

- 28 CARACALLA, AR denarius (18.0 mm, 2.69 g, die axis 6.0): AD 201–6; RIC 127; Hill 1977, no 734 (AD 205). Slight wear. From 1968–9 excavations: in debris between west wall and central foundation of south gate. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 11. McManus Galleries: Dundee Arts & Heritage 70/328/4.
- 29 CARACALLA, AR denarius (18.0 mm, 2.49 g, die axis unknown): AD 206; RIC 84; Hill 1977, no 813. Slight wear. From 1968–9 excavations: in debris between west wall and central foundation of south gate. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 12. McManus Galleries: Dundee Arts & Heritage 70/328/2.
- 30 PLAUTILLA, AR denarius (19.0 by 18.0 mm, 3.62 g, die axis 6.5): AD 202; RIC (Caracalla) 361; Hill 1977, 575A (addenda). Both sides very slightly off-centre; reverse a little weak; no evidence of wear. From 1961–2 excavations: destruction deposit in courtyard of ‘legate’s residence’. Robertson 1974, 116; Leach & Wilkes 1976, 57, no 6. National Museums of Scotland X.C14897.
- 31 GETA, AR denarius (19.0 mm, 1.41 g, die axis 6.0): c AD 200–2; RIC 18; Hill 1977, no 423 (AD 202). Badly chipped; some surface corrosion; slight wear. Metal-detector find from Jamesfield Farm, 1991. Returned to finder.
- 32 GETA, AR denarius (19.0 by 18.5 mm, 2.66 g, die axis 6.5): c AD 200–2; RIC 18; Hill 1977, no 423 (AD 202). Unworn. Metal-detector find from Jamesfield Farm (NGR: NO 205 182), 1995. Returned to finder.
- 33 AR denarius, probably early third century. No other details recorded. From 1964–70 or 1975 excavations; from clay cistern(?) foundation outside south-east corner of *principia*. Leach & Wilkes 1976, 57, no 13. Present whereabouts unknown.
- 34 AR denarius. No other details recorded. From 1964–70 or 1975 excavations: from pit in north of *latus praetorii*. Leach & Wilkes 1976, 57, no 14. Present whereabouts unknown.
- 35 JULIA PAULA, provincial base metal coin of Macedon. Thessalonica: AD 219–20; *BMC* 104; Found in ‘a garden at Carpow’ in 1927. DES 1990; Bateson 1990, 166. Perth Museum and Art Gallery 1990/18.1.
- 36 SEVERUS ALEXANDER, provincial base metal coin of Edessa: AD 222–35. No further details known. Found in ‘a garden at Carpow’ in 1927. DES 1990; Bateson 1990, 166. Perth Museum and Art Gallery 1990/18.2.
- 37 Unidentified Roman coin. Small, 1823,176; Macdonald 1918, 232. Present whereabouts unknown.

BRICKS, TILES AND DAUB

Christopher Lucas

A total of 368 fragments of daub, tile and brick were recovered from the excavations at Carpow in 1964–79. They are currently held at the McManus Galleries, Albert Square, Dundee, together with a more detailed archive catalogue of the assemblage.

TABLE 2

Proportions of brick, tile and daub

Type	Total
Daub	138
Undifferentiated tile	172
<i>Imbrex</i>	26
<i>Tegula</i>	21
Box tile?	5
Brick	6

DAUB

Forty-four fragments of daub bore wattle impressions. The various diameters of impression can be tabulated as follows:

TABLE 3

Diameters of wattle impressions in daub

Dia (mm)	No of occurrences	% of total
1-5	1	1.7
6-10	5	8.5
11-15	11	18.6
16-20	21	35.6
21-5	7	11.9
26-30	8	13.5
31-5	4	6.8
36-40	2	3.4

BRICK AND TILE

A total of 224 fragments of tile and six fragments of brick were examined. Of these, 21 could be unequivocally identified as *tegulae* and 26 as *imbrices*. Five fragments were identified as box tiles.

The assemblage yielded one complete *tegula* (reconstructed from 11 fragments) in a soft salmon pink fabric. It measures 441 mm in length, 344 mm in width and 26 mm in depth with a flange 51 mm high and 33 mm thick.

TABLE 4

Variation in tile thickness

Thickness (mm)	No of occurrences	% of total
11-15	5	23.8
16-20	6	28.6
21-5	2	9.5
26-30	5	23.8
31-5	2	9.5
36-40	1	4.8

STAMPS (ILLUS 41 & 42)

Twenty fragments of tile bore stamps. Details are given below. The most complete example is no 20 which shows LEG VI VIC B[-] and the complete stamp can be restored as LEG(io) VI VIC(trix) B(ritannia) P(ia) F(idelis).

Catalogue of stamped tiles

- 1 thickness: 17mm; the tile is flat but curves irregularly towards one edge
- 2 *imbrex*; thickness: 15 mm; there is a pronounced ridge on the upper face
- 3 thickness: 29 mm
- 4 *imbrex*; thickness: 19 mm; slight trace of finger smoothing along the ridge
- 5 *imbrex*; thickness: 19 mm; trace of finger smoothing along the ridge
- 6 *tegula* (?); thickness: 25 mm; flange missing; mortar attached to the base
- 7 *tegula*; thickness: 27 mm; flange height 59 mm, 36 mm thick
- 8 33 mm
- 9 *imbrex*; thickness: 15 mm
- 10 probable *tegula*; one edge is present but there is no flange
- 11 *tegula* (?)
- 12 *tegula*; thickness: 27 mm
- 13 *imbrex*; thickness: 11 mm
- 14 *imbrex*; thickness: 19 mm; fragment if partly burnt on upper surface
- 15 *imbrex*; thickness: 14 mm
- 16 *imbrex*; thickness: 17 mm
- 17 *imbrex*; thickness: 13 mm
- 19 *imbrex*; thickness: 19 mm
- 20 thickness: 38 mm

ROMAN POTTERY

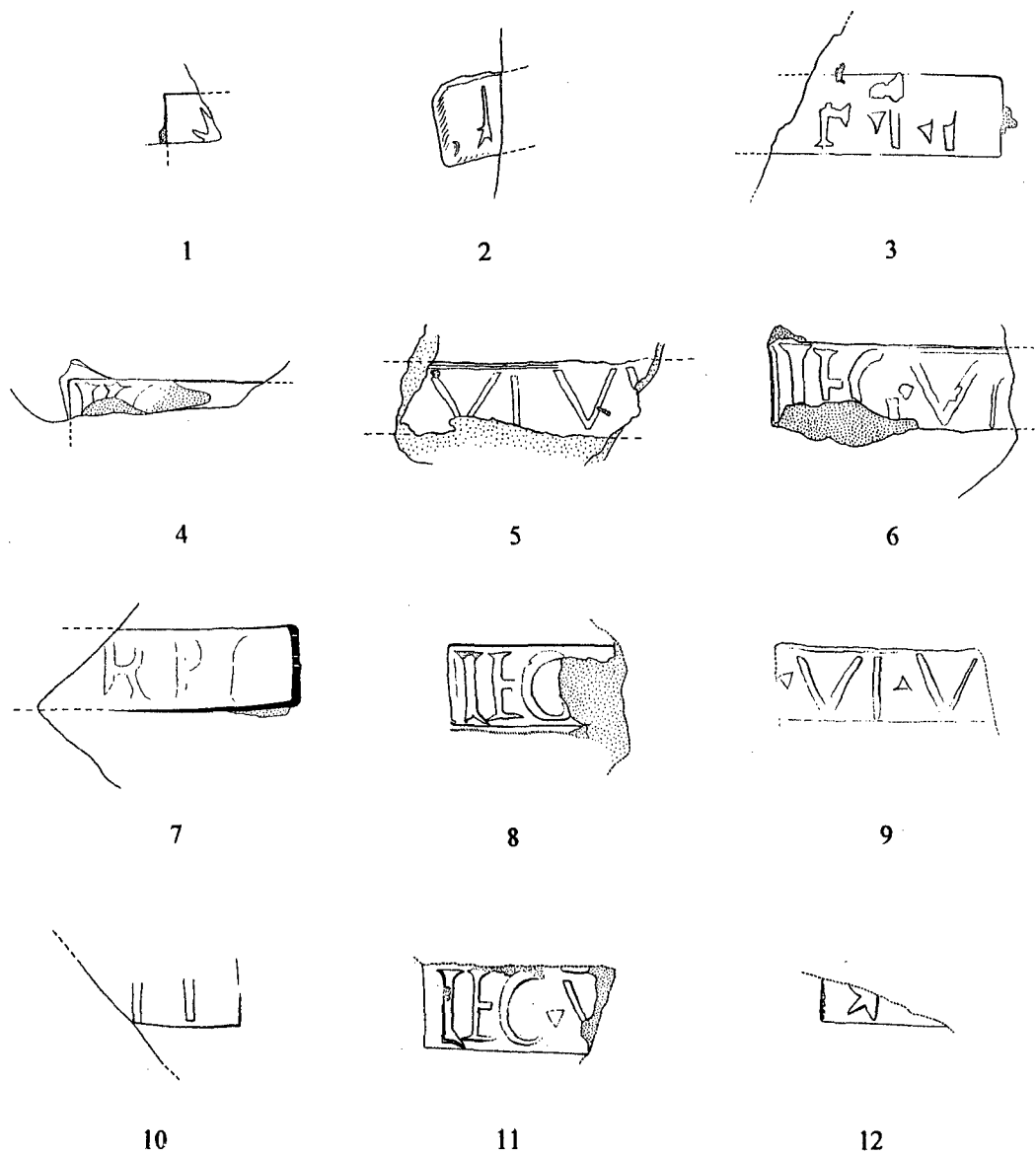
John N Dore

Following the final season of excavations in 1979, parts of the pottery assemblage spent some time at a number of different locations. The assemblage has now largely been reunited in the McManus Galleries, Albert Square, Dundee, though there are indications from extant documentation that a few pieces still remain missing. These have been noted in the catalogue.

PREVIOUS WORK

The present writer began work on the final pottery report in 1995. The late John Gillam had examined pottery from the work of various seasons on a number of occasions. As far as we know he never produced a complete report, but there are three extant pieces of evidence which show his thoughts on the material at the time he examined it:

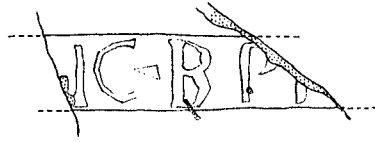
- 1 A short manuscript report on selected pieces (principally the group from a pit in Trench B, 1966) was found among his papers following his death. This report is in pencil, on three sheets of ruled quarto. The sheets were found clipped together with a number of pencil drawings of coarseware vessels which were almost certainly executed by the late Jock Tait, John Gillam's research assistant at the time. The drawings are dated 8 & 9 March 1967. The report is dated 27 V 71 and almost certainly represents preparatory notes for the paper given to the Roman Northern Frontier Seminar two days later, on 29 May 1971 (see 2 below).
- 2 The typescript record of a paper given to the Roman Northern Frontier Seminar on 29 May 1971 (Gillam 1971).



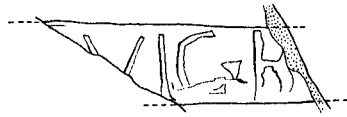
ILLUS 41 Tile stamps, nos 1-12



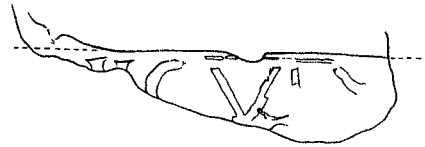
13



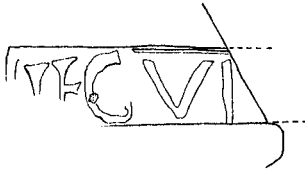
14



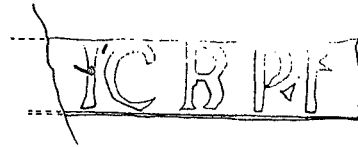
15



16



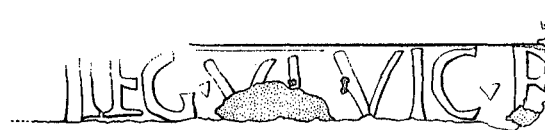
17



18



19



20



ILLUS 42 Tile stamps, nos 13–20

- 3 Comments on aspects of the material which appeared in Gillam's (1973, 60) paper in the CBA Research Report on Roman Pottery (usually known as CBA 10).

The fullest record is that of the seminar typescript (no 2) which includes all the significant data of the manuscript notes (no 1) and the published paper (no 3), though it does not include any material from the final three seasons work on the site in 1975, 1976 and 1979. Gillam talks of the assemblage in terms of 12 groups. The first two are those with which his notes (no 1) were

primarily concerned (this is hardly surprising since these were probably preparatory notes for the subsequent seminar paper — no 2), and he characterizes these groups as including no pottery later than the early third century. He treats the remainder of the material separately since, in his view at the time, it contained material (principally the hammer-header mortaria) which dated to the later third century.

TABLE 5

Summary of conclusions in Gillam's May 1971 seminar typescript (no 2)

	Context	Pottery	Comments by J Gillam
1	Pit in Trench B which contained a denarius of Julia Domna	(a) round-rim bowl in BB2— Gillam 225	(a) emergence c AD 200
		(b) three bowls with flat grooved rims	(b) emerged by c AD 210
2		(a) three flags plain samian: (i) tiny (ii) wall sherd Dr 45 (iii) base sherd Dr 37? Antonine	
		(b) wall sherd mortarium: white with red brown grit	
		(c) five round rim bowls in BB2 or grey fabric	(c) emergence c AD 200
3	Ten other groups	(a) frags of medieval green-glaze	
		(b) one bowl with flat grooved rim with intersecting arc decoration in BB1 (Gillam 227)	(b) not earlier than AD 210
		(c) mortarium: white fabric, black grit (Gillam 273)	(c) probably emerged c AD 220
		(d) several examples of hammer-head mortaria: 'within the range of Gillam 278–84 . . . in all but one instance white with small black grit . . . typical west Midland products'.	(d) first arrival at Carpow not earlier than c AD 270
		(e) single cavetto-rim cooking pot	(e) Severan?
		(f) Funnel-neck beaker	(f) second half of third century AD

STRATIGRAPHY

The assemblage was, for the most part, recovered from poorly stratified deposits, though there is a small number of groups whose provenance can be more closely defined. These are listed below in Table 6.

DATING

The number of vessels from securely stratified contexts is extremely small and thus any discussion of the date of the site must proceed from a consideration of the whole assemblage. Since this amounts only to some 55 vessels the conclusions presented here should be treated with caution.

On present evidence, the date of the majority of the material lies within a range which begins in the later second century and ends in the early third century. The absence of types of BB2 bowl common on the Antonine Wall (those with a triangular or beaked sectional rim profile) and the preponderance of what are usually taken to be later types (those having rims with a more

TABLE 6

Pottery groups with associated finds from stratified contexts

Context	Context Description	Pottery S: samian C: coarseware
—	Trench A1, fill of outer ditch	amphorae & tile
64AC	Trench A2, in cobbles at south end	C: no 32
64AD	Trench A2, post pit in south-west corner	C: no 24
64BD	Trench B4, ditch fill	C: no 38
64BE	Trench B3, material at bottom of ditch fill	C: no 33
64BF	Trench B3, ditch fill, below stones at 8 ft in charcoal	C: no 50
64BG	Trench B8, on road surface beneath rubble of collapse	S: no 1 C: nos 45, 51, 55
65CE	Trench C1, fill of stone-lined drain, below level of stones	C: no 28
65EC	Trench E, inner ditch-fill, wood and organic material level	C: no 28
66DB	Trench B fill of pit	Coin: no 24 C: nos 7, 13, 15, 20, 22, 34, 39, 40, 44
67C2	Fill of inner ditch	C: no 27

rounded sectional profile) should allow the start of the range to be placed around AD 180, and the total absence any of the later types of jars in BB1 implies that the end of the range comes before the second quarter of the third century.

RANGE OF TYPES

The range of types is quite restricted (which could be interpreted as resulting from a short occupation of the site) and is dominated by the following:

- Nos 7–16: jars with pronounced shoulders, well developed necks and rims whose lips are accentuated to a greater or lesser extent, in fabrics allied to BB2. Early third century +.
- Nos 34–7: bowls in BB2 with rims with rounded sectional profiles. AD 180 +.
- Nos 38–40: bowls in BB1 with flat, grooved rims. Late Antonine +.
- Nos 51–3: mortaria from Hartshill-Mancetter with hammer-head rims. These were previously thought not to appear before the later third century, though K. Hartley (*pers comm*) now places the appearance of these particular types at the very end of the second century AD.

Material which is likely to lie outside the late second to early third century range is as follows:

- Samian sherd no 5: central Gaulish Dr 37 whose fabric suggests a Hadrianic or early Antonine date.
- Coarseware no 22; late first to mid second century.
- Coarseware no 25; c AD 100–50.

- 8 Coarseware no 41; form and fabric suggest a Yorkshire product. Although the initial date of this type is assumed to be mid to late third century this is not well established.

Finally, attention is drawn to nos 47 & 48 which bear a passing resemblance to popular North African forms which appeared in the later second or early third century (see Hayes 1972, forms 181 & 197).

CATALOGUE

The catalogue is arranged in the following order:

Samian

Amphorae

Coarseware

flagons

beakers

jars

bowls

mortaria

Detailed examination of the fabric of the pottery could not be undertaken since making new breaks on sherds was not possible. All drawings were originated by the present writer, except where noted, and were inked for publication by Tony Liddell.

Samian

Nine sherds of samian were recovered:

- 1 Wall sherd Dr 31 (?), central Gaulish. Context CW64/BG.
- 2 Wall sherd Dr 31 or 31R, east Gaulish. Context CW65/CA.
- 3 Wall sherd Dr 31 (?), Antonine, central Gaulish (Trench E, west extension, charcoal layer at depth of 15 in). Context CW65/E.
- 4 Base sherd, indeterminate form, very abraded, all gloss lost. Context CW68/E4.
- 5 Base sherd Dr 37, central Gaulish, Hadrianic — early Antonine fabric. Context CW68/E4.
- 6 Wall sherd Dr 31 (?), central Gaulish. Context CW68/E3.
- 7 Wall sherd mortarium, east Gaulish. Context CW68/E4.
- 8 Wall sherd Dr 37, Antonine, central Gaulish. Context CW75/M2.
- 9 Wall sherd Dr 31R, Antonine, central Gaulish. Context CW75/M2.

Amphora

A total of 190 sherds of amphorae were examined (this total excludes the sherds incorporated in the reconstructed Dr 20 on display in McManus Galleries, Dundee). The forms represented are summarized below.

- 1 **Gauloise 4** Peacock & Williams 1986, class 27. Two walls sherds and one base sherd. Context CW65 & CW70.
- 2 **North African** One wall sherd was found whose thinness, curvature and fabric strongly suggested that

it had belonged to a North African cylindrical amphora (from context CW65). Three other wall sherds (from context CW75/M13) were noted as less certainly attributable to such a form. Context CW65/US & CW75/M13.

- 3 **Dressel 20** The greater part of an amphora of this form was recovered from the fill of the outer ditch, and is now on display in McManus Galleries, Dundee. Trench A1: outer ditch fill.

A number of measures of quantity were recorded in an attempt to estimate the number of vessels of Dressel 20 form represented by the assemblage. (In Table 7 the minimum and maximum vessel statistics which were derived are summarized.) The total surface area of the wall sherds in the assemblage (excluding the restored vessel on display in Dundee) was estimated as follows. A wall sherd was chosen as a standard. The area of every other wall sherd was then visually estimated (as a multiple of the standard: eg 0.5 x standard, 2 x standard, etc) by a rapid comparison with the standard sherd. The area of the external surface of the standard sherd was carefully measured and from this the area of all the other estimates could be calculated and summed. The area of the external body surface of a complete example in the Museum of Antiquities, Newcastle upon Tyne, was calculated using the formula $4\pi r^2$ and this was divided into the total for the assemblage to give a minimum vessel estimate. The minimum vessel estimate for rim sherds was arrived at simply from the fact that two of the sherds were complete rims. Handles were recorded in terms of whether they possessed either, neither or both the upper and lower joints where they would have been luted on to the body of the vessel. Since these vessels are very unlikely to have had more than two handles it follows that the maximum upper or lower handle joints which a vessel could possess was two. Thus the minimum vessel estimate is half the number of joints and the maximum vessel estimate is equal to the number of joints.

TABLE 7

Estimate numbers of vessels of Dressel 20 form

		Min	Max	Notes
Total sherds	183			excluding display vessel
Total surface area of wall sherds	21446 sq cm	3		excluding display vessel
Total rim sherds	7	4	7	including display vessel
Handles (upper joint)	13	7	12	including display vessel
Handles (lower joint)	8	4	7	including display vessel

Finally, stamped amphora sherds included the following:

- 1 Two stamps from context CW68/US: LFC (Callender 1965, 155, no LF Crescens)
- 2 DEF (Callender 1965, 120)
- 3 F SCIMNIANO

Coarseware (illus 43–6)

Flagons

- 1 Sandy white ware. Context CW67/AI.

Beakers

- 2 Rim sherd and wall sherd. Very pale orange, buff surface. outer surface burnished in narrow horizontal facets. Contexts CW79 (rim) and W5D1 (wall). North Gaulish white ware, made in north-west Gaul, probably in the Somme Valley area; imported into Britain in the late second and early to mid third

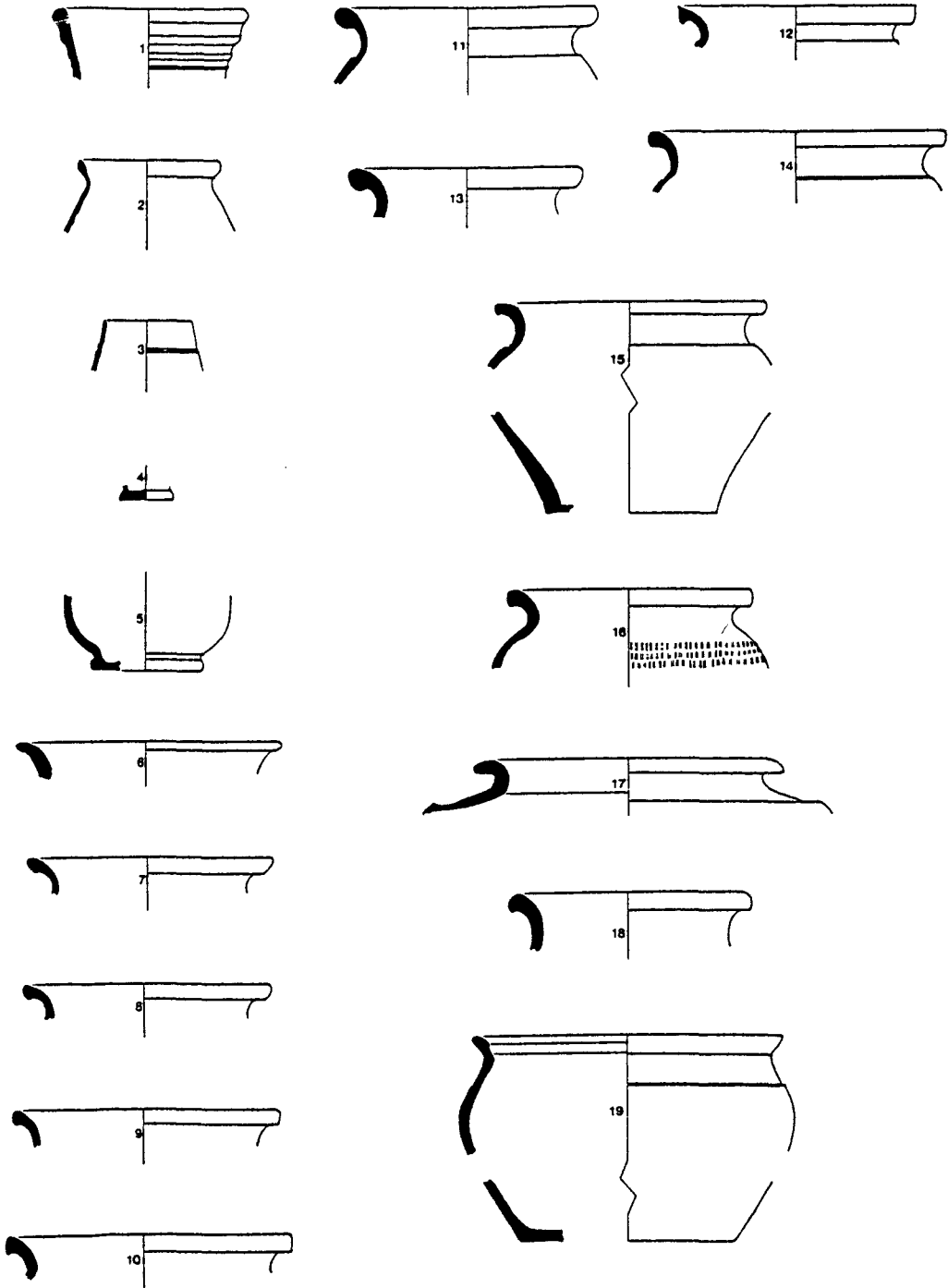
centuries (Richardson & Tyers 1984; Richardson 1986). For previous examples from Carpow see Birley (1963, fig 7, nos 8 & 9).

- 3 Rim sherd and base sherd, probably from same vessel. Bag-shaped beaker. Pale orange, dark brown coat. Contexts CW68/E3 (rim) and CW68/FI (base). Lower Nene Valley; as Gillam types 77, 79; late second to early third century.
- 4 Base of beaker. Pinkish brown with dark brown colour-coat. Context CW68/F1.
- 5 Base sherd of beaker. Pale orange with orange-brown to dark brown colour coat; well worn exterior; moderate quartz inclusions up to 0.5 mm. Context CW79/W4A(?).

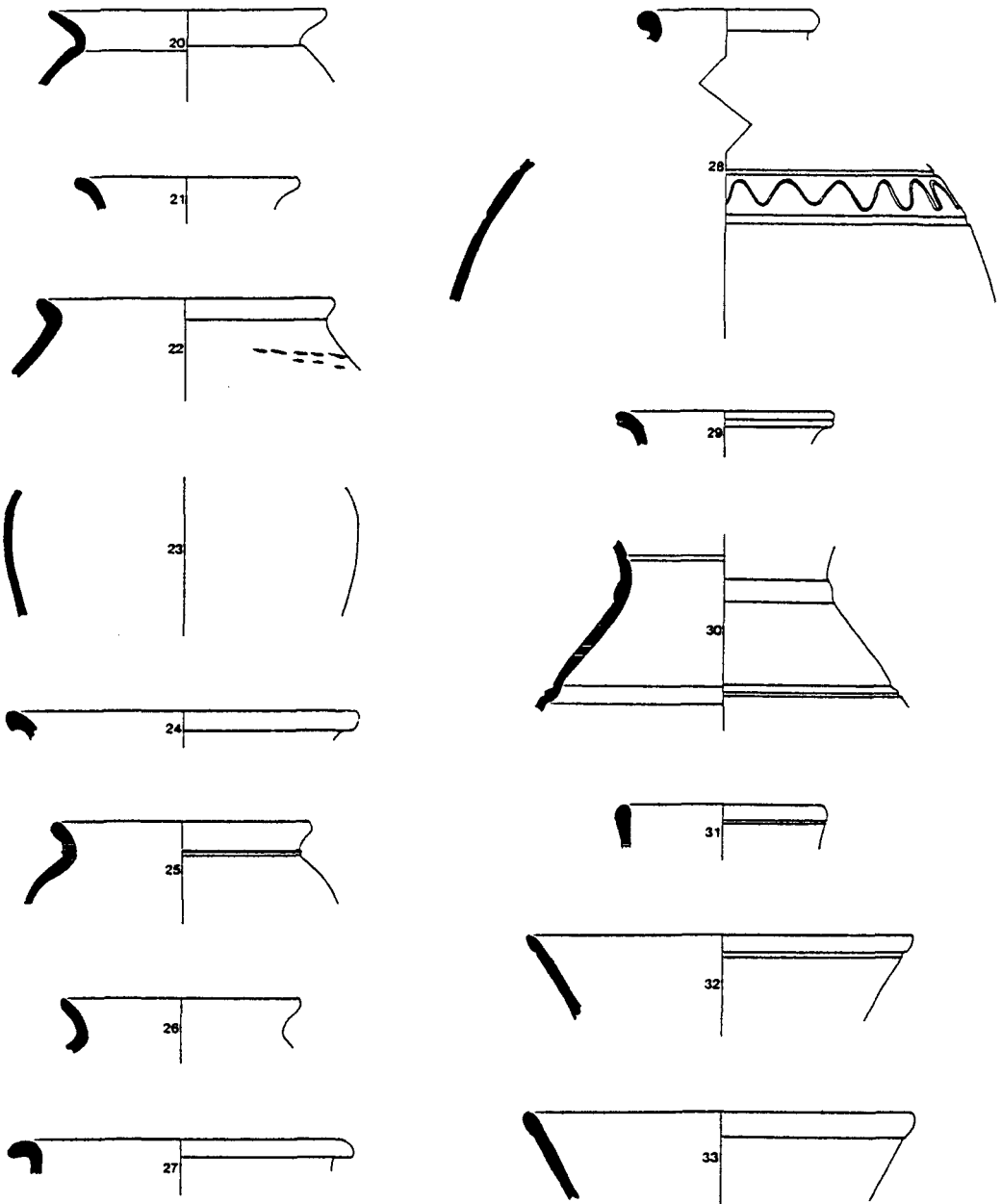
Jars

Amongst the following, no 6 is in BB1 fabric, nos 7–16 are necked jars in fabrics allied to BB2 and the remaining examples are in miscellaneous other fabrics. The basic form of the necked jars has a pronounced shoulder, a well developed neck and a rim whose lip is accentuated to a greater or lesser extent (see Jones & Rodwell 1973 — Mucking kilns; and Monaghan 1987). Published examples are listed by Bidwell & Speak (1994, 230). Present evidence suggests an emergence in the north in the early third century.

- 6 Cooking-pot: thick black core, pale grey margins, dark grey surface; surface quite abraded; south-western BB1 fabric. Context CW75/M1. See Holbrook & Bidwell 1991, 91–4; Gillam 1976, fig 1, nos 3 & 6. Mid second to early third century.
- 7 Sandy grey-brown, banded orange and grey surface covered with fine sparkling grits. Context CW66/DB.
- 8 Sandy dark grey-brown, pale grey margins, banded dark grey and pale grey brown and orange-brown surface covered with fine sparkling grits. Context CW75/M?
- 9 For previous examples from Carpow see Birley 1963, fig 8, no 2. Context CW79/W4/D2.
- 10 Dark red-brown, thick black core, gritty dark grey surface. Context CW79/W4/E.
- 11 Pale grey, dark grey-brown margins, dark grey surface covered with fine sparkling grits. Context CW79/W4/G.
- 12 Contexts CW79/W4/D2 & W4/G
- 13 Dull red-brown, grey core, dark grey surface. Context CW66/DB.
- 14 Sandy grey, dark grey surface. Context CW79/W4/D2.



ILLUS 43 Coarseware, nos 1-19 (1:4)



ILLUS 44 Coarseware, nos 20–33 (1:4)

15 Reddish-brown, grey-brown core, dark grey surface. Some evidence of small sparkling grits on surface. Context CW66/DB.

16 Dark grey-brown. Some evidence of sparkling grits on surface. Rouletted decoration. Context CW79/W4/G.

- 17 Context CW75 M1, M13 & M20. Sandy orange-brown, pale grey core, banded grey and orange surface covered with fine sparkling grits. Probably a Thameside product as nos 7–16. See Jones & Rodwell 1973, fig 7, Type M.
- 18 Context CW75 M20. Narrow-mouth jar. Pale grey with darker grey core, dark grey surface covered with fine sparkling grits. Possibly a Thameside product as nos 7–16. See Jones & Rodwell 1973, fig 7, Type N.
- 19 Two rim sherds, eight wall sherds and one base sherd. Much abraded and burnt. Patchy orange and grey. Trench EW ext. (?1965), in charcoal layer at depth 15 in. Possibly a Thames Valley product, as nos 7–16. See Jones & Rodwell 1973, fig 7. Type G.
- 20 Missing. Drawing by J Tait: 'Light grey fabric throughout'. Context CW66/DB.
- 21 Gritty orange, grey core, orange surface (very abraded). Context CW75/M9.
- 22 Sandy, orange-red, grey core, grey-brown surface. Two lines of thumb-nail impression on external surface below rim. Context CW66/DB.
- 23 Wall sherd. Grey gritty fabric. Vestiges of rustication on external surface. Context CW79/W4/D2.
- 24 Gritty, mid grey, pale grey core. Context CW64/AD.
- 25 Pale orange. For previous examples from Carpow see Birley 1963, fig 8, nos 2 & 7. Context CW75/M18.
- 26 Sandy orange. Surface completely abraded. Context CW75/M7.
- 27 Sandy orange, paler surface. Context CW67/CZ.
- 28 Narrow-mouth jar. Hard dark grey, dark red core, burnished surface. Contexts CW65/CE & EC.
- 29 Well-fired, hard dark red, dark grey core, mid grey surface. Context CW68/E7.
- 30 Neck and shoulder sherds only. Very pale grey, darker surface. Contexts CW75/M16 & M19.
- 31 Soft sandy orange with buff core. Contexts CW65/CA.

Bowls

Of the following items, nos 32 & 33 are from plain rim bowls in BB2 fabric; nos 34–7 are from round-rim bowls in BB2 and allied fabrics; nos 38–40 are from bowls with flat, grooved rims in BB1. The remainder are in miscellaneous other fabrics.

In bowls and dishes having rims forming a projecting flange or bead, a chronological distinction is made (following Gillam 1973) between those rims whose sectional profile is triangular or beaked and those having a much more rounded sectional profile. The types considered early (triangular or beaked) are found in quantity on sites on the Antonine Wall. The types considered later (rounded) are almost entirely absent from the Antonine Wall and from two other deposits which are usually dated subsequent to the abandonment of the Antonine Wall — the Corbridge destruction deposit and the filling of the Vallum ditch at Benwell. They then occur in the level over the sealing of the Vallum ditch filling, and in contexts which should date to the closing years of the second century or the early years of the third at Vindolanda and at South Shields. The position is summarized by Table 8.

Gillam (1976, 68) dated the appearance of bowls with flat grooved rims in BB1 (ie nos 38–40, below) to ‘very shortly before AD 200’. Holbrook & Bidwell (1991, 98) cite evidence from the south-west for the appearance of the type there in the late Antonine period.

TABLE 8

Provenance of round-rim bowls in BB2 fabric

Site name/context	No	References
Mumrills	1	Macdonald & Curle 1929, fig 101, no 24.
Corbridge destruction deposit	1	Richmond & Gillam 1950, fig 10, no 82, but <i>not (contra</i> Bidwell & Speak 1994, 227) Forster & Knowles 1912, fig 6, no 81, which is from a deposit on Site 30 which contains some manifestly much later pieces — an east Yorkshire grey ware flanged bowl and a Huntcliff type cooking pot.
Benwell vallum ditch fill	0	Swinbank 1955
Benwell occupation over sealed ditch fill	2	Swinbank 1955, fig 2, nos 17 & 20; decorated samian gives a <i>TPQ</i> of c AD 180.
Vindolanda: period 1b	1	Bidwell 1985, fig 66, no 9; <i>TPQ</i> from samian of c AD 165.
South Shields: period 4c	1	Bidwell & Speak 1994, fig 8.8, no 26; context should be late second century, immediately prior to building of early third century fort 5.

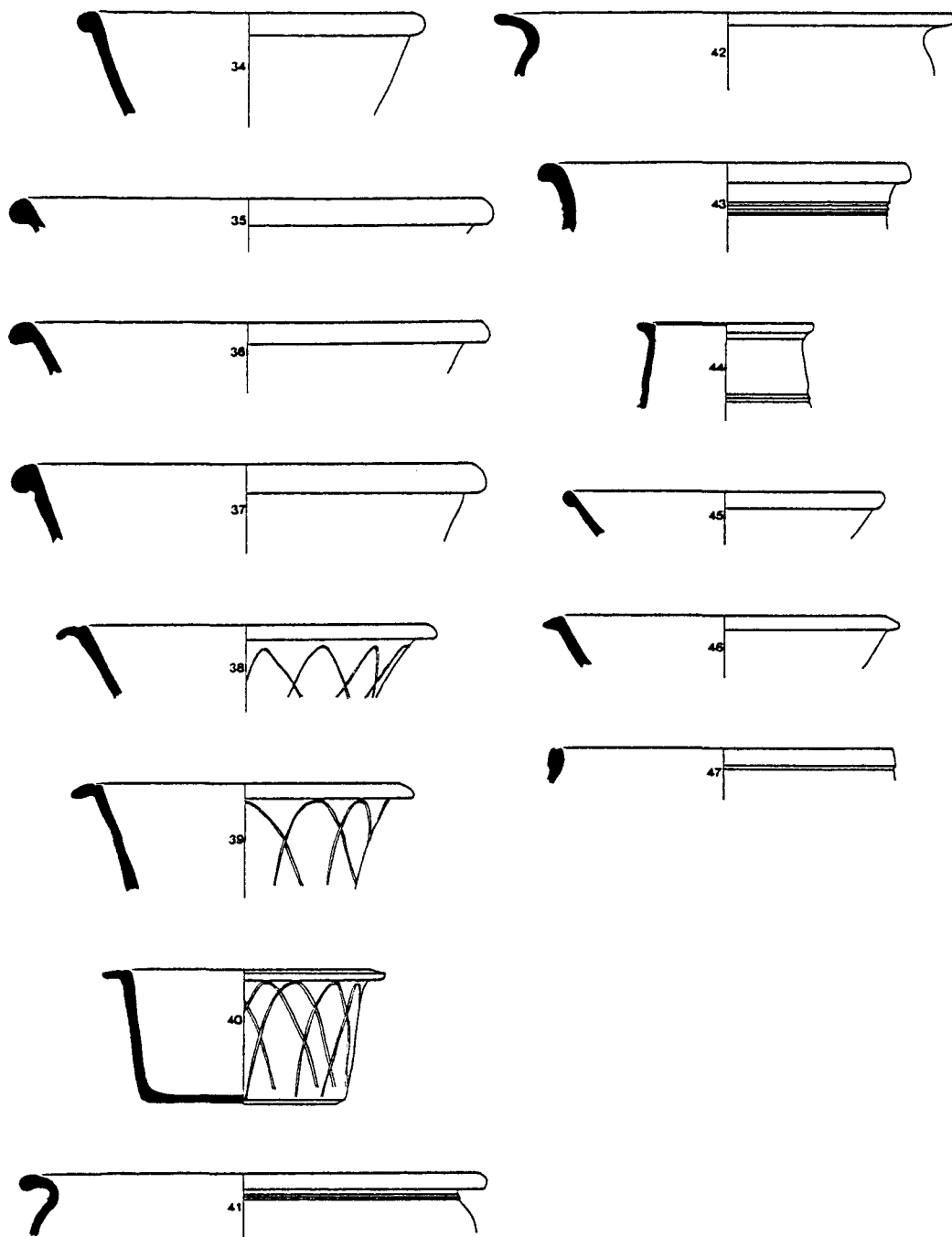
32 Grey with thin pale grey margins immediately below the surface. Patchy dark grey surface. AD 140+. Context CW64/AC.

33 Context CW64/E. AD 140+.

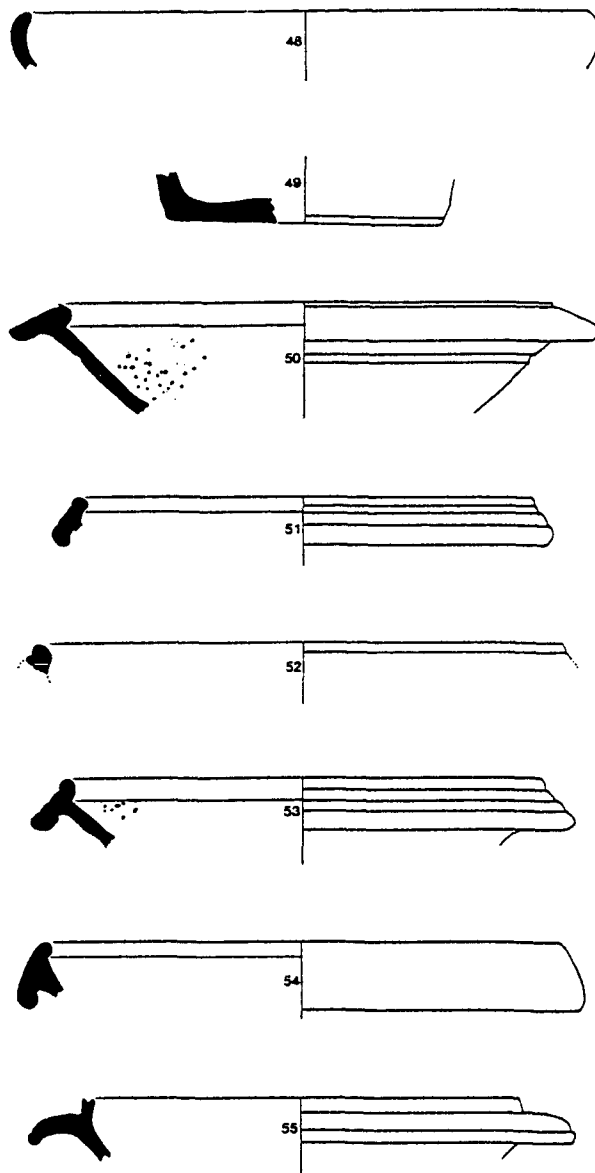
34 Missing. Drawing by J Tait: ‘Grey brown fabric, grey, burnished surface’ (BB2?). Context CW66/DB.

35 BB2: pale grey-brown, smooth, even, micaceous, matte-black surface. Context CW68/E2.

36 Pale grey, mid grey surface. Context CW68/E4.



ILLUS 45 Coarseware, nos 34-47 (1:4)



ILLUS 46 Coarseware, nos 48–55 (1:4)

37 Context CW68 E54 (?). BB2

38 Missing. Drawing by J Tait. Context CW64/BD.

39 Missing. Drawing by J Tait. Context CW66/DB.

40 Missing. Drawing by J Tait. Context CW66/DB.

- 41 Black, thin red-brown margins immediately below the surface, dark grey surface. Context CW68/E4.
- 42 Mid grey, pale grey core. Micaceous surface burnished in narrow horizontal bands. Contexts CW79/W4D2 & W4G.
- 43 Grey, burnished surface. Context CW75/M13.
- 44 Pinkish-buff, micaceous wet-smoothed surface. Context CW66/DB.
- 45 Dark grey. Bronze-coloured, mica-dusted surface. Context CW64/BG.
- 46 Bowl or dish. Fine dark brown, smooth brown micaceous surface. Context CW75/M18.
- 47 Bowl or casserole. Gritty pale orange. This sherd bears a passing resemblance to a popular North African form which appeared in the later second or early third century AD (see Hayes 1972, form 197). Context CW75/M18.
- 48 Dish with plain in-turned rim. Fine pale brown, smooth, micaceous dark grey-brown surface. Context CW75/M1.
- 49 Two joining sherds from a broad-based vessel. Hand-made, very gritty; very dark grey to black, black inner surface, pale reddish-brown outer surface; much mica (up to 0,4 mm) on outer surface. Context CW69/HC.

Mortaria

- 50 Missing. J Tait drawing used. 'Cream with black and brown grits.' Hartshill Mancetter. For previous examples from Carpow see Birley 1963, fig 7, nos 1 & 3. AD 180–230. Context CW64/BF.
- 51 Off-white, cream slip. Hartshill Mancetter. AD 200–30. Context CW64/BG.
- 52 Small rim fragment. Off-white. Hartshill Mancetter. AD 200–30. Context CW70/I2E.
- 53 Off-white pipe clay. Black trituration grits. Hartshill Mancetter. AD 200–30. Context CW67/AI.
- 54 Mid brown. Abundant quartz inclusions ≤ 0.1 mm and iron-rich grains 0.1–0.2 mm. Trituration grits rounded quartz 1.0–2.0 mm. There is a band of quartz grits 1.0–2.0 mm on the lower outer edge of the rim (possibly derived from being stacked). Context CW64/AB. Rhineland? See Richardson 1986, 110, 1.69–72. Late second to mid third century.
- 55 Mortarium or bowl. Sandy, micaceous orange-brown, blue-grey core in places. Inclusions: moderate quartz, mainly c 0.1 mm, occasionally up to 0.2 mm; remains of a dark orange-brown slip on the top of

the flange. Context CW64/BG. While there are elements of this vessel (the fabric and the grooves on the bead and the outer flange) which are suggestive of the Oxford industry of the third and fourth centuries, in general it lacks the angularity which is considered characteristic of Oxford red colour coated products (C Young, pers comm). A close parallel is noted from Cramond (Rae 1974, fig 20, 23) and attributed by K Hartley (pers comm) to potteries between Verulamium and London, and dated c AD 140–80.

CATALOGUE OF SMALL FINDS

Lindsay Allason-Jones

with a contribution by J Price

Abbreviations: D = diameter; L = length; T = thickness; W = width

COPPER ALLOY (ILLUS 47)

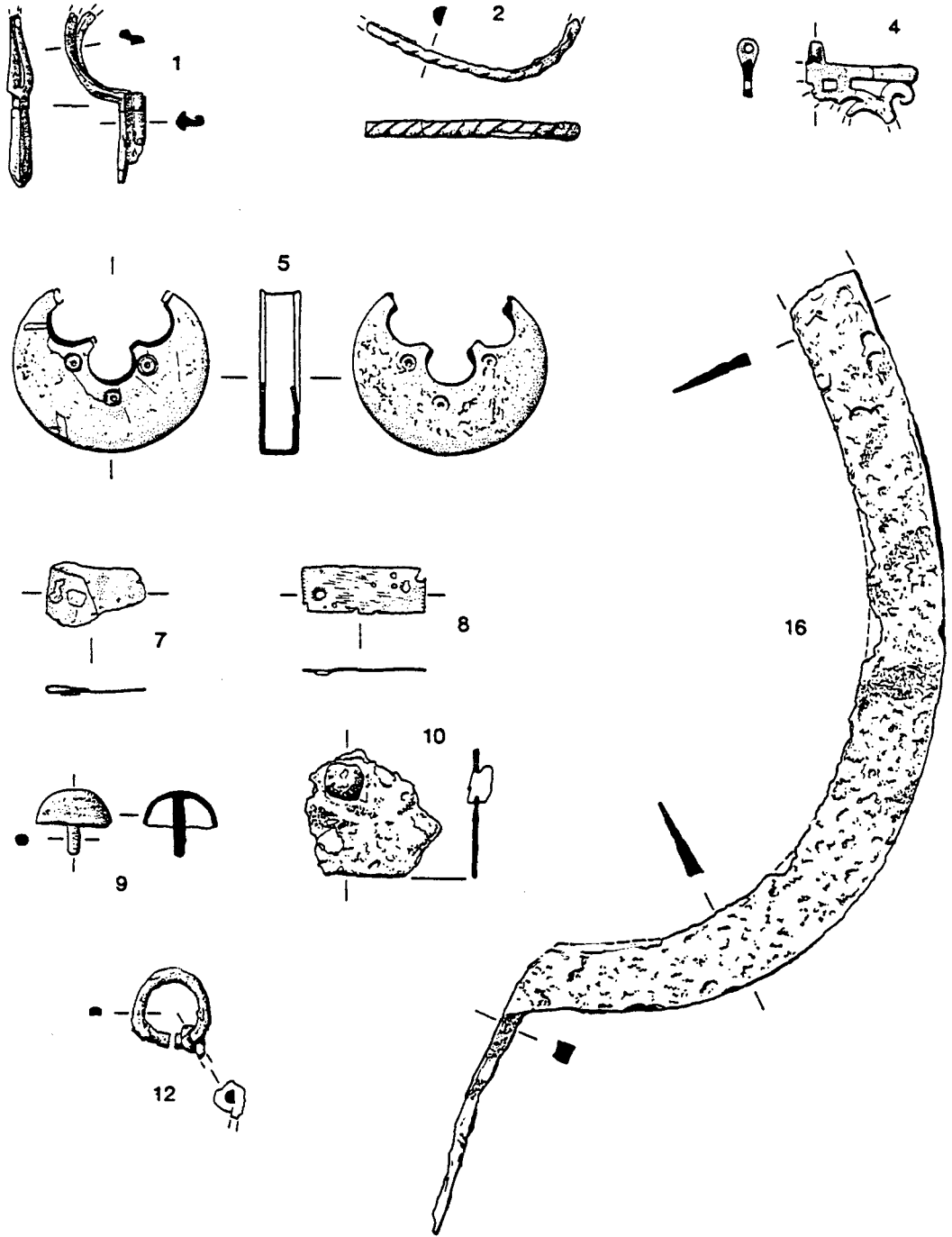
- 1 Incomplete divided bow brooch with triangular-sectioned bows. The plain foot has a rounded end and a foreshortened catchplate which still retains fragments of the pin. This type of brooch can be found in third-century centres throughout the north-west provinces (see Bohme 1972, 60–1, taf. 14.634–6, 15.639–54; Ettlinger 1973, type 55, Riha 1979, type 5.4). A similar example found at Carpow in 1961–2 (Birley 1965, 206, no 3, fig 1.1) was considered by Snape (1993, 21) to be the earliest found in a dated context in Britain. 1971.447. Surviving L: 46 mm, L of catchplate 19 mm; L of foot: 23 mm.
- 2 Strip of semi-oval section curving to one end. The face has pillowed transverse grooves. The back has traces of a lead/tin alloy suggesting that this is an applied decorative strip rather than a bracelet. Such strips are known to have decorated helmets of Robinson's (1975, pl 283–7) Auxiliary Cavalry Type H, but could have come from a variety of objects. CW79.W4G, L: 60 mm, W: 4.5 mm, T: 2 mm
- 3 Incomplete ring with one 'horn' projecting from the edge, possibly a small buckle of late 12th- to late 14th-century date (see Egan & Pritchard 1991, figs 44 & 46). 1971.749.3. Internal D: 13 mm.
- 4 Fragment of wide, elaborate openwork with a hinge loop projecting from the surviving corner. This may have formed part of a balteus attachment (see Oldenstein 1976, taf 83, no 1100, from Zugmantel). CW1979.W8A; Surviving W: 32 mm, Surviving L: 21 mm
- 5 Oval chape with a trefoil opening rather than the more common peltate design. Each face is stamped with three dot-and-ring motifs. There are signs that the surfaces have been silvered or tinned. Although the overall shape of this chape is reminiscent of the second-century peltate chapes which are well known throughout the frontier zones of Britain and Germany (see Oldenstein 1976, 112ff), its decoration is purely Celtic and can be compared to the smaller dagger chapes from Great Chesters (Allason-Jones 1996, no 48) and Housesteads Milecastle (MacGregor 1976, no 169). The inclusion of this chape in the assemblage hints at native troops being present at Carpow. 1979. W6E, W: 55 mm, H: 43 mm, T: 10 mm.
- 6 Several fragments of very narrow binding of U-shaped section, including one which has expanded rivet plates. The wood surviving in the section is unidentifiable and the pieces are not large enough to

indicate whether they come from scabbards, shields or any other piece of military equipment.
CW79.W8.US.BR, L: 50 mm (approx.), W: 4 mm.

- 7 Folded sheet of copper alloy with traces of a secondary alloy on the back. The sheet ends in a crescentic terminal and has a rivet hole through the fold.
CW65. Folded L: 28 mm, Max. W: 21 mm.
- 8 Rectangular plate with a circular rivet hole punched through from one face at each end. There are traces of gilding on the face and shallow nicks decorating the short edges. This is more likely to come from a box or other wooden object than from a leather item such as a belt.
1971.747. Trench B, Pit 1966. L: 35 mm, W: 12 mm, T: 0.5 mm.
- 9 Hollow, domed stud with a circular-sectioned shank. The shank has a hammered end. 1971.748, Rubbish pit. Trench B, D: 20 mm, H: 17 mm.
- 10 Plate with no edges surviving but pierced by a folded fragment of copper alloy. 1971.446(1).L4. CW67, SF6. L: 23 mm.
- 11 Fragment of plate with no surviving edges. 1971.446(2), L5, CW67, SF6. L: 20 mm.

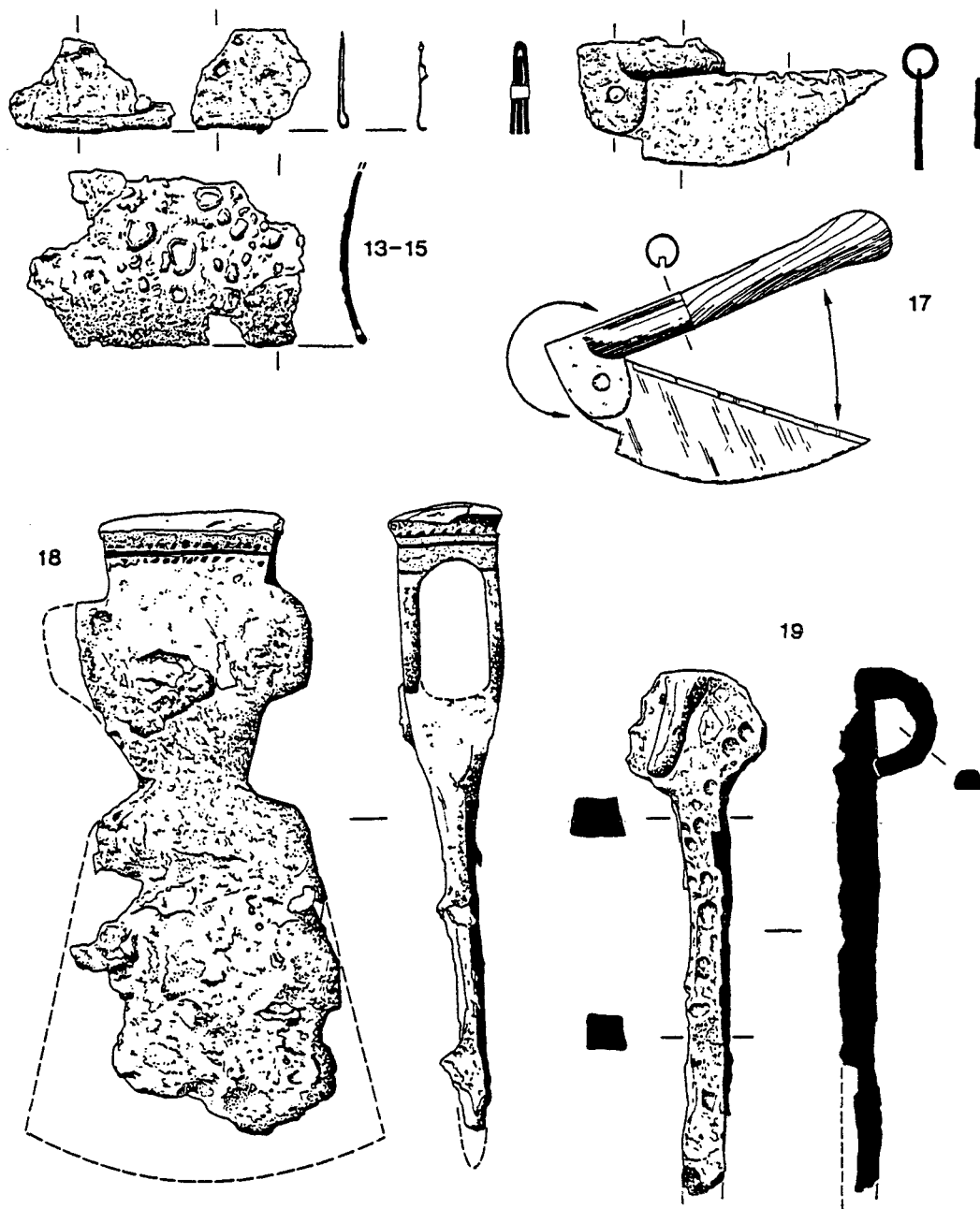
IRON (ILLUS 47–50)

- 12 Penannular brooch of semi-oval section with expanded terminals. A strip of iron wire, now incomplete, has been wrapped around the shank to act as a pin. Although copper-alloy penannular brooches are common finds on Romano-British military sites, iron examples are quite rare. Fowler (1960) refers to two examples from Scotland: one from the Laws, Angus, and the second from Craigie, Dundee; both are of her Type A and of Iron Age date. Unfortunately it is difficult to assign this particular example to one of Fowler's types because of the level of corrosion.
CW79 U/S, D: 22 mm, W: 2.5 mm
- 13 Several strips of iron with straight edges. One strip has a rolled edge whilst another has an iron disc-headed rivet (possibly a reused hobnail) through it. Several have rivet holes with traces of copper alloy around the edges. The appearance of these strips in X-rays and their dimensions suggest that these are fragments of *lorica segmentata*. There has been much discussion as to whether the presence of *lorica segmentata* necessarily proves the presence of legionary troops on a site. Maxfield (1986, 66–71) advanced the argument that the discovery of *lorica segmentata* in an increasing number of auxiliary forts indicates that this type of armour was not worn exclusively by legionaries. Coulston (1988, 11), however, has put forward the counter argument that as *lorica segmentata* was designed for 'close-order legionary combat', auxiliaries, who were expected to fight in both open-order or close-order as the need arose, would have preferred the flexibility offered by *lorica hamata* or *squamata*. These pieces from Carpow may not further either argument although the lack of *lorica segmentata* bronze fittings or any other clearly identifiable legionary equipment on the site is noticeable. It is always possible, of course, that the fragments were present as scrap metal. (For a general discussion of *lorica segmentata* see Allason-Jones & Bishop 1988.)
X-ray E2; W: 47–8 mm, D of rivet head: 8 mm.



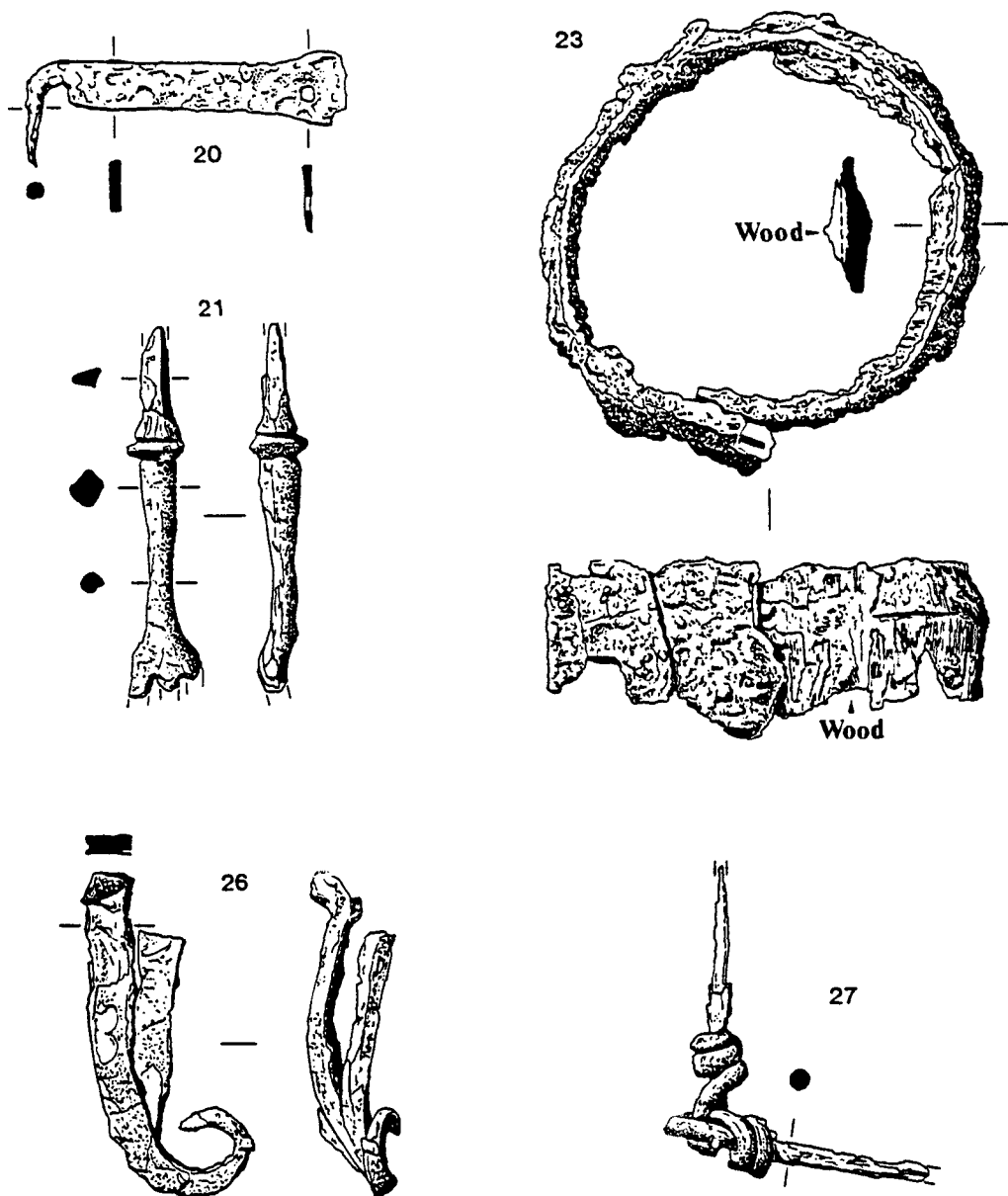
ILLUS 47 Objects of copper alloy (nos 1–10) and iron (nos 12, 16) (1:2)

- 14 Two strips of iron, one of which has a straight edge: *lorica segmentata*?
1971.441. X-ray E5, no measurements.
- 15 Straight-edged iron plate: *lorica segmentata*?
X-ray D8; W: 38 mm.
- 16 Almost complete curved blade of triangular-section and of equal width from the broken tip to the narrow, tapering tang. As this blade appears to have had most of its curve behind the line of the tang it can be identified as a sickle, following Manning's (1985, 50–2) criteria, and would further seem to be an example of Manning's Type 1. Sickles of this type have been found in La Tène Europe and on sites of Late Iron Age date in Britain (cf Blackburn Mill, Berwickshire: Piggott 1953, 47, fig 12, B34; Rees 1979, 457).
1971.443. Total L: 300 mm, L of tang: 68 mm, W of blade: 23 mm, Max T of blade: 4 mm.
- 17 Folding knife. The circular-sectioned socket is broken at one end but expands to two semi-oval brackets at the other, these have been folded together and riveted to act as the hinge. The blade, which has a humped back and a straight, short edge, is only sharpened at the edge, the rest of the blade being flat. Clasp knives are well known in the Roman world but the majority have elaborate handles in the form of animals or people, as for example the South Shields gladiator knife (Toynbee 1963, no 53, pl 56). This example is remarkably plain and it is possibly of medieval date (cf a late 13th-century folding knife of similar form from London: Cowgill *et al* 1987, no 309).
1971.441. X-ray E5; Total L: 85 mm, socket D: 9 mm.
- 18 Incomplete axe-head with a rectangular, solid butt which has an incised grooved all round, flanked by two rows of stamped triangular depressions; the row nearest the blade has been made by a larger stamp. The blade is deeply waisted with parallel sides. Probably of medieval date.
1966.18. Surviving L: 168 mm, W across socket: 70 mm, butt: 51 mm by 29 mm.
- 19 Linchpin with a rectangular-sectioned shank and a somewhat angular oval head. This can be identified as a Manning (1985) Type B with examples known from Newstead (Curle 1911, 293, pl LXX.1) and Blackburn Mill (Piggott 1953, 41, fig 11, B4).
CW76.04.003. Total L: 141 mm, W of head: 40 mm, T: 12 mm.
- 20 Rectangular strip with one end hammered flat and pierced by a circular hole. The other end has had a piece cut away and then curled through a right angle. Possibly a barb-spring padlock key although not of the common form (see Manning 1985, 96–7).
X-ray D8; L: 86 mm, W of shank: 11 mm, D of hole: 3.5 mm, T of shank: 3 mm.
- 21 Iron rod with a trident-shaped end. The hexagonal-sectioned shank narrows away from the end and then expands to a waisted disc. The lower shank is rectangular in section. Forks were not used in the Roman period but are known in Britain from the ninth century onwards. They were not, however, in general use until the later Middle Ages and were still rarities in the 15th century.
X-ray K2. Surviving L: 95 mm, W across end: 16 mm.
- 22 Complete but fragmentary iron collar with a median rib around the outer face. The traces of wood adhering to the inner surface leave a gap suggesting that the iron collar held two wooden water pipes



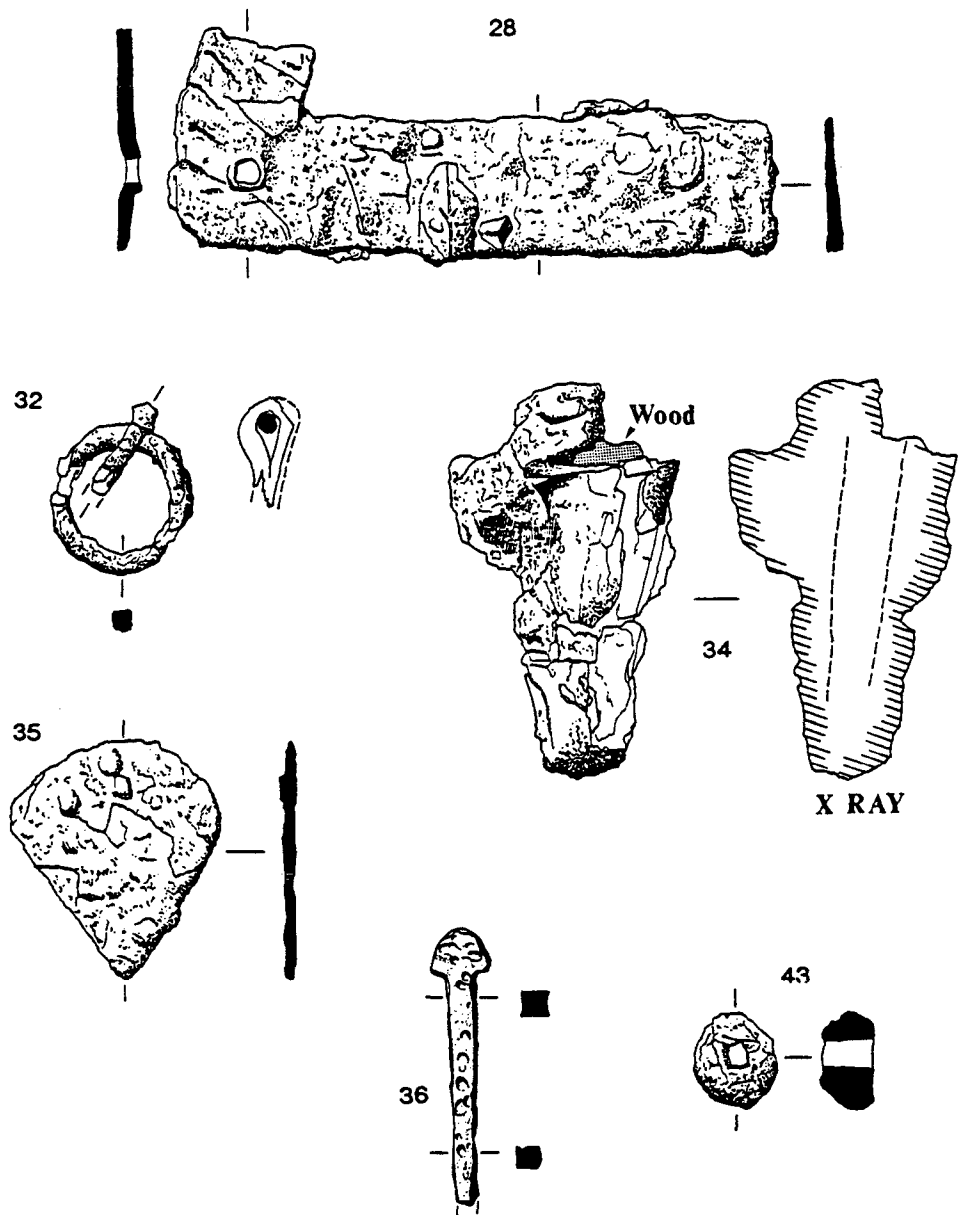
ILLUS 48 Objects of iron (nos 13-19) (1:2)

together. Wooden water pipes held by such collars have survived at London (Manning 1985, R19) and at Silchester where they were spaced at intervals of c 2.1 m (Hope 1897, 423). If this is the normal spacing for water pipes in Roman Britain then the four examples from Carpow together represent a length of about 10.5 m. The British examples vary in diameter but Manning has suggested that they



ILLUS 49 Objects of iron (nos 20–27) (1:2)

tend to average either 85 mm or 115 mm. The Carpow pipes, therefore, are of the larger gauge. The surviving examples of iron water pipe collars invariably have median ridges which would have acted as stops to ensure that the ends of the wooden pipes were held equally. This is an important feature: if one pipe was insecurely held within the collar a sudden surge of water could blow the pipe out, resulting in a flood. It has been estimated that this gauge of pipe could take 5000 gallons of water per hour, although the likelihood is that only half that would be flowing under normal conditions. 1971.444(3). Internal D: 110 mm, T: 1.5 mm, W: 28 mm.



ILLUS 50 Objects of iron (nos 28–36) and lead (no 43) (1:2)

- 23 Complete iron collar of similar type to above.
Display. Internal D: 110 mm, T: 1.5 mm, W: 35 mm.
- 24 Incomplete iron collar of similar type to above.
1971.444(2). X-ray J2. Internal D: 130 mm, T: 1.5 mm, W: 38 mm.

- 25 Incomplete iron collar of similar type to above.
1971.444(1) (1968/F1, from north-east corner outside north-east angle of *principia* foundation).
X-ray J. Internal D: 105 mm, T: 1.5 mm, W: 33 mm.
- 26 Hook of rectangular section which has a bifurcated shank.
CW79.W8.U/S; L: 85 mm.
- 27 Two lengths of oval-sectioned iron wire looped together. Each loop is formed by curling the end over and wrapping its around the shank twice. Possibly from a small cauldron chain.
X-ray Cl. Total L: 143 mm, T: 4–5 mm.
- 28 Bar with an arm at right angles and a circular hole cut through the angle.
CW79.W7G. L: 60 mm, W of bar: 34 mm, hole D: 5.5 mm.
- 29 Strip with one small circular hole cut close to the surviving terminal.
X-ray D8. L: 64 mm, Max. W: 12 mm, hole: 2 mm.
- 30 Globular bead or small collar.
CW75.M1. D: 21 mm, H: 12 mm, hole: 7 mm.
- 31 Annular ring of hexagonal section. Traces of tinning or silvering survive of the surface.
1971.749.2.L8. Internal D: 14 mm, W: 4 mm, T: 3.5 mm.
- 32 Annular ring with a double-spiked loop wrapped round its shank. Double-spiked loops provided a simple method of attaching a ring to timbers or masonry (see Manning 1985, 129–31).
Internal D: 26 mm.
- 33 Fragment of a large ring of rectangular section.
1971.749(1).L7; Internal D: 38 mm, W: 7–8 mm, T: 3–5 mm.
- 34 Circular socket or ferrule with a hammered mouth and a blunt end. Traces of wood survive on the inner surfaces.
X-ray K. L: 76 mm, external D: 32 mm.
- 35 Triangular plate of iron with one of its straight edges sharpened; the third edge is curved.
L: 60 mm, W: 55 mm.
- 36 Rectangular-sectioned brad or nail with a flat triangular head. The shank thickens beyond the head, a feature which Manning maintains would allow the nail to be driven completely into wood if the head was aligned with the grain of the timber (1985, fig 32, Type 2).
Display. Surviving L: 68 mm, W across head: 15 mm, T of head: 6 mm.
- 37 Two rectangular-sectioned shanks tapering to both ends.
Display. Max L: 121 mm, Max. T: 4 mm.

- 38 Five nails with rectangular-sectioned tapering shanks and disc heads.
Display. Max L: 100 mm, D of heads: 19 mm.
- 39 Forty-six disc-headed hobnails. The average number of hobnails per boot sole could be as high as 80 or 90 if the full sole was covered, in which case it is unlikely that this group represents a complete boot. The number of hobnails seems to have varied from craftsman to craftsman or from customer to customer, however, and a shoe sole from London has 43 hobnails confined to the edge with a few extras under the heel and the ball of the foot (Manning 1985, R104).
Display; D: 8 mm.
- 40 Circular-sectioned rod.
C2. X-ray. L: 200 mm, T: 4 mm.
- 41 Two circular-sectioned-rods.
X-ray C2. L: 110 mm, 105 mm, T: 5 mm.

LEAD (ILLUS 50)

- 42 Lentoid strip cut to shape with one end curled. Roof-tie?
CW75; M13. L: 67 mm, W: 19 mm, T: 7 mm.
- 43 Domed lead caulking from copper-alloy stud. Roman military sites in north Britain often produce studs whose copper-alloy domed heads have been fixed to an iron shank by lead. Unfortunately, none has been found *in situ* so it is not possible to suggest a precise function. D: 10 mm.
- 44 Large flat block with cut edges. Possibly base from which objects have been cut.
CW75; M13. L: 62 mm, W: 59 mm, T: 10 mm.
- 45 Lead spill; one edge is curved as if it has solidified around a tube.
CW75; M9. L: 112 mm.
- 46 Roughly triangular plate. CW75; M16. L: 33 mm.
- 47 Lead fill from an ovoid depression.
Found behind clay lining of drain. L: 29 mm, H: 15 mm.

GLASS (NOT ILLUS)

- 48 Ring bead of 'natural' green glass. Beads of this type can be found in both pre-Roman and Roman contexts and are impossible to date with any accuracy, but this particular example appears to have been made from recycled Roman vessel glass. For parallels from Scottish sites, see Guido 1978, 142.
D: 20 mm

Bottle fragment

Jennifer Price

- 49 Fragment from the side of a rectangular bottle. Blue/green glass showing little wear. This type of bottle occurs regularly on military sites in northern Britain (eg Price 1990, 175ff and fig 163, from Carlisle; and RIB, vol II, fasc 2, 2419.74–177, for inscribed examples). They were in use in the second and third quarter of the second century AD.
From pit fill in Trench B, 1966. Max W: 54 mm; max H: 68.5 mm.

SCALE ARMOUR

J C N Coulston

During the 1979 season of work at Carpow a shallow pit containing a folded, articulated piece of scale armour was excavated in the *praetentura*. The fine state of preservation of the organic components mark this as a find of the first importance to Roman military studies.

The piece was given preliminary cleaning and partial consolidation at the National Museums of Scotland in 1979, before being deposited at the McManus Galleries, Dundee. A brief investigation of the piece was published by Wild (1981; cf Coulston 1992) and at least one other detailed publication is proposed (Coulston forthcoming).

DESCRIPTION (ILLUS 51–3)

The artefact represents a piece of armour constructed of copper-alloy scales attached to a textile backing, and edged with leather. Before deposition it had been multiply folded so that the armour bundle as found was made up of six layers. When discovered, the constituent elements were still very well preserved through impregnation of the organic components with a solution of copper-alloy corrosion products which toxically arrested bacteriological breakdown (ibid, app 2). Since discovery, the artefact has degenerated alarmingly, and a curved leather binding has become completely detached. During initial conservation work the top two layers were removed in one piece. Of the remaining four layers of folded textile and scales, the uppermost one was successfully removed and the next one folded back through 180 degrees to uncover well-preserved scales, cords and stitching on its underside and on the contiguous upper face of the layer below.

By 1992 the bundle of the three uppermost layers measured approximately 205 mm long, 130 mm wide and 37 mm thick. Nearly all the outer edges have been lost, making it difficult to reconstruct exactly how the folding was done. Three conventions are adopted in the following description to aid clarity:

- 1 The armour layers are numbered from top to bottom of the bundle as they lay: Layers 1–2 of the originally conserved piece; and Layers 3–6, unconserved (Coulston forthcoming, app 1–2).
- 2 In terms of alignment, the edge of the surviving bundle to which the curved leather binding was attached is referred to as ‘top’ or ‘upper’, with corresponding ‘side’ and ‘lower/bottom’ labels. This is based on the alignment of Layer 3.
- 3 With each layer the face with attached scales is the ‘front’ and the reverse face is the ‘back’.

The layers are folded sections made up of similar components and uniform construction method whereby overlapping rows of copper-alloy scales are attached laterally by copper-alloy ribbon-twists, and fixed to a textile backing by cords and stitching. When complete, each scale would have been 15–16 mm long, 13–14 mm wide and 0.15 mm thick, and sub-rectangular in shape with the lower two corners rounded. Each had six perforations in three longitudinally aligned pairs: one in the middle, at 1.5 mm from the upper edge; and two pairs lower down, each positioned 1 mm from a side edge. Many scales snapped along lines of weakness caused by these holes.

Each scale overlaps its neighbour to the left by 3 mm and is attached to it by a copper-alloy ribbon (up to 16 mm long, 1 mm wide, 0.17 mm thick) passed through the overlapping side pairs of perforations. At the back the ribbon ends are twisted past each other near-diagonally, and flattened. Many of these ends are exposed by the fragmentation of scales, and ribbons have themselves snapped through brittleness, particularly at the points where they passed through the scale-perforations.

Overlying and partly protecting the upper portions of the rows of scales are downward-curving, near-parallel cords, c 4–7 mm apart. Each cord is 3–5 mm thick, depending on the degree of flattening. Lengths of two-ply yarn pass through one of the upper perforations of each scale, over the cord, back through the other perforation, and through the textile backing, thus stitching the three elements together. This was done so tightly that the cords are bunched at each threading, and are flattened by the scales between. The upper parts of many scales were pressed back and horizontally bent by the cords, further weakening them.

Details of individual layers follow.

Layer 1 Scale side upwards, all edges lost, stuck back-to-back to Layer 2. 104 mm top to bottom, 91 mm wide, left to right. 55–60 scales in 11 rows, and 10 cords.

Layer 2 Scale side downwards, all edges lost, stuck back-to-back to Layer 1, subsequently separated from Layer 3. 110 mm top to bottom, 105 mm left to right. 40–5 scales and nine cords.

A straight section of leather 128 mm long is attached directly to the armour and binds a diagonal edge. It consists of a strip 30–2 mm wide, doubled over, then irregularly stitched with two leather laces 6–8 mm wide.

Layer 3 Scale side upwards, all edges lost, subsequently separated from Layer 4. 130 mm top to bottom, 146 mm left to right (90 mm by 145 mm after removal). 115–20 fragmentary scales and 11 parallel cords.

Layer 4 Scale side downwards, edges lost except one foldover to Layer 5, subsequently folded back 180 degrees. 140 mm long, 65 mm wide before unfolding. The weave runs diagonally top right to bottom left, and aligned with it is a tear at the top right, c 40 mm long.

A second section of leather edging, 220 mm long and 30 mm wide, was originally attached to Layer 4(?). X-ray photography indicates that it encloses textile, ribbons and c 20 scale fragments. It was fastened by a lace 8–9 mm wide which has been threaded in a back-stitch through itself.

Layer 5 Scale side upwards, edges lost except foldovers from Layer 4 and to Layer 6, unfolded to form continuous scale surface with Layer 4 underside. Unfolded 230 mm left to right, 130 mm top to bottom. 70 complete and fragmentary scales in 12 rows, plus more unattached, 11–12 cords.

Layer 6 Scales downwards, edges lost except foldover from Layer 5. Two sections visible: linen backing projected for some 40 mm from under unfolded Layer 4; debris and at least three cords projecting at the upper right out from under Layer 5. Fragmentary scales on the under surface of the bundle also belong to Layer 6.

Analysis of materials

Samples were taken for analysis by scanning electron microscope and by a drying-twist test at the Manchester Ancient Textiles Unit. A piece of textile backing, a cord, a stitching thread and loose fragments were examined. Each of the specimens was found to be composed of flax, the bast fibre obtained from the stems of the flax plant (*Linum usitatissimum*; Wild 1970, 14, 27–9). The textile backing is made up of two-over-one linen twill. The probable warp is Z-spun with 6–7 threads per centimetre. The weft has a count of 10–12 thicker Z-spun threads, almost concealing the warp. The cord is S-ply from two virtually unspun yarns, and the stitching is of very fine, Z-spun thread (Wild 1981, 306; Coulston forthcoming, app 3).

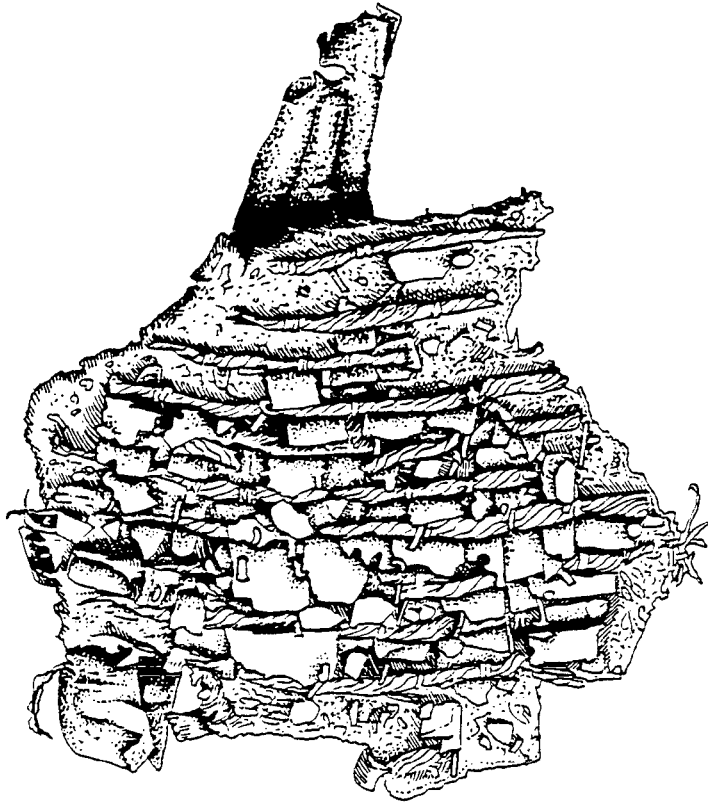
Fragments of three scales and three ribbon-twists were analysed by Energy Dispersive X-ray Fluorescence by the Analytical Research Section of the National Museums of Scotland. All the samples were heavily corroded and thus to a degree contaminated. However, the resultant values do allow internal comparison and the types of alloy used to be identified with reasonable confidence. The scale fragments were made of a copper alloy containing significant amounts of tin and zinc. The ribbons were bronze (copper-tin alloy) and contained only traces of zinc (ibid, app 4).

Unfortunately, the thick and cloying agent employed in conservation has made leather identification difficult. Nevertheless, C van Driel-Murray kindly examined the detached curving piece and cautiously opined that, to judge from some visible follicles and from thickness, the binding strip may be goat/sheep leather, and its lace may be calf leather.

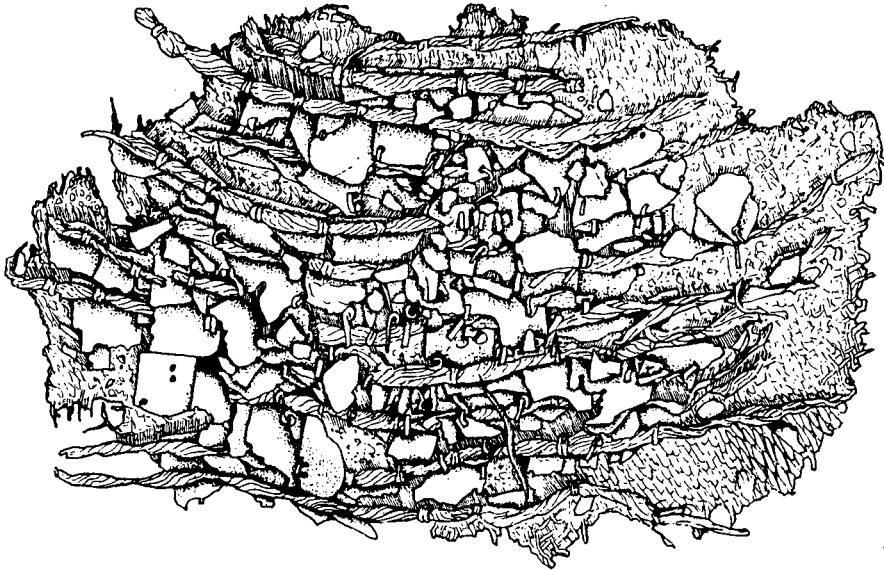
Construction

Following from characterization of the materials (above), close examination of the armour reveals a common structure made up of the following components: copper-tin-zinc alloy scales; bronze ribbon-twists; linen cords; linen yarn stitches; linen textile backing; and sheep/goat(?) leather edge-binding with calf(?) leather laces. Study of these components suggests the following method and sequence of assembly:

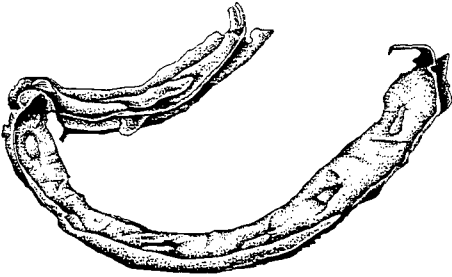
- 1 A coarse linen garment was woven and tailored.
- 2 One scale was laid so as to overlap its left neighbour (as seen from the front). A bronze ribbon was passed through its left pair of perforations and through the neighbour's corresponding right pair, then the ends were twisted past each other and flattened down.
- 3 By repeating this process a row of scales was built up. This was laid horizontally on the linen textile backing near the latter's lower edge.
- 4 A cord was laid horizontally along the scale row, aligned between the holes of the upper pairs of scale perforations.
- 5 Linen thread was passed through each perforation pair, stitching cord to scales to backing.



ILLUS 51 Scale armour, 1997: Layer 1 (*Drawing by Peter Martin*)



ILLUS 52 Scale armour, 1997: Layer 3 (*Drawing by Peter Martin*)



ILLUS 53 Scale armour, 1997: detached leather edging (*Drawing by Peter Martin*)

- 6 Processes A to E were repeated with successive scale rows added from the lower edge of the backing progressively towards the top. Lower ribbon-ends overlaid the cords. The latter were affixed close enough together to allow each row of scales to cover and protect the cord of the row below.
- 7 Lastly, edges were bound with lengths of leather strip, folded over and fastened in place by leather laces, using a variety of threading methods.

DISCUSSION

The scale armour cuirass (*lorica squamata* or *plumata*; for usages see Lewis & Short 1969, sv) was widely used in the Roman period (Alfs 1941, 82–105; Robinson 1975, 153–61; Clemetson 1993). However, preservation of the organic components of the Carpow scale armour is extraordinary, as is the surviving structural integrity. Various finds of linen textile in plain-weave have been made in Britain (Wild 1970, 91–4). Examples of two-over-one twill are found in the Roman western provinces — notably a Hadrianic instance at Corbridge (ibid, 50, 101; Allason-Jones & Bishop 1988, 107–8) — but they are not numerous. They are perhaps more common amongst German textile finds than in Britain (Jørgensen 1992, 21, 24, 62, 66, 199, 231–3). However, the numbers involved are so small that it is unsafe to draw any conclusions about importation into Britain.

A large amount of Roman scale armour has survived in the archaeological record. The majority of scales which have been analysed metallurgically were made from copper-zinc alloy (*orichalcum*; Anstee 1953; Bishop & Coulston 1993, 148, 184, 191). However, alloy contents differ widely (Bishop 1989). In the Carpow case the comparatively high tin percentage may indicate recycling in combination with more ‘bronze’ items, and the low zinc content may be the result of reduction through repeated recycling. The high copper content of the Carpow ribbon-twists deliberately made them softer, and thus more flexible for use.

Very large groups of scales articulated by wire twists do occur (eg RLÖ IV, fig 46; Curle 1911, pl XXIV; Webster 1958, pl XIc; Walke 1965, pl 103.1; Kolnik 1986, fig 2). Very occasionally, a substantially complete cuirass set has been recovered, such as the one in Tower 16 at Dura (Baur *et al* 1932, 11), and the rolled-up armour in the tumulus at Vize, in Bulgaria (Mansel 1938, fig 203). What makes the Carpow scale so exciting and important, however, is that the relationship between its metallic and its organic components is so well preserved. Its condition is second only to the scale armours from Dura (cf Rostovtzeff *et al* 1936, 441–2, 450–2, pl XXIII).

Scale perforations (numbers, sizes and positions) may be employed to categorize Roman scale armour into 10 types (RLÖ II, 87–8, pl XV.i–ix; Coulston forthcoming). The Carpow variant is frequently seen elsewhere: examples include Mainz, Pfünz, Künzing and Regensburg in

Germany; Augst and Aventicum in Switzerland; Carnuntum and Lorch in Austria; Musov in the Czech Republic; Serdica and Sisak in former Yugoslavia; and Buciumi in Romania (Landesmuseum Mainz, pers comm; Braun *et al* 1992, 58; Fischer 1990, pl 53.B.2 and 1991, fig 7.9; Deschler-Erb *et al* 1991, fig 40.21; Robinson 1975, fig 161; RLÖ II, pl XV.11–9, and XI, fig 14.7; Tejral 1994, fig 6.6; Hoffiller 1912, fig 13.1 and 14.4; Chirila *et al* 1972, pl XVIII).

The Carpow armour exhibits evidence of pre-deposit damage. In particular, the laces of the leather binding of Layer 2 were unravelled and the curving binding was already detaching from the bundle. In their present condition it is very difficult to determine whether the scales were in need of repair, but most were bent by the cords and some on Layer 2 (protected by Layer 3) may already have snapped. The copper-alloy ribbons were weakened by the scale perforations and some of these too may already have required replacement. Damage was incurred in the bundling up of the armour prior to placement in its pit. The folds between Layers 4 and 5, and Layers 5 and 6, run diagonally across the scale alignment, resulting in bent scales, detached stitching and displaced cords. Sections of the textile backing may have been ripped apart whilst the armour was in use, as suggested by the tear on Layer 4. In addition, the textile may have been rotting and stinking through dampness, irreparably soiled with human products (cf Thordemann 1939, 95), or even infested with lice and fleas.

Pictorial sources suggest that a wide variety of troops wore scale armour during the Roman period (Éspérandieu 1907–66, no 153, 260; Alfs 1941, 89–91; Florescu 1965, fig 183, 188–92, 206; Robinson 1975, pl 241, 307, 442–5, 448, 452–3; Benseddik 1979, fig 13, 15–16) and there is nothing about the Carpow armour which specifically denotes the owner's unit or status. It was found in the *praetentura*, an area of timber buildings which most likely served as barrack accommodation. Cuirasses have been found in military accommodation at Dura-Europos and in barrack-blocks at South Shields and Buciumi (Rostovtzeff *et al* 1936, 28; A T Croom, pers comm; Chirila *et al* 1972, 69).

There is clear evidence for orderly dismantlement of the Carpow base and the scale armour may be viewed in this light. The vast majority of military equipment found on Roman sites was deliberately buried in pits, wells or defensive ditches at the time when occupation of the installation was ending, when buildings were being dismantled, defences slighted, and rubbish discarded. For example, ditch-ends at Longthorpe, Cambridgeshire, contained cavalry-fittings; the *principia* well at Bar Hill, on the Antonine Wall, had archery equipment; pits within the Inchtuthil fortress in Perthshire contained tons of iron nails; a pit in the fort at Corbridge had a chest full of armour and other items; and pits around the annexe at Newstead, in Roxburghshire, held a wide variety of arms and armour (Bishop 1986, fig 1; Robertson *et al* 1975, 56; Pitts & St Joseph 1985, 289–92; Allason-Jones & Bishop 1988; Curle 1911, 116–39). Close parallels may be drawn with deposits associated with third-century German frontier withdrawals (Oldenstein 1976, 59–67). A large proportion of such pieces prove to be either in the course of manufacture, or damaged and presumably awaiting repair. The Carpow scale armour was certainly in some disrepair before it was folded up and put into the pit.

ANIMAL BONES AND SOIL SAMPLE

L J Gidney & J P Huntley

The excavations produced finds of animal bones from 11 soil contexts, detailed in Table 9. Only some cattle bones from the inner ditch fill and from a pit in Trench B can be regarded as securely stratified. The remainder should be regarded as no more than groupings recovered from topsoil

(Contexts CW/36C/1–10). The animal bones are extremely poorly preserved and are most unlikely to be representative of the bones originally deposited, both in terms of species and skeletal elements. No bones were measurable and accurate assessments of tooth wear were not attempted as the dentine had decayed from many teeth. (Context CW/36C/3 produced the best preserved bones.)

The species identified are cattle, sheep/goat, pig, horse, red deer and rabbit. The latter is a Norman introduction and, as the bones are comparatively well preserved, is most likely to indicate recent disturbance by this species. The four sheep bones from context CW/36C/2 were in better condition than most other bones and may, like the rabbit bones, indicate a relatively modern intrusion. The presence of dog at this site is attested by one bone with unmistakable dog gnawing marks on it, from context CW/36C/3.

Species identification

Cattle Not unexpectedly, the large and robust bones of cattle were the most numerous identified specimens. The preponderance of jaw, maxilla and teeth fragments among the identified cattle remains is probably misleading and is a factor of the better survival rate of tooth enamel than bone. The majority of the finds are of long bones or teeth from adult animals, as these survive better than porous and fragile bones from juveniles. However both context CW/36C/6 and context CW/36C/8 produced evidence for the presence of juvenile animals. The former produced two long bones with unfused epiphyses of a size comparable with animals less than a year old, the latter produced a long bone and part of a maxilla with deciduous dentition.

The most interesting cattle bones are a group found in a pit in Trench B. It is possible to suggest that these fragile and fragmentary remains represent what is left of a complete cattle skull and neck. This appears to have been an animal aged over three years, as all the permanent teeth are present and both maxillary third molars exhibit abnormal wear caused by malocclusion with the mandibular teeth. This condition is often age related. However none of the epiphyses of the cervical vertebrae had fused, suggesting an age less than five years at death. It is not possible from these meagre remains to determine whether this find represents disposal of part of a sacrificial animal or meat unfit for human consumption. There were no indications of butchery marks on the cervical vertebrae.

Sheep/goat is represented by two bones of the feet in CW/36C/3, a mandible in CW/36C/8 and also by four foot bones in context CW/36C/2, though these last may not be of great antiquity. The mandible has all the permanent molars present but little wear on the third molar, suggesting the animal was killed at an age between two or three years.

Pig is represented by a mandible fragment containing two permanent premolars in context CW/36C/3 and, from CW/36C/7, a maxilla fragment, again with permanent premolars but also a socket for a feminine sized canine, and an unfused proximal tibia. The pig teeth suggest slaughter of animals aged over 16 months while the tibia indicates an animal aged less than 30 months.

Horse is represented by two loose teeth, one mandible fragment and one toe bone. Unlike the preceding species, horse-meat is unlikely to have been eaten. However, a high casualty rate of cavalry horses on active service might be expected and is suggested by the mandible fragment from context CW/36C/5 which exhibited little wear on the third molar, which erupts by four years of age.

Red deer is represented by a piece of antler tine. This was a popular commodity with the army and might derive from an artefact or craft waste rather than an animal hunted for meat.

TABLE 9

Carpow animal bones

	Cattle	Sheep/goat	Pig	Horse	Rabbit	Red deer	Indet.
Topsoil contexts							
36/C/1	4						8
36/C/2	1	4					
36/C/3	6	2	1	1	1		17
36/C/4				1	1		
36/C/5				1			
36/C/6	5						7
36/C/7	3		2	1	1		8
36/C/8	9	1				1	>100
36/C/10	2						
Inner ditch fill	1						
Trench B pit fill	17						
Totals	48	7	3	4	3	1	40

Organic inclusions on cattle mandible from inner ditch

A quantity of soil with adhering to the remains of one cattle jaw bone from a fill of the inner ditch was considered worth investigating for any other biological material. The aim here was to determine the potential for environmental work of this sort should further excavations be undertaken in the future.

The teeth and any large fragments of bone were removed from the soil which was then soaked in warm water and wet sieved to 500 μ . A quantity of c 150 ml washed down to c 100 ml which was then examined under a stereomicroscope at magnifications of up to x50. Much of the coarser material retained bright blue vivianite staining indicative of anaerobic deposits. A small amount of white bubbly industrial waste was present amongst a moderate amount of cream mineral staining. Twigs, bark, heather flowers, insect fragments, caddis larval cases (moderately abundant) and cereal straw were all present although in small amounts only. Seeds of *Stellaria media* (chickweed), *Montia fontana fontana* (blinks), *Sambucus nigra* (elderberry) and *Potamogeton* sp (pond weed) were recorded. These, as with the animal bones, are highly likely to be unrepresentative of the original assemblage. Given the presence of the pond weed seed and the caddis cases, the ditch probably had standing water when these deposits accumulated; at least they are unlikely to have been brought to the site with other material. The heather and straw suggest a deposit with some rubbish in it.

WOOD

J P Huntley

Four pieces of wood were sent to the laboratory for identification and comment. These were derived from stakes or piles driven into soft, wet sand beneath the south wall of the headquarters building, but some may have been reused in this context. All proved to be oak (*Quercus* sp). Condition varied from excellent to moderate (ie from solid, heavy wood to softer, slightly flaky wood).

One piece had an overall shape and size similar to tent pegs from, for example, forts at Ribchester and Vindolanda, in northern England. This had no surviving 'notch', however, where a guy rope would have been held, though there are clear cut marks on both sides where such a notch would have been. Another bore a shallow (2–3 mm), mortice-type feature on one face and also a series of shallow knife cuts which suggest its use as a make-shift cutting block. A third stake had a mortice slot through the middle of one long side. Narrow rings were visible in section in the mortice slot and the angle of curvature of the rings was slight. These details indicate that the piece

derived from a slow-grown timber, cut from a tree of considerable girth; it was also especially knotty.

All four of these pieces are clearly artefactual and it is not surprising that they were all cut from oak trees. This is the species favoured by the Romans, and indeed by most western Europeans since then, for structural building and many artefactual works. They give the impression that both trunk and branches were used and this is confirmed when major assemblages of wood are investigated (see Huntley 1989; 1991; 1995).

IRONWORKING

R F Tylecote

During excavation in 1967 extensive remains of iron working were found in the upper levels of the inner ditch fill on the north side of the fort. A layer of slag with small smithing or smelting furnace bottoms, more than 150 mm deep, extended across almost the entire width of the ditch. Amongst this was a tuyère which consisted of a lump of clay, 100 mm square, with a central perforation 24 mm in diameter. Half the tuyère is slagged and it would seem that this clay lump was built into the furnace so that it projected into the interior of the structure to about 50 mm. Some small pieces of slagged furnace lining were also found, consisting of red burnt clay with grey vitrification. The slaggy material could have been either smithing or smelting slag, but the tuyère is probably from a smelting furnace rather than from a smithing hearth. A similar tuyère can be seen in the museum at Zatec, Bohemia; it measures 130 mm by 90 mm and has a hole 14–19 mm in diameter. These tuyères are typical of the Roman period but that from Carpow could be post-Roman in date.

DISCUSSION

The historical context for most of the remains at Carpow is the expedition against the peoples of northern Britain led by the emperor Septimius Severus between AD 208 and 211. The lengthy accounts furnished by the contemporary historians Cassius Dio and Herodianus are imprecise and somewhat confused. These are to be supplemented by a small amount of numismatic and epigraphic evidence and a steadily increasing body of archaeological material (see Birley 1988, 170–87).

The existence of a temporary camp belonging to a Flavian series has been inferred from aerial photographs by J K St Joseph (above) but no confirmation is revealed in the finds made during excavations. Evidence of pottery and coins found at the site does not present a picture of Carpow that conflicts with the hypothesis of brief, intensive use during the operations of Severus against the northern tribes.

The course of the campaigns, based on the historical accounts and other evidence, may be summarized as follows. Responding to letters from the governor of the province, the imperial party — consisting of Severus, his sons Caracalla and Geta, both now elevated to full imperial rank of Augustus, and other members of the imperial family including the empress Julia Domna — set out from Rome accompanied by a force drawn from the Praetorian Guard and from the legions. A large amount of money was also taken. The imperial advance is depicted on coins: Severus and his elder son ride at the head of an army (Severus in the event had to travel most of the way in a litter because of his arthritis), while a galley is shown conveying military banners and standards across the sea. In Britain preparation for the imperial expedition probably

included the construction of new storage buildings at Corbridge, while the fort at South Shields near the mouth of the Tyne was converted into a supply base through the construction of more than 20 new granaries. The importance of seaborne communications is also indicated by the presence of detachments from the Rhine and Danube fleets, and also by the images of Neptune and Oceanus which appear of the coinage of AD 209.

The literary accounts of the campaigns against the Maeatae of central Scotland and the Caledonii further north lay emphasis on the slow progress of the army's advance, held up by the need to cross rivers and marshes, penetrate forests and cross ranges of hills. The scope and direction of the campaigns of AD 208 and 209 have been reconstructed through reference to a series of marching camps indicating a northern advance up the east side of Scotland. The first series (c 25 ha or 63 acres) begins with a crossing of the Forth near Stirling and extends to the northern end of Strathmore at Keithock. The two roughly parallel lines of these camps may indicate a simultaneous march by two separate columns or the outward and return march of a single force through the territory of the Maeatae. The operations of the following year may be indicated by a later series consisting of two sets of larger camps (52 ha or 130 acres and 44 ha or 110 acres) which together suggest a march towards the Moray Firth, the larger series extending from Ardoch to Kair House near Inverbervie, and the smaller continuing to Muiryfold near Keith.

The *as* of Caracalla struck in AD 209 bearing the legend TRAIECTUS show the Augustus crossing a bridge of boats. As has already been noted, this may depict the crossing of the river Tay at Carpow at the outset of the campaign of that year. Other issues of that year portray the same ruler on horseback, riding down fallen barbarians, and on campaign with an escort of legionaries.

In spite of the difficulties of movement and the heavy Roman losses, Severus halted the advance only when he had almost reached the end of the island. Then a peace was imposed and the Britons forced to surrender to the Romans a large part of their territory, which gave cause for the celebration of a victory in AD 210. All three Augusti assumed the triumphal title *Britannicus* and the success was soon being widely promoted on the imperial coinage (*Victoriae Britannicae*). When the Maeatae rebelled in AD 210 Caracalla was ordered north from York to carry out reprisals (he and Severus are recorded in residence there on 5 May), but the reappearance of a Roman army in the area caused the Caledonii also to resume hostilities. A resumption of full-scale operations might very likely have ensued had not Severus — who despite his infirmity was planning to rejoin the army — died on 4 February in the following year. The war was brought rapidly to a conclusion by his successor Caracalla. He abandoned the newly won territories, evacuated Roman bases and, in the company of his mother the empress Julia Domna and his brother and fellow-emperor Geta, travelled to Rome bearing his father's ashes.

There are only two sites north of Hadrian's Wall which can be linked with any certainty with the activities of Severus in Britain: Cramond on the Forth and Carpow on the Tay. Both are ideally situated to serve as bases for a seaborne invasion force of central and north-east Scotland. Cramond lies on the western outskirts of Edinburgh where the river Almond flows into the Firth of Forth and had served as a Roman base already in Flavian times. Later the stone buildings of the auxiliary fort of traditional design were refurbished as a base during the Severan campaigns. It may have served as a point of disembarkation of troops and supplies for the first season of campaigning in AD 208 which began with a crossing of the Forth near Stirling. The remains now identified at Carpow suggest that it was probably the major Roman base in the Severan campaigns, although there is a great deal that is uncertain as regards the precise character and

duration of the Roman presence, in spite of the amounts of epigraphic, numismatic and ceramic evidence which the site has produced.

During the early seasons of the 1964–79 excavations there had seemed to be sufficient evidence for two distinct construction phases in the Carpow fortress. At first timber posts in the vicinity of the east, north and south gates had appeared to support this conclusion, but as more evidence appeared of the combined use of mortared stone and timber by the fort's builders, the case for two phases became weaker and was ultimately rejected. No features or combination of features have been recognized to challenge the conclusion that the occupation of the Carpow fortress was a brief one. It probably started, at the earliest, in or soon after AD 208 and is unlikely to have continued for any significant period following the death of Severus at York and the treaties concluded by his successors, Caracalla and Geta, resulting in Roman withdrawal from military bases north of the Cheviots. The much-debated fragment of the east gate inscription appears at present neither to strengthen nor to weaken this interpretation; and the evidence of the coins and pottery recovered from the site certainly offer no significant counter-argument.

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In 1963 the excavators were invited by R E Birley to undertake further excavation at Carpow, after he was unable to follow up his work of 1961–2 which had revealed for the first time the existence of the Severan legionary base on the site. We received welcome support and advice from Mr Birley, and also from the headmaster and staff of Strathallan School, where the work of 1961–2 had been based. The greatest benefactors of the work were the owners of Carpow, Mr William Smith and, from 1965, Mr John Smith. They assisted the work in countless ways, not least in generously undertaking the backfilling of trenches by tractor after each season. In recent years, as the importance of the site has become more widely known, a great debt is owed to the vigilance of Mr Smith in regard to persons using metal-detectors in and around the area of the site.

All work on the site was undertaken without payment beyond minimal subsistence and limited assistance with travel costs. The annual budgets for the 1964–70 seasons barely exceeded £500. The principal financial support came from Universities where one of the excavators (JJW) held an academic post: Manchester (1964), Birmingham (1964–70) and the Institute of Archaeology (Gordon Childe Fund), University of London (1975–6 and 1979). Regular grants were also forthcoming from the Society of Antiquaries of Scotland and the Administrators of the Haverfield Bequest, University of Oxford. Contributions were also received from the University of Glasgow and from the Society of Antiquaries of London. In 1976, when there was increasing concern with damage to ancient remains through normal agricultural activities, a grant was received from the Scottish Development Department, specifically to monitor the extent and nature of this threat; and in 1979 a similar grant was received from the Department of the Environment. Permission to excavate on what was to become a Scheduled Ancient Monument was readily granted via the Inspectorate of Ancient Monuments, from which we received continuing support through, first, Iain MacIvor, and then David Breeze.

The excavations received all manner of help from the McManus Galleries: Dundee Arts & Heritage and, in particular, from the Director, John Boyd, and his colleagues Herbert Coutts and Adrian Zealand. It was the hope of the landowners that the finds from the site would be housed in Dundee, whose Museum has curated and, where necessary, conserved all the material from the 1964–79 excavations.

The discovery of the sculpture and inscription at the east gate in 1964 drew many visitors to the excavations in subsequent seasons. It is now a pleasure to recall the warm and jovial interest of Sir Ian Richmond, accompanied by Angus Graham, in September 1965. We were also grateful to the late R P Wright for his prompt and meticulous publication of the east gate inscription and sculpture, and for his sustained interest in the later progress of excavations. The contribution of aerial photography to the work at Carpow has been significant throughout and much has been gained from aerial views provided by Colin Martin of the University of St Andrews and G D B Jones of the University of Manchester. The greatest contribution came from the work of the late J K St Joseph of the University of Cambridge. Not only did he take an interest in the progress of the excavation but he also provided full reports on the discoveries he had made at Carpow from the air.

A new survey of the Carpow area was generously undertaken by Val Morocco and his colleagues from the Duncan of Jordanstone College, Dundee, and this forms the basis of the general plan of the fortress published in this report.

A large number of volunteers took part in the ten seasons of excavations, many from University Departments of History, Classics or Archaeology, some of whom have achieved distinction in various branches of these disciplines. It is unfortunate that a full register of all those who participated can no longer be compiled but it is hoped that this final record of their labours will compensate for the lack of more specific acknowledgement that is their due. The size of the teams varied from 10 to 25, most of whom camped at the site or lived in bed-and-breakfast accommodation at Abernethy or Newborough. Several local volunteers were particularly welcome, while we were delighted to receive visits from several local historical and antiquarian associations. — JJW

Mrs K F Hartley very kindly made available her drawings and comments on the mortaria, both from the 1964–79 seasons and also those from earlier work excavations published by R E Birley in 1963. Plans and sections were prepared for publication by Tony Liddell who also inked the coarseware drawings. The small finds were drawn by Alan Braby. Adrian Zealand of the McManus Art Gallery and Museum, Dundee, provided much assistance and, above all, patience during the assembling of the finds reports. — JND

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