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The linear elements of the Hadrian's Wall complex: four investigations 1983–2000

by Tony Wilmott and Julian Bennett

with contributions by Julian Bennett, Gery Friell, Allan Hall, Helen Moore, David Earle Robinson, M-R Usai, and James Wells

Introduction

by Tony Wilmott, Julian Bennett and Gerry Friell.

The linear elements of Hadrian's Wall

Although the best known of the linear elements of the Hadrian's Wall system is the Stone Wall itself, the visitor to the frontier today can see far more of the linear earthworks that formed such an important integral part of the system. As a complex of directly inter-related earthworks, well preserved and documented, these components of the World Heritage Site are one of the most significant archaeological resources of their type in Britain. They contain evidence relating to the structural sequence of Hadrian's Wall, methods of construction, the appreciation by their builders of the strategic capabilities of the Wall landscape, and the logistics of the work. In broad terms, although with great dimensional variations, the linear works consist of the following components.

The curtain wall

In the original plan for the building of the frontier, the Stone Wall with integral milecastles and turrets (pp 137) ran from Wallsend to the River Irthing. Although it has been generally accepted for many years that the Wall was begun at Newcastle, and built westwards, with a later eastward extension to Wallsend (Hooley and Breeze 1968), it has recently been suggested (Breeze and Hill 2001) that a start at Dere Street, with work progressing to east and west, is consistent with the evidence and possibly more likely. The foundations for the Wall were generally some 3.15m wide, and were either built directly on the ground or in a shallow trench. In Wall miles 7–22 the Wall constructed upon these footings is known as Broad Wall, and above offsets on both faces this Wall averages at 2.85m in width; a measurement close to 10 Roman feet. Wing walls attached to the sides of turrets and milecastles were almost invariably built to this Broad Wall gauge, in anticipation of the erection of curtain wall to the same thickness. It is clear that some of the more strategically placed of these installations (Symonds 2005) and the broad foundation had been completed prior to a decision to reduce the Wall width to the dimensions of the so-called Narrow Wall, at 2.25m wide (close to 8 Roman feet). Most of the milecastles and turrets were linked by stretches of Narrow Wall, often built on broad foundations, and this left offsets, or 'points of reduction' at the points where wing walls and foundations met Narrow Wall curtain. These offsets were all on the southern side of the Wall, forming a continual face to be seen from the north side. The Turf Wall, which ran from the River Irthing to the Solway, is described below, but it should be noted that its replacement in stone measured in the order of 2.75m (close to 9 Roman feet). This has been termed Intermediate gauge (intermediate, that is, between the Broad Wall and the Narrow Wall), but in reality little evidence survives for exact measurements.

Factors such as the height of milecastle gate arches and the angle of rise of steps within milecastles (p 140) have made it possible to estimate the height of the Wall at around 4.4m or 15 Roman feet (Simpson 1911, 419; Brewis 1927, 115; Hill and Dobson 1992, 46–9). There are a number

of different ideas on the treatment of the Wall top. It is very likely that there was originally a Wall-walk for patrolling, as is suggested by the presence of footbridges carrying the Wall over the rivers North Tyne and Irthing (Bidwell and Holbrook 1989, 134–5). A Wall-walk suggests a parapet on the north side at least. The evidence as marshalled by Hill and Dobson (1992, 29–30), however, suggests that such a parapet would not have been provided with crenellations as has often been suggested. A further, less likely alternative is that there was no Wall-walk, and the Wall top was sloped to allow water to run off.

The Wall foundations were generally clay bonded. In both the Broad Wall, and in the stone replacement of the Turf Wall, foundations often included flags at ground level, above which the Wall face was offset, which frequently resulted in the cracking of the flags on the line of the Wall face above. Above the foundations the two wall faces were built in squared, coursed rubble (*sensu* Hill 1981) with facing stones tapered to the rear to bond with a core of clay-bound rubble or soil and stones. There are some signs of mortar, usually a sandy, pale brown, and rather weak material. Rebuilds of the Wall, which were probably Severan in date, were constructed with a strong white mortar (Crow 1991, 59). At Denton (Bidwell and Watson 1996) evidence suggests that the surface of the Wall was plastered. Elsewhere apparent evidence for lime washing might equally have been the result of brush pointing (Wilmott 1997a, 119) or of the leaching of lime from mortar.

The last part of the complex to be discovered was the Turf Wall, the existence of which was predicted by Cadwallader Bates (1895), and proved by Francis Haverfield at Appletree, near Birdoswald in 1895 (Haverfield 1897, 187). It was not until 1934 that it was finally confirmed that the Turf Wall had extended from the Irthing to Bowness-on-Solway (Simpson, Richmond and McIntyre 1935a, 217–18). Part of the original conception of the Hadrian's Wall frontier, this earthwork was the counterpart of the Stone Wall, and formed the main curtain from the River Irthing at Mc49 (Harrows Scar) to the western end of the Wall at Bowness-on-Solway. The reason for the contrasting construction materials of the curtain to east and west of the Irthing remains obscure. The Turf Wall was constructed on a flat base, either of several layers of turf, as at High House (Simpson *et al* 1935b), or of cobbles as at Burgh-by-Sands (Austen 1994, 38–40), and possibly at Mc53 (Banks Burn; Simpson and Richmond 1933a, 267–70). The base of the Wall was normally some 6m wide. At High House, sufficient evidence has survived to suggest that the southern side of the Wall sloped at an angle of about 1:4, while the north face was almost vertical towards the base, perhaps changing to a more gentle slope higher up. The height of the Turf Wall has been estimated at some 12ft (3.66m). The Wall was constructed using whatever materials were to hand, and Breeze (1982) has suggested that the term 'Earth Wall' would be more accurate. Certainly where turf was available for building it was clearly stripped from the areas to the north and south of the Wall (p 118). As with the Stone Wall the treatment of the wall top is not known for certain. In a reconstruction drawn for Simpson *et al* (1935b) the Wall is reconstructed with a boardwalk on the top, and a breastwork of split timber. Evidence from pollen analysis (p 117) at Appletree, however, indicates that any breastwork would more likely have been hurdling made from the birch and alder scrub woodland that grew in the area (Wilmott 2001a, 44).

The stone replacement of the Turf Wall was mostly upon the same line, although the Stone Wall diverges from the Turf Wall line from Mc49 (Harrows Scar) westwards to Mc51 (Wall Bowers). A further complication occurs at Garthside (T54a), where there are two successive earthwork walls, one of clay and the second of turf, on divergent alignments, both predating the stone rebuilding (Richmond and Simpson 1935). The stone rebuild seems to have occurred in two stages; the sector between the River Irthing and Wall mile 54 was built during the reign of Hadrian, with the remainder replaced after the return from the Antonine Wall (*see* Willis, this volume pp 347–9).

The Wall berm, ditch, glacis and counterscarp bank

Lying to the north of the curtain wall(s), the Wall ditch is a consistent feature from coast to coast, except in the Solway marshes and where the Wall mounts the crags of the central sector. Even in the latter area the ditch tends to reappear in the gaps between hills. The early Turf Wall was equipped with a ditch, so in the area where its stone replacement diverges from the original line

there are in effect two Wall ditches. There are wide variations in profile, dimensions and completeness, and this is often due to the varied character of the geological material through which the ditch was cut, although it seems to have been cut with edges as steep as it was possible to create. In general the ditch is some 8.75m wide and 2.80m deep. There is a widespread view that the ditch was intended to be V-shaped in profile, often with a squared cleaning out, drainage, or ankle breaker slot in the bottom (Daniels 1978, 20; Breeze and Dobson 2000, 43). From the very small number of full-depth sections of the ditch that have been excavated it seems that this 'ideal' profile has never actually been recorded, and the idea of it has developed from a misunderstanding of early references, particularly the description of the ditch section by Philip Newbold (1913a; Wilmott, 2006a). The ditch was often not completed, the most famous location for this being at Limestone Corner (p 82). The unfinished areas show some evidence for the construction of the ditch. At Limestone Corner this proceeded from west to east, whereas other exposures show the work running in the opposite direction.

On the north side of the Wall ditch lies a bank of upcast, which seems primarily to derive from the first excavation of the ditch and possibly, although by no means certainly, by subsequent cleaning out of the feature. The bank varies enormously in size and shape throughout the length of the frontier; in some places it is a broad, even, low bank, elsewhere a high, crested, narrow earthwork, and again in places just a series of mounds. Recent fieldwork by Welfare (2004) has examined the different types of ditch and counterscarp types in the Central Sector of the Wall line, and has demonstrated that there was a huge variation in the ways in which these aspects of the system were deployed, particularly in the gaps between the ridges along which the Wall runs in this area. In this important paper, which together with his work on the causeways across the ditch at milecastles (Welfare 2000) revives the study of these neglected aspects of the frontier, Welfare makes a distinction between two types of earthwork on the north bank of the Wall ditch: the glacis and the counterscarp bank. It seems to this author that this is a useful terminological distinction, which will help future discussion to be advanced with more precision. The glacis is defined by Welfare as the usual spread northwards of upcast from the ditch, which accentuates the northern ditch edge, but tapers in height northwards over a distance of 10–15m, and is characterised by a low, very gently sloping profile, deliberately levelled and smoothed. The counterscarp bank comprises a distinct, narrow, and comparatively high, crested earthwork, characteristically built to emphasise the edge of the ditch in areas where it was not possible to dig it to great depth. It occurs in particular to the immediate east of the Central Sector.

The berm separating the Wall from the ditch was generally about 6m (20 feet) wide in the Stone Wall sector and 1.9–2.4m (6–8ft) for the Turf Wall, although wider berms have been recorded to the west.

The recent unexpected discovery of additional obstacles placed on the berm at Byker and at Throckley (Frain *et al* 2005; McKelvey and Bidwell 2005), following similar discoveries at Buddle Street, Wallsend (Bidwell and Watson 1989), has resulted in extensive study of this hitherto neglected part of the frontier system (Bidwell 2005). The evidence for obstacles takes the form of regularly spaced pits, which seem to have been emplacements for forked branches to create a defensive entanglement – yet another element to add to the system of defence in depth, and further evidence that the purpose of Hadrian's Wall was militarily defensive. Bidwell suggests that wide berms were provided to allow for the positioning of these entanglements, although they may not have been provided everywhere.

The Vallum

It is generally accepted that this series of earthworks was added to the frontier complex some years later than the construction of the curtain wall, and that the decision to build it was either contemporary with, or later than the decision to add the garrison forts to the Wall. The Vallum runs from western Newcastle to Bowness on Solway though, like the Turf Wall, the question of the crossing of the Solway marshes is unresolved. The essential element of the Vallum is a ditch, nominally 6m wide and 3m deep, with a flat bottom. Recent excavations have shown that the depth and profile of the Vallum ditch vary, although the width seems to be reasonably constant. The ditch is flanked by two mounds, each set back some 10m from the ditch edges.

The mounds are 6m in width, and are usually of earth, sometimes faced with turf cheeks. At each fort a causeway of un-dug earth was left and revetted on each side with stone. The causeways were surmounted by free-standing stone gates that were closed from the fort side, the first of which was found at Birdoswald (Simpson and Richmond 1933c). Unlike the Wall ditch, the Vallum ditch was continuous, being cut continuously through the dolerite outcrop at Limestone Corner (p 82). This attests to its perceived importance in the system. Gravel or stone metalling has been identified in different places on both berms of the Vallum, but this is patchy and probably does not imply a road or track along the Vallum allowing east–west communication to the south of the wall, as was once thought.

A further element in the anatomy of the Vallum is the so-called marginal mound, which occupies part of the south berm on the south lip of the ditch. Although this has generally been attributed to the deposition of material cleared from the bottom of the ditch, the work reported on below indicates that it might have been a primary feature, at least in some places. This is discussed extensively below (p 135).

The distance of the Vallum from the Wall varies. In general there was a preference for the earthwork to run close to the rear of the Wall where topography allowed, and in these areas the Vallum is forced to deviate to skirt the southern side of the forts. In the central sector, however, the Wall runs along the top of the crags of the Great Whin Sill while the Vallum, laid out in long straight stretches, lies in the valley below to the south. Similarly, from Mc68 (Boomby Gill) to Bowness-on-Solway the Wall follows the line of high ground along the rivers Eden and Solway, while the Vallum, again in economical long, straight, alignments, follows the nearest practicable line. Between Kirkandrews-upon-Eden and Burgh-by-Sands this creates the broadest distance between Wall and Vallum on the entire line.

The gaps that are visible in the mounds, together with the crossings over the ditch, are variously explained. Gaps in the north mound opposite each milecastle have been claimed as original, although all crossings other than those at forts are probably secondary, and are thought to date to the abandonment of Hadrian's Wall during the Antonine move into Scotland and the occupation of the Antonine Wall. In general it seems that the Antonine slighting of the Vallum consisted of a regular provision of some 35 crossings every mile, around 45yd (41.15m) apart (Simpson and Shaw 1922). The clear traces of these breaks to be seen today show that the Vallum was never restored to its former condition and purpose.

The Military Way

The last of the linear elements of the complex is the road known as the Military Way. This is a secondary feature of the frontier, and this is demonstrated by the fact that it utilised the north mound of the Vallum in many areas. Link roads from the Military Way connect it to some turrets and milecastles. In general the road can be clearly seen in the central sector. The antiquary William Stukeley (*above* p 1) mentions this in his protest letter to the Princess of Wales. The road consists of a base of large stones with a gravel or stone-chip surface. It is usually about 6m wide and is cambered to a height of some 0.15m (Simpson 1913). Additionally, recent excavations at Denton have identified a narrow track immediately behind the Wall.

Potential for environmental analysis

The structure of the system has been the most thoroughly researched aspect, while the environmental evidence contained within and sealed by the earthworks has been little appreciated until very recently. The potential for environmental analysis of samples from beneath the Turf Wall was eloquently stated by F G Simpson on his realisation of the potential of palynological evidence as early as 1935, when he wrote that "samples from the Turf Wall throughout Cumberland would enable us to reconstruct a detailed picture of the local flora in Roman days, a novel possibility beyond the dreams of older generations" (Simpson and Richmond 1935b, 244–7).

Perhaps surprisingly, no specific broad-scale attempt to explore this primary research objective has yet been made. As primary elements in the Hadrian's Wall system, the Turf Wall and the glacis or counterscarp have the potential to seal buried, undisturbed ground surfaces. These will contain evidence (pollen, soil chemistry and plant and insect macrofossils) for the environmental conditions of the immediate locality, on the eve of construction. The less

stratigraphically secure ditch fills might serve to augment the results from the standing earthworks, and would contribute to understanding of silting processes and chronology, and possibly to aspects of environmental change during the lifetime of the earthworks. The sheer length of the works from coast to coast effectively means that a transect of the late pre-Roman Iron Age landscape is preserved beneath the earthworks. The investigation of this resource has the potential to provide a detailed picture of the landscape of this period in coastal, lowland and highland environments, from east to west. Study of the environment of the Wall zone through work on pollen in lake and mire deposits (summarised by Huntley 1999) has provided a broad regional framework of environmental trends, datable through radiocarbon techniques. The deposits sealed beneath earthworks, however, give a specific local picture at a historical point in time (the AD 120s).

Preservation

Although the survival and condition of much of the earthwork components of the Hadrian's Wall World Heritage Site is surprisingly good, it is under significant and increasing levels of threat. Arable farming in some areas, mainly eastern Northumberland, has gradually obliterated upstanding monuments, and may be continuing to damage sites; we lack, however, adequate direct evidence to assess the degree of continuing damage to archaeological horizons below or within the plough soil. Forestry has made a significant impact in the past, and the future removal and management of replanting schemes where

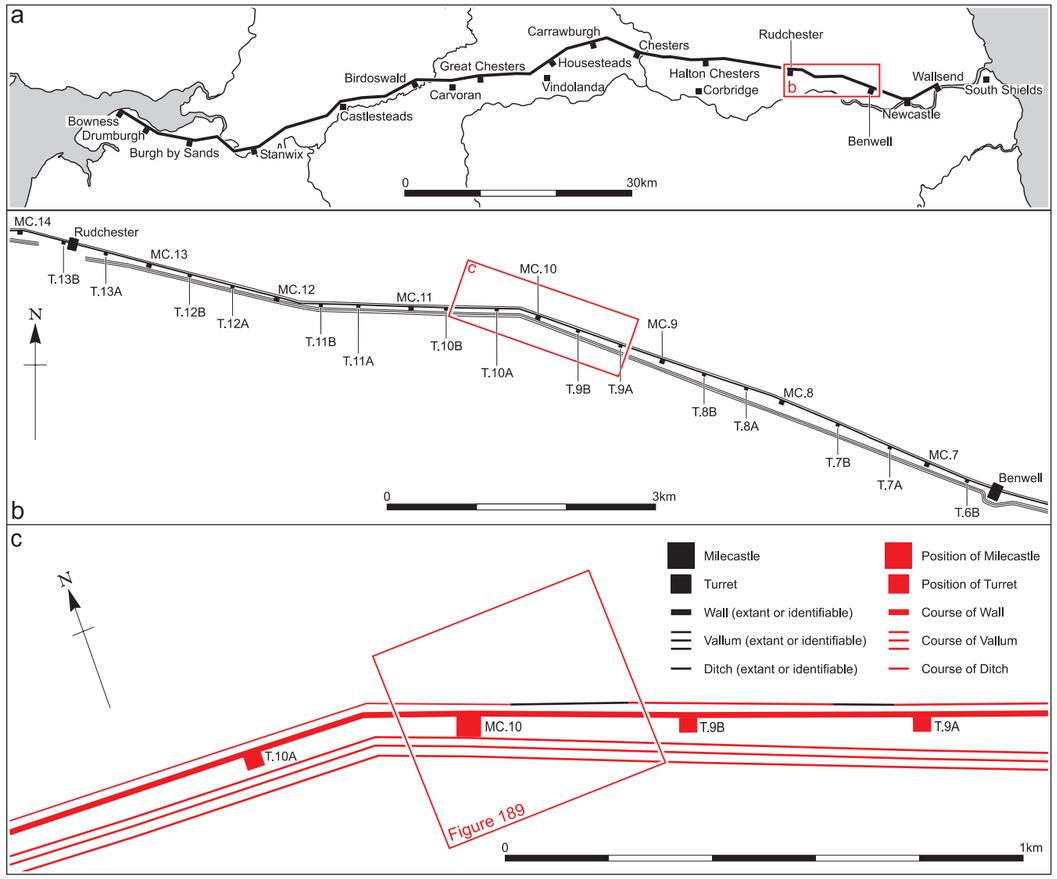


Fig 188
Location of Wall Mile 9 on Hadrian's Wall, and of Fig 189.

these are desirable or necessary has yet to be addressed. The extensive areas of pasture (mainly sheep, but significant areas of cattle farming also exist) have contributed to the preservation of much of the best earthworks, but it has created and continues to create point damage of considerable localised and aggregated impact, particularly through ploughing and re-seeding for pasture. Public access and unregulated or sporadic agricultural movements (tractors, etc) already have a significant impact in some places and pressures are likely to increase in future as a result of this kind of activity. Although development control measures are generally effective in managing those threats – which are covered by planning restrictions – there are still a number of direct development threats that arise.

Management responses to all of these pressures are still in the early days of development, and although the *Hadrian's Wall Management Plan* (English Heritage 1996) does provide a framework for positive intervention in these cases, in particular allowing for regular monitoring of the condition of the earthworks, details of such intervention are largely awaiting definition. Any work that contributes towards such definition is therefore timely. This is the context of two of the projects reported on here, at in Wall mile 9 and at Black Carts.

The Vallum in Wall mile 9 – evaluation, 2000

by Helen Moore and Tony Wilmott

Introduction

The site of Mc10 was evaluated as part of the Milecastles Project in 1999 (p 243). Following this work, the Co-ordinator for Hadrian's Wall, requested that, as part of the second season of the project, the team should examine the survival of the mounds of the Vallum in the field in which the milecastle lay (OS plot 4760; Figs 188–9). The line of the Vallum lies to the south of the milecastle at the foot of the hill. Although the earthworks are visible in a field to the immediate east, the field in question has been regularly ploughed for many years, and the Vallum completely levelled. Despite

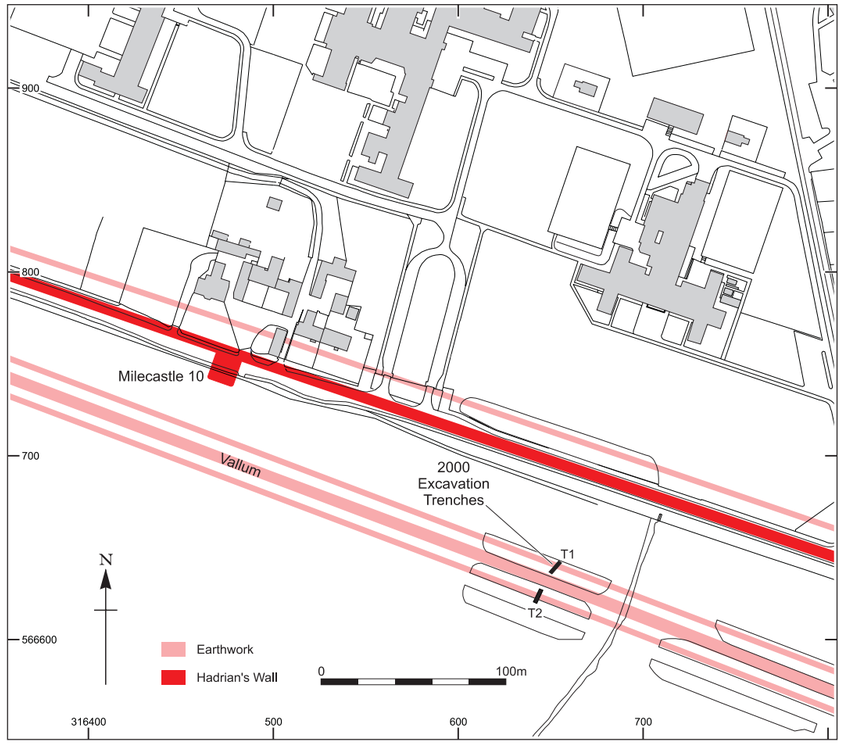


Fig 189
Wall Mile 9: location of 2000 excavation trenches on the Vallum.

this, when the field is freshly ploughed two parallel 'stripes' of pale clay are visible on the surface, and were thought to represent the surviving remnants of the Vallum mounds.

The original aims for the work were to establish the state of preservation of the ploughed Vallum mounds and of any buried soil horizon beneath them, and also to establish the impact on the site of past cultivation, and the implications of its continuance.

The evaluation

Two trenches (Fig 189) measuring 8m × 2m were excavated on the lines of the northern and southern Vallum mounds. The trenches were located by sighting up the field using 2m ranging poles as it

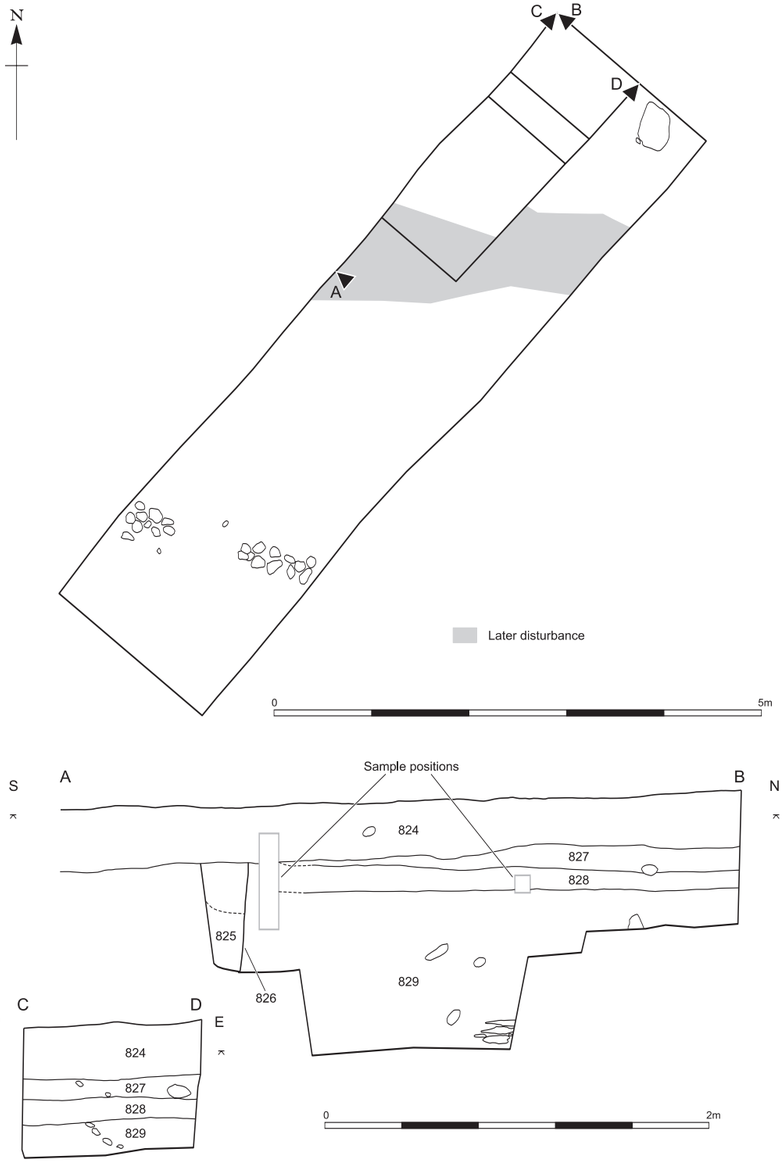


Fig 190
Wall Mile 9: plan and section of Trench 2.

was difficult to see the mounds at the eastern end of the field owing to the slope and dip of the land. They were each dug to include the edge of the Vallum ditch in order to confirm that the trench was correctly located in the event that no mound material was encountered. In each hand-excavated trench, a slot was dug at the opposite end to the Vallum ditch, to ensure that the mound would be seen in section if it still survived. These slots were 3m long × 1m wide. In the event of finding a buried land surface beneath the Vallum mounds, the soil horizons were to be sampled for palynological and pedological analysis.

Trench 1

Trench 1 was aligned north–south across the south berm and mound. It was expected that the Vallum mound would be constructed with material very similar to the natural subsoil as it would have been upcast from the excavation of the Vallum ditch, and so caution was taken in interpreting the pale orangey-grey sandy clay (822) that lay beneath the plough soil (821). It became apparent as the excavation deepened, that very little of the mound survived and it had been almost completely obliterated by ploughing. There was no distinct difference between the natural subsoil (823) and the mound material (which survived at its maximum depth to 100mm), and no buried land surface was visible beneath this. The mound was highest towards the south, and tapered in thickness towards the Vallum ditch.

Trench 2 (Fig 190)

Trench 2 was excavated across the north mound, and a slot was dug at the northern end of the trench. The ditch was located at the south end. Below the plough soil (824), the cut for an east–west land drain (826) was revealed. This truncated a deposit of pale mottled yellow-grey silty clay (827) 170mm thick. This was all that remained of the north mound, and tapered to the south to a thickness of 50mm. Directly below this was a mid- to light brown-grey sandy silt (828) varying in thickness between 100mm and 160mm. This deposit was interpreted as a buried soil horizon. It contained frequent charcoal flecks but no finds. It was sampled for pollen and soil analysis, and the locations of these samples were recorded on the section drawing. Subsequent analysis of these samples showed no pollen survival.

Interpretation

The evaluation confirmed that the streaks visible in the field after ploughing were the remnants of the Vallum mounds. Despite the fact that the earthworks had to all intents and purposes been levelled, their survival attests to the resilience of such structures, and to the fact that the obliteration of such features cannot be taken for granted at first appearance. The survival of a buried soil beneath the mound was remarkable, and shows that the potential for the survival of paleoecological remains exists even in such unpromising areas of survival. Such potential is important even though in this particular instance no pollen survived.

Transection in Wall mile 29 (Black Carts, Northumberland)

by Tony Wilmott, with contributions by David Earle Robinson and M-R Usai

Introduction

This report presents the results of a transection in 1997 of the linear elements of Hadrian's Wall and its associated earthworks centred on NGR NY 884 714 near the Black Carts turret (T29a), Northumberland, between the forts of Chesters and Carrawburgh (Fig 191). The excavation was essentially a mitigation exercise intended to assess stock and rabbit damage to a particular part of the Vallum, although it was decided to take the opportunity to add research value to this work by characterising the nature and survival of the archaeological resource in this relatively little-investigated sector of the frontier. The results of the work fully justified this approach, and much new information was gathered to inform both future research directions and local site management.

The site

by Tony Wilmott and M-R Usai

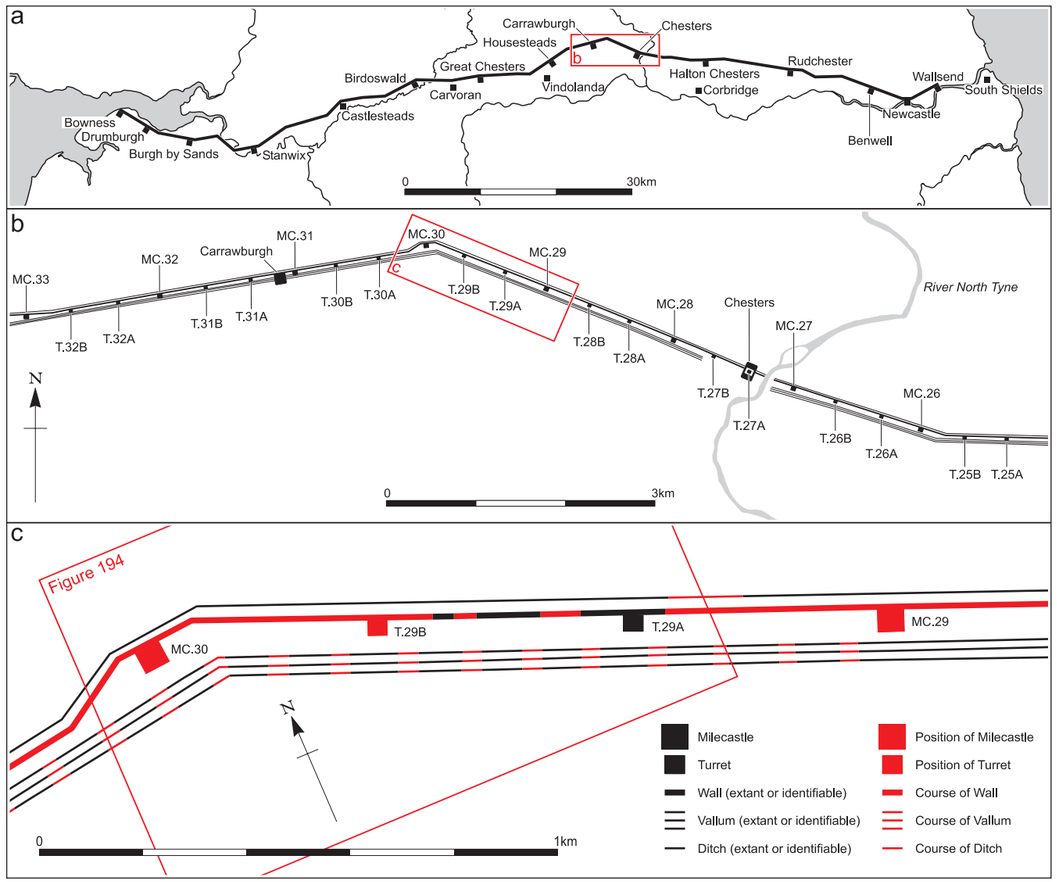
The sector of Hadrian's Wall around Black Carts is bisected by the modern east–west road, the B6318, which originated as the 18th-century Military Road. From Chesters this road runs along the line of Hadrian's Wall up the west side of the North Tyne Valley to Walwick, where the foundations of the Wall have been seen in the past beneath its metalling (Daniels 1978, 121). At Walwick, immediately west of the site of Mc28, the road deviates slightly southward to run along the north mound of the Vallum. It continues along the crest of this earthwork until it rejoins the Wall west of Mc30. The lines of the Wall and Vallum climb from the site of Mc28 (Walwick) to that of T28a, from which the slope becomes gentler up to the next summit at Mc29 (Tower Tye), 198m above OD. From here the ground

drops again across Walwick Fell, past T29a (Black Carts) to the Hen Gap, where a modern side road runs northwards through the Wall to Sharpley and Simonburn. Beyond this there is a further steep rise past the site of T29b (Limestone Bank) to the top of Teppermoor Hill, the site of Mc30 (Limestone Corner), where a triangulation point marks a height of 250m above OD.

Teppermoor Hill is a high outcrop of volcanic quartz-dolerite, or whinstone, and as such forms the easternmost outlier of the Great Whin Sill, along which the Wall runs in its central sector from Sewingshields (Mc35) to Carvoran (Mc46). The Whin Sill comprises an ancient rock that intruded up through the overlying Carboniferous sandstones and limestones (Fitch and Miller 1967) 295 million years ago (Crow and Woodside 1999, 23). In the central sector of Hadrian's Wall these later and softer rocks have largely eroded down to the intractable dolerite that forms the well known wave-like crag landscape in that area.

The Teppermoor Hill exposure of the Whin Sill has long been known to students of Hadrian's Wall by the geological misnomer 'Limestone Corner', and marks the northernmost salient of the frontier line. Although the name appears on no map it is sufficiently familiar to be used hereafter in this report. The dolerite dips beneath the surface drift of boulder clay to the west between Limestone Corner and Sewingshields, but lies just below the modern turf line eastwards from Limestone Corner at least as far as turret T29b. As the ground slopes down towards the Hen Gap, the dolerite dips eastwards beneath the later Carboniferous

Fig 191
Black Carts: location of Wall Mile 29 on Hadrian's Wall.



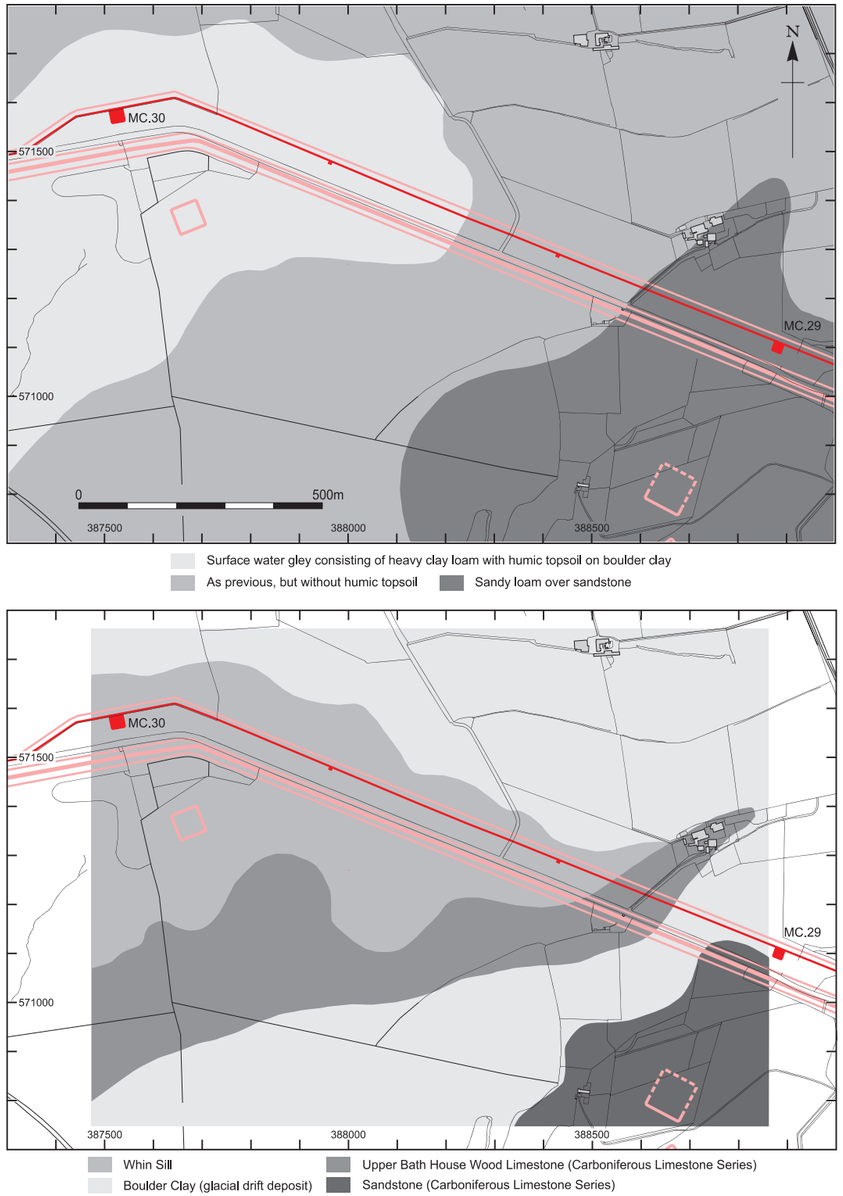


Fig 192
Black Carts: soils (above) and geology (below) of the Wall Mile 29 area.

strata. To the south and east the Upper Bath House Wood Limestone lies against the flank of the dolerite, and the valley fill east of and above this is a thick deposit of boulder clay. Rising towards Tower Tye deposits of Carboniferous sandstone emerge from beneath the boulder clay on the east side of the valley (Fig 192; Usai 1999a, 3–4). The area is thus geologically varied, with sandstone suitable for building, limestone suitable for the making of mortar, and quartz-dolerite, which is difficult to work and yet was

Fig 193
Black Carts: ditch and counterscarp looking east from the site of T29b. Note the mounds to the north of the counterscarp proper.

still utilised for aspects of the construction of the Wall and its earthworks. Modern soils in the area are as varied as their parent geology. Over the dolerite there is a surface water gley consisting of heavy clay loam with a humic topsoil (Wilcocks I association), and over the valley boulder clay the Brickfield 3 association is similar, but without humic topsoil. A light sandy loam of the Rivington I association occurs over the sandstone towards Tower Tye (Usai 1999a, 6–8). The soils over the sandstone were light and easy to cultivate, though very acidic. The lack of fertility in the soil would indicate only short-lived cultivation episodes.

The Roman earthworks are extremely well preserved in this sector, as are those formed from the collapse of the Wall and its installations; Mc29 and Mc30 are clearly discernible. T29a (Black Carts) together with the Wall on either side, which stands to a maximum of 12 courses high, is a consolidated monument in English Heritage guardianship, and is publicly accessible. Between the Hen Gap and the site of T29b the Wall is at first visible standing two or more courses high, gradually reducing in height and preservation until its line is marked by a low mound. T29b appears as a clear earthwork, and west of this the line of the Wall is represented by a linear depression with parallel low, stony mounds on either side. In contrast the Wall ditch is clearly visible throughout the sector as a silted linear hollow, and the counterscarp as a narrow bank on the northern brink of the ditch with a series of mounds to the north (Fig 193).

At Limestone Corner an attempt was made to cut the ditch through the dolerite bedrock, and the counterscarp here comprises huge dolerite boulders that were cut and removed from the ditch (Figs 76–7). The attempt was soon abandoned, however, as is graphically and famously shown by the block in the centre of the ditch, which proved immune to the assaults of Roman wedges, the marks of which can still be seen on its upper surface. West of Limestone Corner, where drift deposits cover the dip in the dolerite before it re-emerges at Sewingshields, the ditch was cut through the overlying boulder clay, and to the east, at the bottom of the slope just west of the Hen Gap, this is also true. At this point the ditch sides are riddled with rabbit holes. Although an attempt has been made to mitigate this damage by burying wire netting, this has been of limited effectiveness.

Although the Military Road is built on the north mound of the Vallum, the Vallum ditch and its south and marginal mounds still form substantial earthworks. Whereas the attempt to drive the Wall ditch through the dolerite outcrop at Limestone Corner was abandoned, the builders of the Vallum succeeded in cutting a continuous ditch through the hard material, and the great boulders removed from the ditch were incorporated into the Vallum mounds. Any soil cover over these boulders has long

since disappeared, at least in part owing to the burrowing of rabbits. On the slope from Limestone Corner eastwards the ditch has been kept relatively clear of silting by the excess ground water that runs down it in wet weather. At the bottom of the slope, silt carried in from both west and east has caused the ditch to be filled and virtually indistinguishable. Opposite T29a, the presence of a main farm access over the silted ditch has meant that the natural attrition of the mounds through weathering has been greatly exacerbated by the passage of cattle and farm vehicles.

Previous work

The earliest known archaeological work in Wall mile 29 was John Clayton's excavation of T29a (Black Carts) in 1873. This, the first ever examination of a Wall turret, resulted in the publication of the first thorough description of such a structure, including the suggestion that an internal timber stair might have been provided (Clayton 1876). The site remained exposed and has remained virtually unaltered since it was recorded by Clayton, and in 1877 by James Coates, who made three paintings, one of which one (Fig 80) includes a ground plan of the turret. The exposed stretch of Wall was taken into state guardianship in 1970, and re-excavated by Dorothy Charlesworth before consolidation the following year. The excavation showed that Clayton had thoroughly and completely removed all stratified deposits (Charlesworth 1973). The consolidation of the turret and Wall was undertaken by Charles Anderson and his team of masons (p 53), and Anderson's photographs of the turret before, during and after consolidation show contrasts between Clayton's conservation and that of the Ministry of Works, and also include shots of work in progress.

The story of the consolidation of Black Carts has been treated popularly and anecdotally by Hunter Davies (1974, 89–91, 217–18), with whose walk along the Wall the work coincided. No fewer than three centurial stones were found during the consolidation, and reported to *Britannia* by Anderson (Wright and Hassall 1972, 354; 1973, 329), while in more recent years six facing stones with quarry marks in the form of 'V's and 'X's (Hassall and Tomlin 1988, 333) have been noted by Alan Whitworth.

In 1912, Philip Newbold identified the sites of T30a and T0b (Carrawburgh East and West), and excavated T29b (Limestone Bank). In his report Newbold (1913a) wrote the first discussion of the broad wing walls that are attached to the stone wall turrets and identified by points of reduction on each interval structure in the Narrow Wall sector between the North Tyne and the Irthing. Newbold, clearly puzzled by the phenomenon, suggested that they might have been a clue to the form of the turret superstructure. The report also contains one of the first published ground plans of a turret (the plans of T49b, T50a and 50b were published by F G Simpson (1913) in the same year). Photographs in the report clearly show Hadrian's Wall standing to a height of four courses above a single course offset (standard A curtain) (Breeze and Dobson 2000, 71). Newbold also found the bottom of the Wall ditch at Limestone Bank, noting that "the two sides did not meet at a point, but fell away, so as to form a shallow gully 1ft (0.3m) deep and 3ft (0.9m) wide with vertical sides."

In the project design (Wilmott and Friell 1997) for the 1997 work it was not considered likely that this statement expressed the true dimensions of the ditch, and it was thought probable that the observation recorded a re-cut or the periodic cleaning out of the ditch. It was further postulated in the project design that the clearly defined counterscarp bank had been partly composed of upcast from ditch cleaning.

A section across the Vallum was cut to the west of Limestone Corner in 1952. Brenda Heywood has kindly allowed the results of this work to be included in this volume. Her report and section appear as Appendix 2 (p 419).

Project background

The degradation of the Vallum banks opposite T29a necessitated some conservation intervention to halt and repair the damage being caused. This would inevitably have required some excavation and other ground disturbance to enable consolidation to take place. Rather than restrict this to an engineering-led disturbance it was decided to take the opportunity to establish the original profiles in order to inform the nature of the reinstatement to be pursued for management and presentation purposes. Work on the Vallum alone would mitigate the threat; however, it was also seen as appropriate to address wider issues of the state of survival of the archaeology of the area.

The project was conceived as the full excavation of a staggered section across the full width of the Vallum, Wall, Wall ditch and counterscarp bank. This would maximise information retrieval, ensuring that the essential work to the Vallum was complemented and contextualised by the examination of all elements of the frontier system in this area. The original aims of the project could be divided into three groups. The first related to curatorial imperatives, the second were purely research driven and the third involved an assessment of the logistics necessary to undertake similar interventions in the future. The curatorial and research aims were:

1. To establish the state of preservation of the works of Hadrian's Wall in this sector.
2. To recover data to inform the appropriate level of reinstatement of the Vallum.
3. To recover data to assist in future interpretative work.
4. To contribute to the objective enshrined in the *Hadrian's Wall Management Plan* (English Heritage 1996, 7.2.2) which provides for "regular monitoring of the condition of the earthworks of Hadrian's Wall "
5. To establish the morphology of the works, and to examine the stratigraphic sequence with reference to the chronological sequence of construction.
6. To examine the robbing of the Wall.
7. To establish the postulated existence and state of preservation of any buried land surface beneath the Vallum mounds and the counterscarp, and to assess the potential of this surface for pollen and soils analysis.
8. To compare the preservation and content of the pollen record from beneath the Vallum mounds and the counterscarp.
9. To establish the presence/absence of evidence for pre-Wall arable cultivation in this sector.
10. To establish the potential for pollen and soils analysis, and for the survival of artefactual and ecofactual evidence within the filling of the Vallum and Wall ditches.
11. To produce an integrated environmental sequence for the area under investigation.

The project was also intended to inform the formulation of a design for a strategic project on the earthworks and ancient environment of Hadrian's Wall.

Methodologies

Fieldwork

Two trenches were cut, one on each side of the B6318 road (Fig 194), in order to sample all of the earthwork elements of the frontier in at the most appropriate points. Trench BC1 examined the Wall, Wall ditch and counterscarp, and was located on the rise from Hen Gap to Limestone Corner, 3m west of T29b. It measured 5m wide and 15m long, although only the centre 2.5m was fully excavated. Trench BC2 sectioned the Vallum south mound, marginal mound, ditch and north berm. It was situated almost directly opposite T29a. The trench measured 18m long and 5m wide. The trenches were some 500m apart. The TBM for Trench BC1 was at a level of 237.73mOD, while that for BC2, in the valley, was196.47mOD. During excavation the area over the Vallum ditch had to be widened and stepped in order to reach the bottom of the ditch in safety, while the sections cut through the earthworks were 2.5m in width. All excavation was done by hand, with no mechanical aid other than for backfilling and reinstatement at Trench BC2. Recording followed the methods then in use by the Central Archaeology Service of English Heritage (CAS).

Pedological results

Aluminium Kubiena tins were used to collect blocks of soils and sediments from the two trenches. Pedological observations of soil depth, colour, mottling, stoniness, structure and texture were carried out on two contexts from the Wall ditch fill (Contexts 28–9), on Contexts 224, 303, 298, 219 and 218 beneath the Vallum mound, and on some of the soils/sediments below the counterscarp bank in Trench BC1. Brief observations, with no standard description, were made of samples of the Vallum ditch fill, to assess their potential for analysis. Selected soil and sediment samples were described using mainly the criteria of Hodgson (1976).

Palynological results

by David Earle Robinson

Sampling involved hammering metal monolith tins into the exposed sections and then cutting them free in order to recover small intact columns of sediment. On preliminary analysis (Huntley 1998), the contexts sealed under the berm (monolith 831) were found to contain little or no pollen – their only organic content comprising some occasional fragments of charcoal or coal. In contrast, and somewhat surprisingly given the well drained, highly-inorganic nature of the deposits, the contexts under both the counterscarp bank and the Vallum contained pollen in appreciable amounts. The pollen was poorly preserved, with a high proportion of unidentified grains, but sufficient numbers of pollen and spores could be identified to reveal the existence of an anthropogenic landscape and to enable some preliminary conclusions to be drawn about the nature and composition of the vegetation. In the light of this, further, more detailed work was suggested (Huntley 1998) and it was emphasised that this should be done in close collaboration with the soil studies carried out at the site (Usai 1999, 2004); and the use of contiguous high-resolution sampling was recommended in the interests of methodological development.

Detailed pollen analysis was carried out on samples taken from monolith 818 from the base of the counterscarp bank and 838 from the base of the Vallum mound. These were equivalent to, but not identical with, the monolith samples used for the soil studies. The samples were taken and prepared for pollen analysis at the University of Durham using methods described in Huntley (1998). The samples were weighed and tablets contained known quantities of exotic (*Lycopodium clavatum*) spores were added during sample processing in order to enable the concentrations of fossil pollen to be calculated.

The pollen analyses were carried out by the author – analysis of each sample was continued until either a full slide (22 traverses) had been counted or a sum of at least 500 pollen grains of terrestrial plants had been reached. Exotic (*Lycopodium clavatum*) spores were also recoded and unidentifiable grains were registered into categories – Broken, Corroded, Crumpled and Obscured – to give an indication of the state of preservation of the preserved pollen. With regard to the methodological aspects of the work, contiguous or closely spaced sampling proved to be inappropriate. The nature of the deposits did not allow the development or maintenance of the high-resolution pollen stratigraphy, which this approach was designed to detect and quantify.

Stratigraphy and structures

The description of the excavation is divided between the two trenches. Each trench description begins with natural strata and

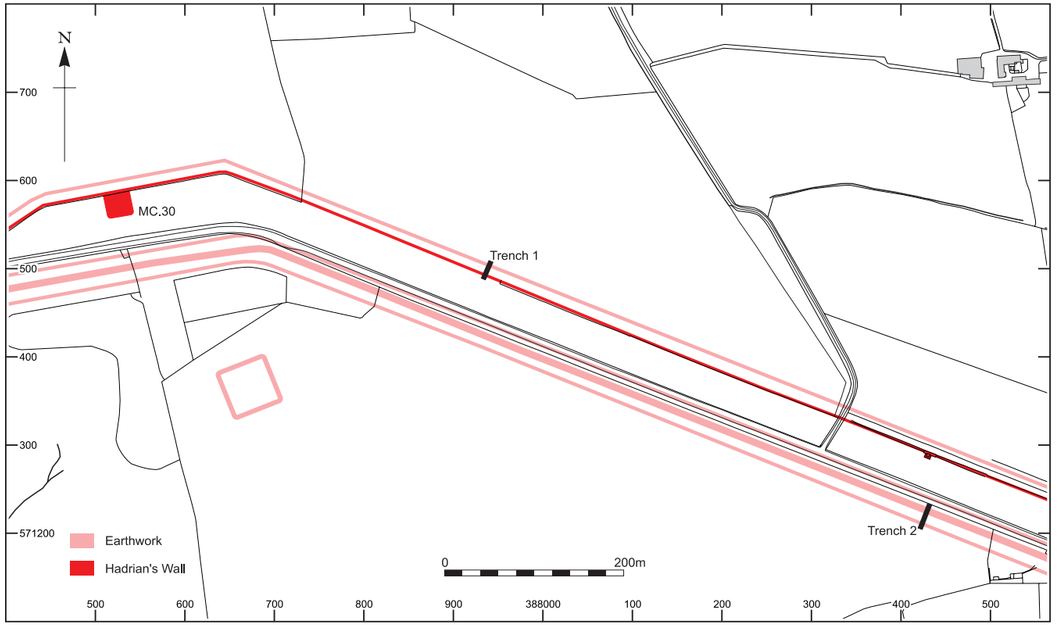


Fig 194
Black Carts: location of trenches excavated in 1997.

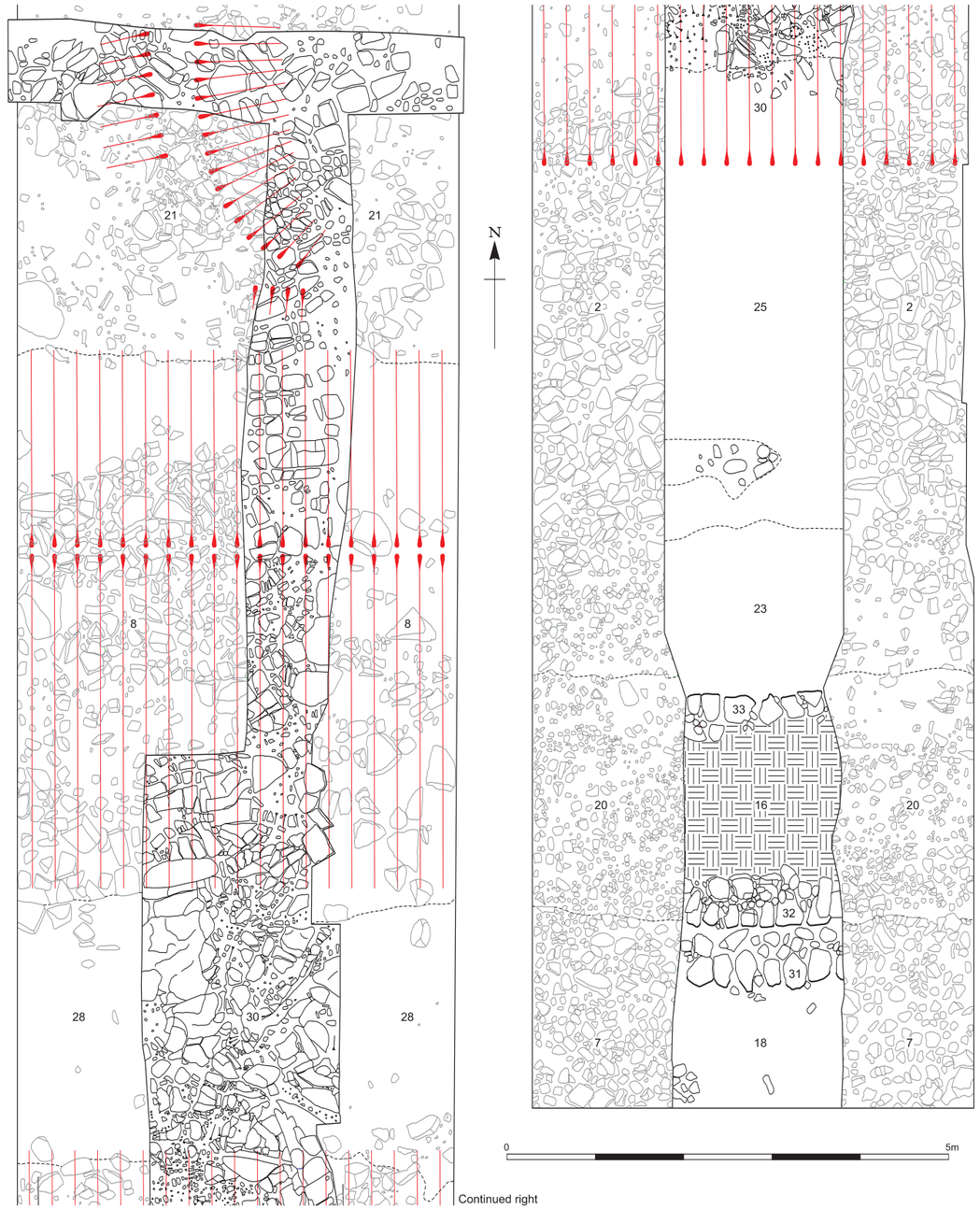


Fig 195
Black Carts: plan of Trench BC1 showing the surface plan in greyscale and the deeper central excavation in black. Gradients shown bt red hachures.

evidence for the pre-Roman environment. The elements of the frontier are then described in order from north to south.

Trench BC1

(Plan, Fig 195; Section, Fig 196)

Natural bedrock and soils

by M-R Usai and Tony Wilmott

Trench BC1 lay on the southern side of a low, natural, east–west ridge with its northern end on the crest. The natural bedrock throughout the trench was quartz-dolerite. To the south of the Wall ditch, the bedrock was sealed by a succession of buried soils consisting of orange-brown clay-silt (25, 26). A further similar deposit (23), which incorporated charcoal flecks, overlay these deposits, and was the surface upon which Hadrian's Wall was constructed. To the north of the Wall ditch, the functional equivalents of soils (25) and (26) were represented by similar deposits (17, 11). As contexts (11) and (17) were sealed by the counterscarp, they were sampled and assessed in order to establish whether they comprised the natural pre-Roman soil profile over the dolerite (Usai 1999a). It was concluded that these contexts were the result of *in situ* soil formation over a considerable period of time. There are no signs of unconformities and truncation, such as would arise from ploughing prior to wall construction.

The pre-Wall environment

by David Earle Robinson

The pollen spectra of the two samples, sample 5–6 from context 11 and sample 11–12 from context 17, are very similar (Fig 197, Table 1, Appendix 2 Tables A1, A2). They are characterised by relatively low values for trees – mostly alder and oak (5.8–9.4%) and high values for hazel

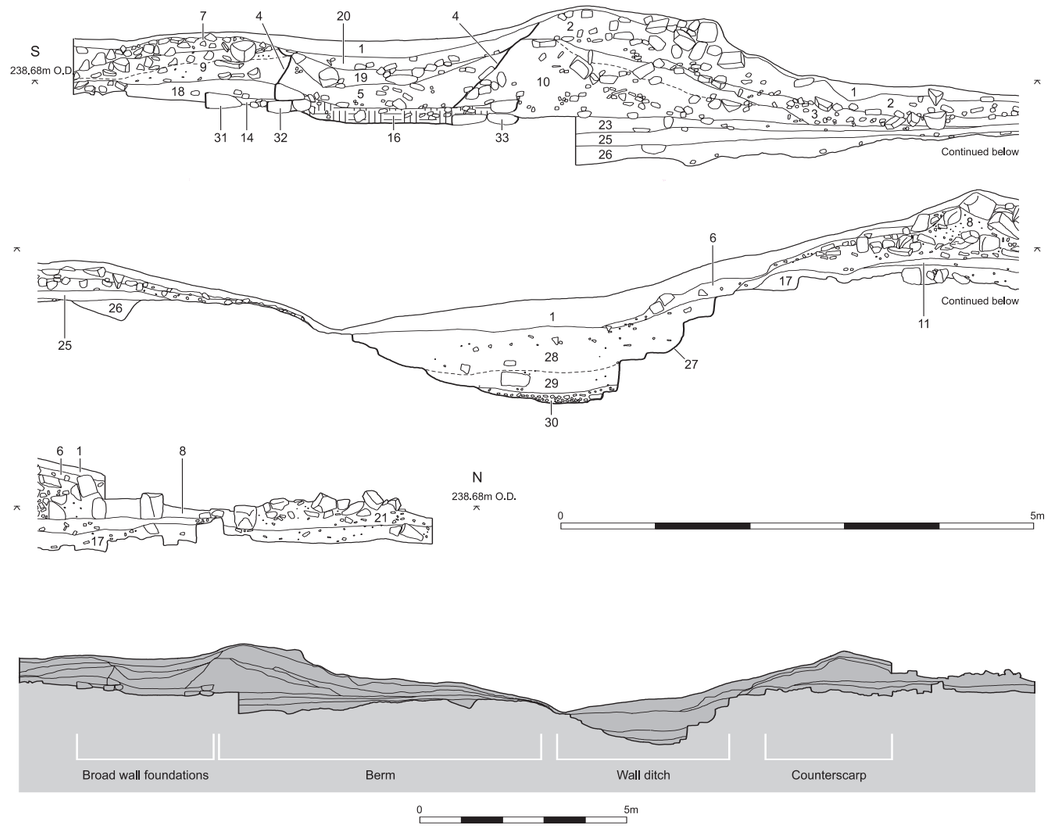


Fig 196
Black Carts: west-facing section of Trench BC1.

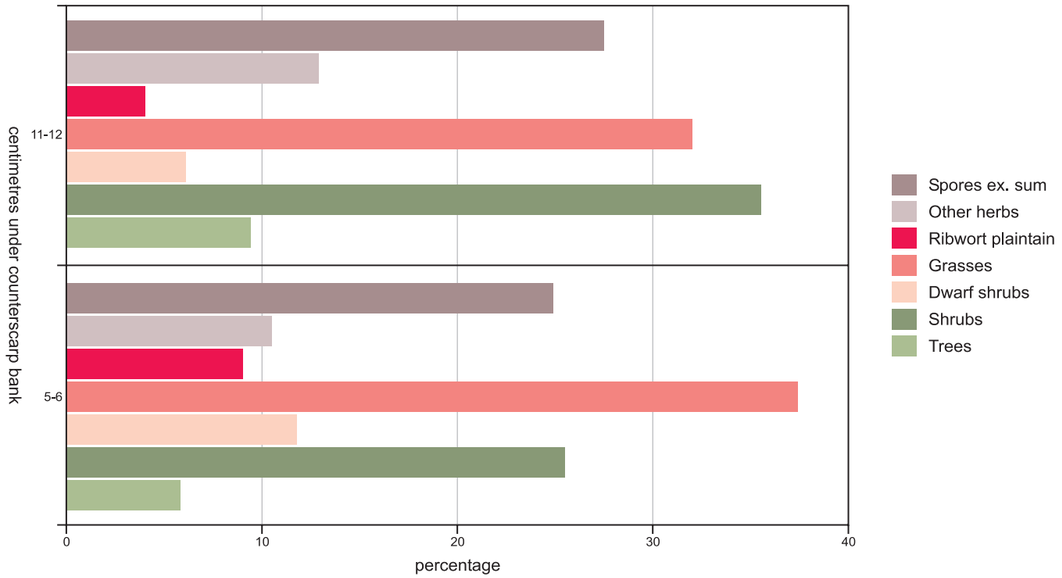


Fig 197
Black Carts: pollen data from beneath the counterscarp bank.

(25.5–35.5%) and grasses (32–40.2%). Dwarf shrubs, including heather (6.1–11.8%), and herbs are relatively abundant with ribwort plantain (4–9%) playing a substantial rather than a dominant role. The grass pollen includes one possible cereal grain (sample 11–12). Of the herbs, sedges are relatively abundant (5.9–6.5%) and there are consistent presences in the samples of pollen of carrot family, daisy-type, lettuce family, rose family, bedstraw family, dock, sheep's sorrel and scabious. There are single occurrences of daisy family, cabbage family, goosefoot family, dead-nettle family, greater/hoary plantain, buttercup family, meadowsweet, nettle and woundwort-type.

There are high values for spores, corresponding to 24.9–27.5% of the pollen counted – they are not included in the pollen sum used in calculating percentages. These mostly include ferns, notably polypody and bracken, with minor occurrences of bog moss, moonwort and parsley fern. There are approximately two thirds as many unidentifiable as identified grains. Corroded pollen grains are by far the most abundant, and this is commonly the case in mineral soils, due to the actions of the soil fauna and microflora.

The clear dichotomy in the pollen spectra between contexts 11 and 17 seen in the pollen assessment (Huntley 1998) is not obvious here. The differences between the two analyses may result from local variation in the pollen content of the sediments or that the low numbers of pollen grains counted for the assessment did not give a representative picture of the pollen spectra present.

The counterscarp (Fig 198)
The counterscarp consists of two elements: a linear bank, which occupies the crest of the small ridge crossed by Trench BC1, and a range of small, low mounds to the immediate north on the downslope. The bank (8) was 4.5m wide and 0.7m high at the apex, measured from its contemporary ground level. It was constructed of sub-angular, split, dolerite boulders and blocks up to 0.6m long. These appeared to have been carefully laid rather than dumped, and the bank retained a cohesive structure. It was very apparent that the counterscarp here was deliberately built, and was not merely a loose dump of material. There was no berm between the bank and the Wall ditch. The south side of the bank continued and maintained the line of the north edge of the ditch, accentuating the profile. The back slope of the north was very much gentler.

The mounds to the north of the bank appeared from the evidence in areas of animal disturbance to have been dumps of loose dolerite rubble. One of these was

investigated in an attempt to determine whether these were earlier than, later than, or contemporary with the counterscarp. It was found that the rubble dump (21) had the same relationship to the underlying buried soil (17) as did the constructed counterscarp, and was thus contemporary.

The Wall ditch (Fig 199)
The north edge of the ditch (27) was cut into the natural dolerite in the southern flank of the ridge on which the counterscarp stood. It measured only 2m wide and 0.8m deep (compare Appletree and Crosby-on-Eden, pp 106, 122), with a stepped profile formed by the splitting out of naturally angular dolerite blocks along horizontal bedding planes and vertical fissures. The ditch was precisely the sort of shallow gully described by Newbold (1913a). The bedrock in the bottom of the ditch was water-worn, and it had clearly operated as a run-off gully for a very long period. The fills of the ditch (28, 29, 30) comprised layers of orange-brown and brown water-lain silty sands with few inclusions. Given the amount of water wear on the rock in the ditch bottom, it seems that the rock was exposed for a long time, and this silting is thus considered to be a relatively recent phenomenon.

The berm
The berm between the ditch and the Wall was 8m wide, and was almost level. The surface contemporary with the Wall was that of the uppermost buried soils (23, 25), which were truncated towards the edge of the ditch. The soils under the berm were assessed for pollen but none was found (Huntley 1998).

Fig 198
Black Carts: section of the built counterscarp bank.

Hadrian's Wall (Fig 200)
The remains of the Wall, although heavily robbed, could still be interpreted in terms of the long-established sequence of Wall construction between the North Tyne and the Irthing. Here the interval structures and foundations were built first, the foundations and the wing walls on the turrets and milecastles to Broad Wall gauge (nominally 10 Roman feet: 3m). The curtain wall was later built to Narrow Wall gauge (nominally 8 Roman feet: 2.4m) on the northern edge of the foundation leaving an offset to the south, and the points of reduction at the ends of the wing walls; the phenomenon that so puzzled Newbold (1913a).

Fig 199
Black Carts: the Wall ditch in Trench BC1 looking west. The profile and fill of the ditch are shown by the darker silt seen here in section.

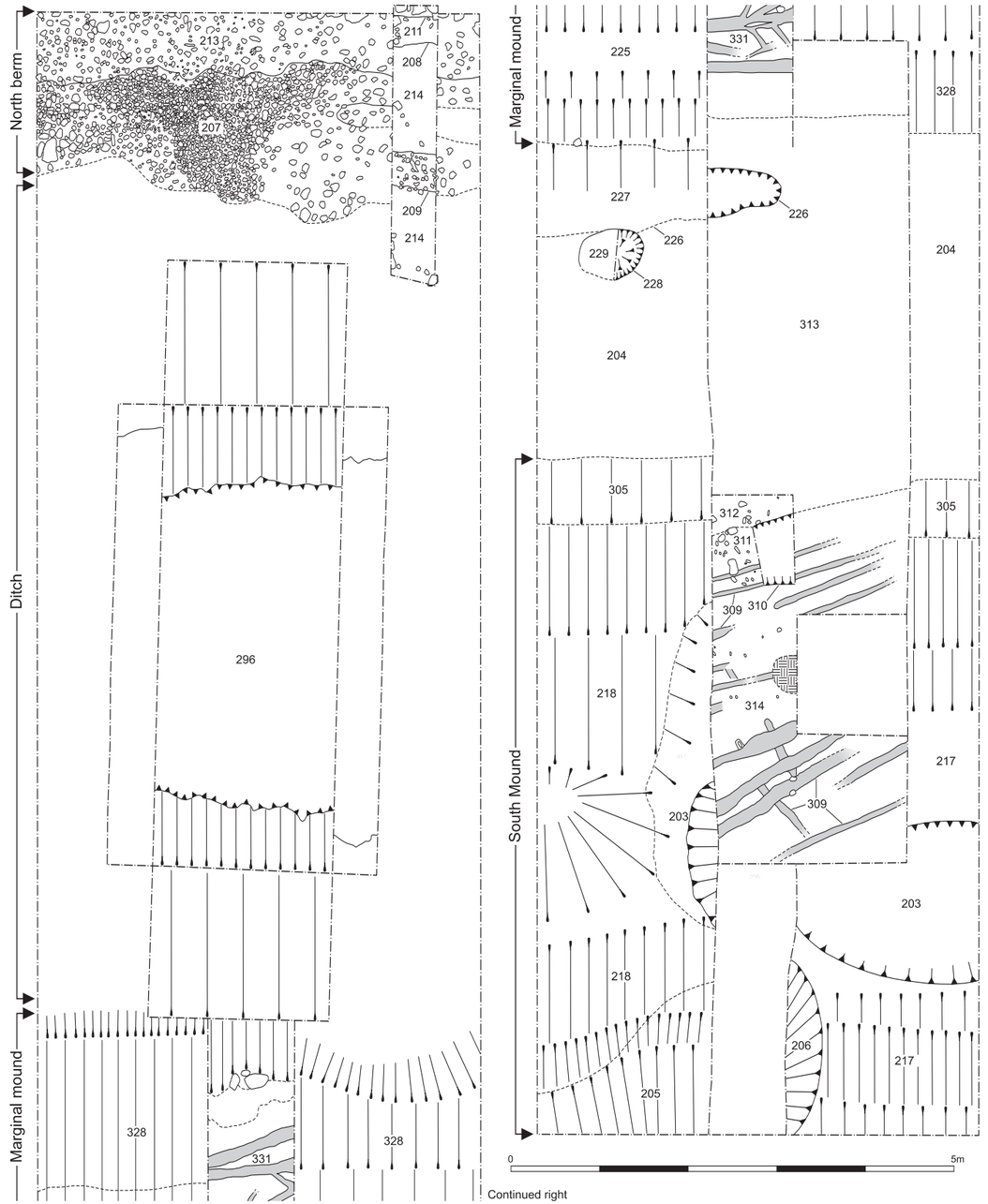
Fig 200
Black Carts: the footings of Hadrian's Wall in Trench BC1, looking north, showing the two outer faces of the Narrow Wall foundation spanned by the ranging rod, with the southern face of the original Broad Wall footings in the foreground. The robber trench is the same width as the Narrow Wall, and the spoil mounds on either side of the robber trench can be seen at the upper level.

All that remained of the Broad Wall foundation in Trench BC1 (31) was a single course of the southern face with some core work behind it. The remnant projected 0.7m to the south of the south face of the Narrow Wall, and it is probable that the north faces of the foundation and Narrow Wall coincided. If so, the broad foundation would have been very broad at 3.3m, probably to allow for the kind of offset in the upper courses recorded by Newbold nearer T29b. The facing stones comprised blocks of dolerite, which were neither dressed nor deliberately faced, but had been split out of the stone bed by exploiting the straight fissures that occur naturally, with the straight split edges used as a tolerably even face. The core consisted of smaller dolerite fragments, and there was no sign of any bonding material.

The Narrow Wall curtain (16) was 2.6m wide. The bottom course was of large, unshaped dolerite boulders with flat upper and lower faces (32, 33). The second course was the first proper facing course, and was offset slightly from the foundation on the south side. Again the facing stones comprised dolerite blocks that had been split to size and shape taking advantage of the natural bedding and fissuring of the rock; no post-quarrying dressing had been attempted. The core, which was bonded with a light-brown sandy clay dissimilar to the underlying buried soils, consisted of broken dolerite waste. South of the Wall a dark brown soil layer (18) overlay the broad foundation, but respected the bottom course of the curtain wall as built.

The Wall was robbed except for the two courses of Narrow Wall. Few, if any, facing stones were recovered during excavation, and it is probable that most of these were removed during a first phase of robbing. This would have caused the clay and stone core to collapse *in situ*, producing a linear mound of stone and soil some 8m wide (9, 10). This mound was subsequently cut longitudinally by a robber trench (4), which removed the buried foundations. From this trench, upcast and stone unsuitable for re-use was thrown on each side of the Wall footings (2, 3, 7) creating two parallel banks. Subsequently the robber trench was backfilled in the natural course of silting and slumping from the edges and banks (5, 19, 20). Most of the robbing debris consisted of dolerite rubble, but the two facing stones found incorporated in these banks were sandstone.

Fig 201 (opposite)
Black Carts: general plan of Trench BC2.



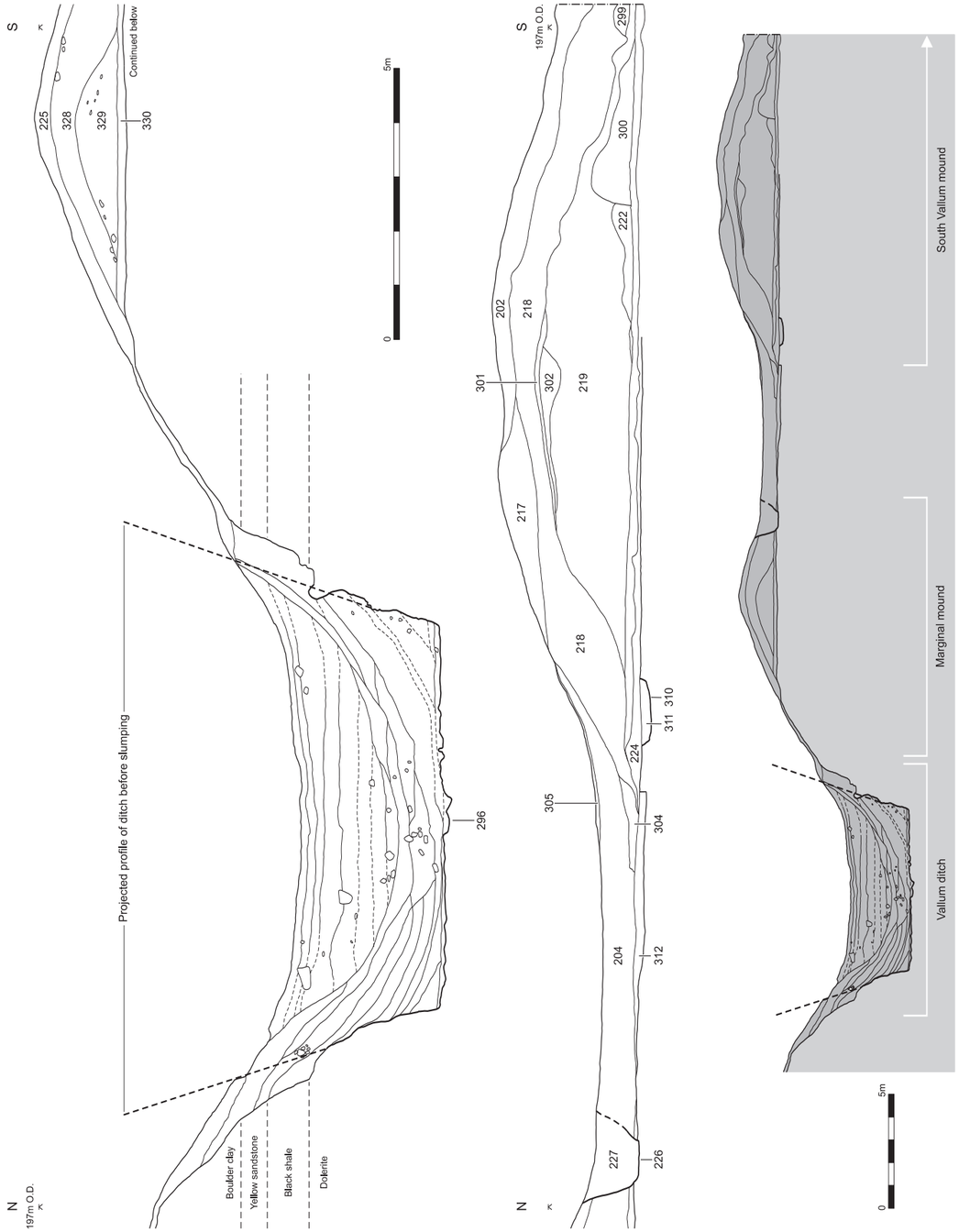


Fig 202
Black Carts: east-facing section of Trench BC2.

Trench BC2
(Plan, Fig 201; Section, Fig 202)

Natural strata and soils
by M-R Usai and Tony Wilmott

Trench BC2 was situated at a point where many of the geological complexities of the area came together. The south Vallum mound sat upon the solid sandstone, which dipped sharply northwards. At the south edge of the Vallum ditch it was covered by boulder clay 1.10m thick. At this point the sandstone was only 0.25m thick, as revealed in the side of the Vallum ditch. Beneath the sandstone was a 0.5m thick deposit of black shale, which was clearly part of the Carboniferous limestone, sandstone and shale deposits. Beneath the shale, at 1.85m below the level at which the Vallum was constructed, the top of the dolerite was seen in the ditch edge and base. The strata cut by the Vallum ditch were thus boulder clay, sandstone, shale and dolerite, and these formed the material of which the mounds were constructed.

Soil development patterns are much more complex than in BC1 (Usai 1999, 2004). Soil development appears to have been truncated not just once but twice – firstly by ploughing, then possibly by de-turfing before construction of the Wall. There is also a discontinuous iron-pan, which apparently coincides, at least in some cases, with ancient hoof prints and plough marks. Context 303 is interpreted as a remnant of the original soil profile, with context 224 being a remnant of the plough soil formed from it. Context 224 may subsequently have been truncated by de-turfing. Context 298 is the iron pan formed at the boundary between contexts 224 and 303. It is discontinuous and has not therefore hindered horizontal and vertical movement of water. There seems to have been considerable movement of the clay fraction within the various layers and it should be borne in mind that pollen might have moved in a similar way.

The pre-Vallum landscape
by David Earle Robinson and Tony Wilmott

The evidence for the pre-Vallum landscape was contained and defined in the buried soils sealed by the south and marginal mounds of the Vallum (303, 330). The earliest artificial feature to be cut into these soils was a 0.75m wide, 0.10m gully (310, fill = 311) that ran east–west beneath the south Vallum mound. There was no hint as to date or function for this gully. After it had been filled, the gully was cut by a network of ard marks, which scored its fill and the buried soil. These were fairly widespread, being evident beneath the south mound (Fig 203) and the marginal mound (Fig 204), as well as (with less certainty) on the north berm of the Vallum. The ard marks (308, 331, fill = 309) were up to 80mm wide. Where the plan seems to show a broader mark, this actually comprises multiple marks on the same alignment. The majority of the marks ran south-west to north-east, although there were also a series taking the opposite alignment, south-east to north-west, and, under the marginal mound, a hint that a more nearly east–west alignment also existed.

Above the buried soil and ard marks there was a layer of hard iron panning (298). When the surface of this deposit was excavated in plan, it was found to have fossilised a mass of sub-circular depressions (306; Fig 205). These were interpreted on site as possible hoof prints, although when casts of these depressions were examined by Drs Sebastian Payne and Polydora Baker they proved unidentifiable. Examination of recent hoof prints in the area, however, demonstrated that on ploughed ground there is a tendency for hoofs to tear up clods, rather than to leave legible imprints. This gives a very similar effect to that observed in the iron pan level. There is no sign that the hoof prints were those of cloven-hoofed beasts, and the most likely identification is that these were horse prints.

The pollen spectra of sample 14 (context 224), sample 16 (context 298 – iron pan) and sample 17 (context 303), resemble each other closely (Fig 206, Table 1, Appendix 2 Tables A1, A2). The pollen assemblages are characterised by low values for trees – mostly alder and oak (4.5–6.7%), shrubs – mostly hazel (3.5–7.2%) and dwarf shrubs – heather (0.4–1%), and high values for grasses (40.2–45.5%) and other herbs, especially rib-wort plantain (27–32.3%). The grass pollen includes a single possible cereal grain (sample 17). Of the herbs, sedges are relatively abundant (2.8–4.1%), as are pink family (2.2–3.2%), rose family (1.9–2.7%), buttercup family (0.4–1.7%), nettle (0.2–1.0%) and daisy family (0.2–1.1%). Carrot family, lettuce family, bird's foot trefoil, greater/hoary plantain, dock and sheep's sorrel are represented in two of the three samples and there are single occurrences of mugwort, meadowsweet, bedstraw family, scabious and sundew. Values for spores are relatively low

Fig 203
Black Carts: ard marks beneath the Vallum south mound, Trench BC2. The hoof-marked iron-pan deposit is in the foreground.

Fig 204
Black Carts; ard marks beneath marginal mound, Trench BC2.

Fig 205
Black Carts: hoof prints sealed by the Vallum south mound, Trench BC2. The hoof prints can be seen in the brown material beneath the mound to the right of the picture, which in turn seals the ard-marked natural soil seen to the left, against the mound section.

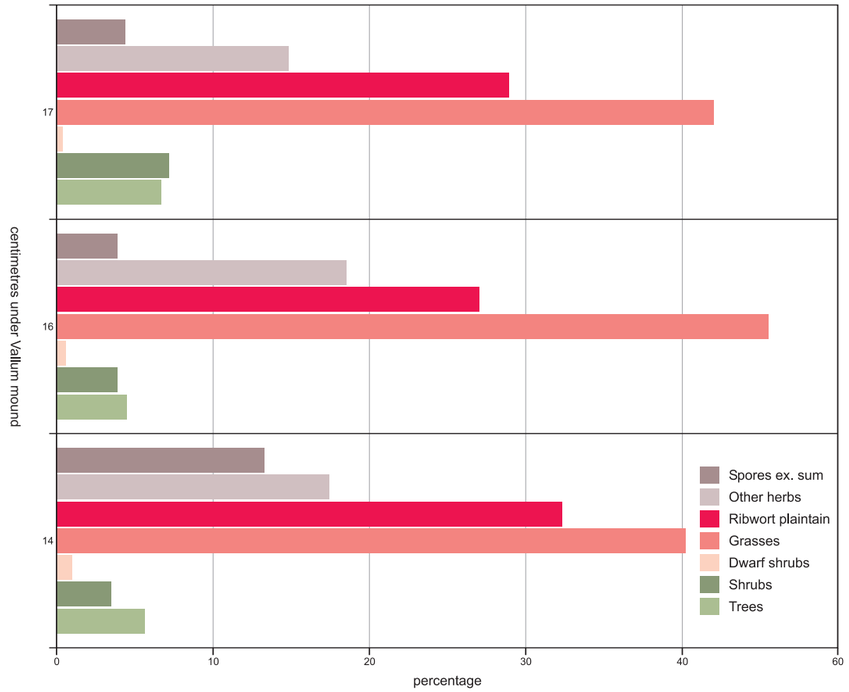


Fig 206
Black Carts: pollen data from beneath the Vallum south mound.

Table 1 Black Carts, Hadrian's Wall: pollen data summary percentages.

	under Vallum mound Monolith 838			*under Counterscarp bank Monolith 818*	
sample	14.0%	16.0%	17.0%	5–6%	11–12%
trees	5.6	4.5	6.7	5.8	9.4
shrubs	3.5	3.9	7.2	5.8	9.4
dwarf shrubs	1.0	0.6	0.4	11.8	6.1
grasses	40.2	45.5	42.0	37.4	32.0
ribwort plantain	32.3	27.0	28.9	9.0	4.0
other herbs	17.4	18.5	14.8	10.5	12.9
spores (not in % sum)	13.3	3.9	4.4	24.9	27.5

(3.9–13.3%), mostly comprising ferns, polypody and bracken, with minor occurrences of bog moss and moonwort.

The north berm of the Vallum (Fig 207)
The natural buried soil (214) was directly covered with an uneven spread of compacted and loose cobbles (207), which appeared to be scored by east–west wheel ruts (208, 209, fill = 213). These features were not recent, as they were cut by the foundation (211) for a modern drystone field boundary wall (210).

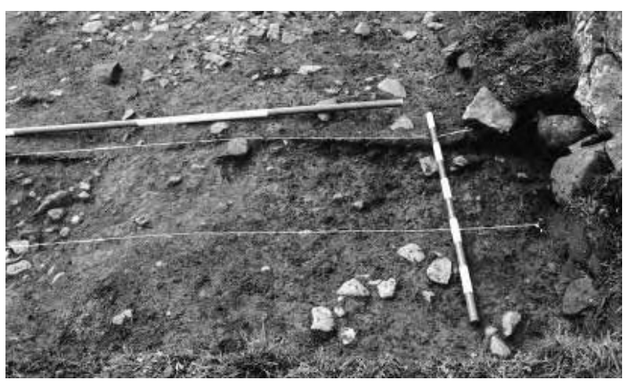
The Vallum ditch (Fig 208)
As already noted, the ditch (296) was cut through boulder clay, sandstone, shale and dolerite. It was 3m deep in total. Where cut through rock it was virtually square in section, and measured 4m wide. In the top metre, where the ditch was cut through clay, the ditch sides had slumped such that the slope of side was less steep and the width of the ditch expanded to 7.5m at the top.

The ditch is silted or filled up to less than half its total depth (1.4m). The fills were recorded largely in section, and the sequence of filling, silting and slumping over time is tolerably well understood, but probably not very archaeologically significant, as it seems to bear little or no relation to any human intervention after the ditch was cut. There was certainly no sign of deliberate backfilling at any time, and the suggestion of a re-cut in the section seems to be due to a change in the silting pattern in the ditch, and not to human activity. All distinctions in fill were slight, and only really visible after the section had been allowed to weather. The sections on each side of the trench through the ditch were slightly different, showing that silting patterns were localised throughout.

There seem to have been three broad phases of silting. The first was the deposition at the base of the ditch of a thin, sandy primary silt (289). Above this the second phase is marked by deposits of dark blue-grey to dark grey-brown clay and shale with an admixture of silt and differing concentrations of yellow flecking, small pieces of sandstone, and dolerite fragments (273–9, 281–3, 286–8 and 290–5). These clays were concentrated against the sides of the ditch, and seem to have slumped from the upper edges of the ditch where it was cut through clay and shale. If this was the case, then the upper edges slumped to the point at which they had a secure angle of repose at an early stage in the life of the ditch. A simple calculation of the quantity of clay deposited and the extent to which the upper edges of the ditch had eroded suggests that the original ditch edge was cut to *c* 70–75° (Fig 190). On the south side of the ditch, one layer in the fill (287) consisted of a lump of sandstone that had sheared away from the ditch side and had slid down until stopped by a shoulder of unweathered dolerite.

The deposition of these clays produced a rounded profile to the ditch bottom, and it is this that gives the impression of a re-cut.

Fig 207
Black Carts: track on the north Vallum berm.



Fill deposits above this point consisted of more-or-less level strata (215–16 and 257–62), which comprised silts rather than clays. The slope of the ground (and experience during the excavation) shows that the Vallum ditch acted as a watercourse in wet weather. Water running down from Teppermoor Hill on the west side and Tower Tye on the east carried down silt, which caused the ditch to fill up in the valley bottom. The character of the upper silty ditch fills suggested a waterborne origin for this material within a depositional regime that continues today.

The marginal mound (Fig 209)
The marginal mound was located, as the name suggests, on the south lip of the Vallum ditch. It was 4.2m wide and 0.812m in surviving height. It comprised two lower layers of clay (328, 329) below a shale cap (225). It is an important observation that the marginal mound consisted of clean materials similar to those in the south Vallum mound proper. It also had the identical stratigraphic relationship with the underlying buried soil deposits and ard marks as the south mound (Fig 204).

The south Vallum mound (Fig 210)
The south Vallum mound was separated from the marginal mound by a berm 3.7m wide. The Vallum was 8.1m wide and 1.35m in surviving height, and was made up of the material won from the ditch. At the base was a deposit made up of an admixture

Fig 208
Black Carts: the Vallum ditch as excavated down to dolerite bedrock, Trench BC2.

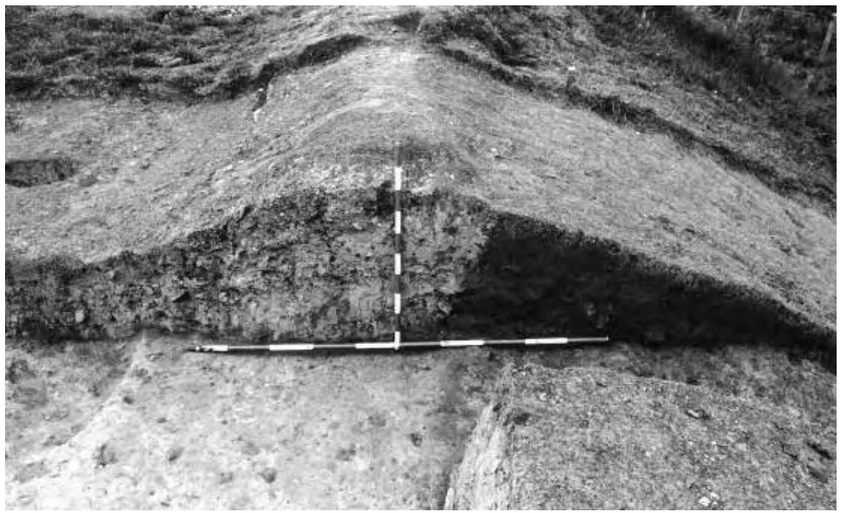


Fig 209
Black Carts: section of the marginal mound, Trench BC2. The darker area to the right is due to differential drying during excavation.

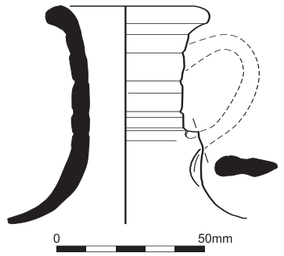
of natural materials (224), above which were deposits of clay (219–23, 299–300), shale with sandstone (218, 301–3), and small dolerite rubble (217). The order in which these materials were deposited was very broadly in reverse of their natural order of deposition; the clay from the top of the natural sequence, then the black shale and then the dolerite. It was noticeable that there was very little dolerite on the mound, and examination of the surface of the field to the south showed that such material had not spread to any meaningful extent to the south of the tail of the Vallum mound.

There was clear evidence for the post-Roman degradation of the south mound through erosion (304–5), and by small cuts or animal scrapes (202–6, 226–9), and the berm between the two mounds became thoroughly silted up with a very mixed clay soil (204).

Fig 210
Black Carts: section through the south Vallum mound, Trench BC2. Note the bulk of the mound made up of clay and dark shale, but with a dolerite capping.

Finds

Finds from the site generally comprised a few pieces of modern ironwork in the topsoil deposits in Trench BC2. There was a single Roman find from the upper silting of the ditch on its south side; the neck of a coarse-ware flagon of 2nd century date, which might derive from the nearby turret (Fig 211).



Interpretation

The pre-Wall landscape

by David Earle Robinson and Tony WIlmott

What kind of landscape did the Romans encounter – the surveyors, the engineers and the construction teams – when they came to build Hadrian's Wall? This question has occupied many people and several studies have been launched over the years in search of an answer. These have mostly involved analysing ancient pollen preserved within the peat bogs and lake sediments on either side of the Wall in order to trace the development of the local vegetation before the Wall, during its construction and use and following its abandonment (Barber *et al* 1993; Dumayne and Barber 1994). The disadvantage of these so-called off-site pollen data is that, whereas they give a very good idea of what was happening in the area as a whole, they are often difficult to relate precisely, both in time and space, to events happening directly on the Wall. There is always the difficulty of correlating the landscape changes and human activities revealed by the off-site data with specific and precise historical events such as construction of the Wall (see especially (Dumayne-Peaty and Barber, 1997; Dumayne *et al* 1995; McCarthy 1997). Much more suitable in this respect, are on-site data, for example those obtained from sediments sealed under or within the Wall and its earthworks during construction, as these can be related to events directly at the time of the Wall building. These data can, however, be rather more difficult to acquire, particularly in freely draining mineral soils such as those found at Black Carts.

The two sets of samples reveal two very different local cultural landscapes, although each of these was clearly under human influence. The samples from under the Vallum mound, in particular, reflect intense human activity: low values for trees, shrubs and dwarf shrubs reveal that the immediate area was virtually treeless with no heather. The high values for grass and ribwort plantain, and the range and diversity of herb species, are consistent with the presence of grazed pasture/meadow. The greater/hoary plantain may well indicate bare trampled soils in areas of heavy use and the nettle pollen suggests the presence of nutrient-enriched soil. The only direct indication of arable agriculture is the presence of one possible cereal pollen grain. However, the broad pollen types and family groups to which many of the pollen grains have been assigned (state of preservation or taxonomic uniformity prevented more precise identification) potentially include many arable weed species.

The samples from under the counterscarp bank reflect quite a different local landscape – one that was under less intense human influence. High values of shrub and grass pollen and relatively high values for trees and dwarf shrubs are consistent with open scrubby woodland combined with heath and grassland. Values for ribwort plantain are much less than those seen under the Vallum mound, and the spectrum of herbs present also reflects less heavy human usage. High values for ferns agree well with the presence of woodland or scrub. However, fern spores are tough and resistant to decay and their presence is often accentuated by differential preservation under conditions such as those prevailing here.

The Black Carts pollen analyses have already been placed in a general context by Huntley (1998), who summarised the results of a number of pollen analyses from deposits associated in some way with the Wall. No pollen was found under the fort at Wallsend (Huntley 1995) or from adjacent to the Vallum mound and berm at Denton Bank, east of Newcastle upon Tyne (Huntley 1998). A mixture of alder woodland and open grass/sedge dominated communities, but with no clear indication of arable agriculture, emerged from analysis of the buried soil under the Newcastle Milecastle (Huntley 1988). At Wallhouses (Balaam 1983), it was the core of the north Vallum mound itself that revealed a pollen spectrum indicating an essentially open landscape with a little woodland and cultivation; no pollen was found in the deposits sealed beneath the Vallum. Wiltshire (1997) produced evidence of dense alder woodland from under the original Turf Wall at Birdoswald and a similar woodland scenario, albeit in a more advanced stage of clearance, at Appletree (Wiltshire 1997). Arguably the best data produced so far comes from analyses carried out at Tarraby Lane (Balaam 1978) on five profiles associated with both the Turf and Stone Walls. All of these showed a predominantly wooded landscape.

In summing up, Huntley (1998) concludes that there were marked differences between the landscape east and west of the high Pennines at the time the Wall was constructed. The west appears to have remained wooded for longer, with the Romans perhaps responsible for major clearances, whereas the east was predominantly cleared before the Romans arrived. The Black Carts site shows a clear affinity to developments elsewhere in the east.

Sampling and analysis of these deposits has paid dividends despite initial concerns about their unpromising nature and appearance. Pollen analysis has revealed the presence, prior to wall construction, of a well developed cultural landscape of varying character, pastoral and arable, extending mosaic-like across this region. It is clearly worth considering further work of this nature along the line of the Wall – although high-resolution analysis of the buried soils does not appear to be a practical option.

The pollen picture demonstrates that the valley bottom was subject to more human intervention than the valley side, and this is confirmed by the evidence for ploughing. At some time before the construction of the Vallum the ground was ploughed using an ard-type plough, and leaving characteristic U- or V-shaped grooves. Such ard marks have now been found at many sites on the eastern flank of the Wall; indeed it seems clear that these should be expected in any excavation of the Wall to the east of the central sector over the Great Whin Sill.

Fig 211 (opposite)
Flagon neck from Trench BC1.

They have been found on virtually every modern excavation from Wallsend to Carrawburgh (p 128).

The ard marks lie beneath a thin soil pocked with probable hoof marks, perhaps suggesting that animals crossed a ploughed field immediately before the Vallum mounds were built on the site. Survival of hoof marks in buried ground surfaces, although rare, is not unprecedented; the hoof prints of cattle survive buried beneath blown sand in a Bronze Age surface at Glesborg, Denmark (Boas 2000, 10), and a palimpsest of the prints of humans, cattle and wheeled vehicles has been found in the latest pre-amphitheatre deposits at Chester. The Black Carts hoof prints appear to be those of horses, however, and the picture of an *ala* of Roman cavalry crossing a ploughed field prior to the building of the Vallum is as irresistible as it is unprovable.

A major problem in interpreting the pre-Roman landscape is the difficulty of identifying and dating the settlements from and for which the land was ploughed. Elsewhere in the Wall zone prehistoric agriculture is represented by the earthworks of cord rig (Woodside and Crow 1999, 32, 131; Gates 1999, 16), which were probably formed by the use of ard ploughs. Gates (1999, 20–1) has argued that cord rig is associated with a number of settlements within the Northumberland National Park, suggesting the practice of a mixed farming economy into the Roman frontier period. At Black Carts it is possible to speculate that the settlement associated with the ploughing might have been the enclosed settlement of Late Iron Age or Romano-British form at Tower Tye (NY 8864 7065). This rectangular enclosure with its internal divisions and at least six round houses may be the culmination of a long period of settlement, and lies only 600m south of the site, on Walwick Fell (Gates 1999, 42).

Frontier structures

The northern and conventionally primary group of features of the linear frontier are the Wall, Wall ditch, and counterscarp, and these are the three elements explored in Trench BC1. In general the Wall ditch, as well as the Vallum ditch, varied in its size and profile according to the nature of the subsoil and possibly subsequent cleaning and erosion, among other factors. At Black Carts the variation was so extreme as to be unique. The ditch hereabouts was originally excavated from west to east. This is shown graphically at Limestone Corner. The ditch had been dug continuously from the west through the boulder clay that overlies the dolerite. Where the dolerite outcrops on Teppermoor Hill, the attempt was made to continue the line of the ditch by bodily removing huge blocks of stone, which were then incorporated in the counterscarp. As noted above (p 82) this attempt was soon abandoned. The situation at Black Carts demonstrates a sophisticated response to the problem, involving the use of terrain to give a false impression of the scale of the earthworks. The slope from Teppermoor Hill to the Hen Gap forms a west–east aligned ridge, which is effectively a dolerite outlier of the Great Whin Sill. The slope from the northern side is somewhat sharper than that to the south. It might be expected that the curtain wall would have been constructed along the crest of the ridge as is the case, for example, along the Whin Sill west of Housesteads or of the Turf Wall at Birdoswald.

At Black Carts, however, this is not the case, and the Wall is set somewhat south of the ridge crest, which is actually crowned by the narrow linear bank of the counterscarp. The counterscarp rises sharply from the northern edge of the ditch, and is built with stone that has been carefully laid, and that, despite the proximity of the ditch, shows no sign of ever having slumped. The ditch was cut into the southern slope of the ridge, with its deeper side, therefore, on the north. Although the ditch was merely 0.8m deep from ground level on this side, the combined factors of the slope, the depth of the ditch and the height of the counterscarp gave a total apparent depth of at least 1.5m. This is admittedly still shallow, but is considerably greater than would have been possible had the Wall been on top of the ridge and the ditch on the downhill slope, and would have given the visual impression that the ditch was more formidable than it was in fact. The ditch at Black Carts was narrow and shallow, as described by Newbold (1913a), and was formed by levering out blocks of dolerite using the naturally occurring vertical fissures and horizontal bedding planes to do this. Some of the blocks won from the ditch may have been used in the construction of the Wall, but irregular or small pieces were probably incorporated in the counterscarp, which was raised on the natural ground surface of the ridge, preserving a buried soil horizon. It should be noted that the examination of the berm showed no signs of the kind of

obstacles found here in other areas, despite the fact that the berm was very wide. Bidwell (2005, 66) is clearly correct in noting that their absence is in part due to the hardness of the rock.

The foundations of the Wall at Black Carts showed the classic pattern for this area. Broad foundations were laid first, then the Narrow Wall constructed on the north edge of the foundation, leaving a single course foundation offset projecting 0.7m to the south. The courses of Wall and foundation that were recovered consisted of dolerite blocks with no trace of bonding material of either mortar or clay. The core also appears to have been dry-built; a type of construction that also appears on the Whin Sill (Bennett 1983, 44). The adjacent field walls, which were built of re-used Roman stone, are predominantly of sandstone, although occasional dolerite blocks occur. This implies that while dolerite was used for foundation and core material, much of the facing stone was cut from the sandstone outcrops towards Tower Tye. Despite this, the surviving dolerite blocks in the Wall and counterscarp amount to considerably more material than could have been derived from the shallow ditch alone. This may be the context for the range of mounds of broken dolerite rubble that are such a feature of the landscape to the north of the built counterscarp (Fig 93).

The difficulty of quarrying deeply for dolerite, and the reluctance of the Wall builders to undertake this, is demonstrated by the abandonment of work on the ditch at Limestone Corner. During the excavation, however, it was noted that the natural surface of the dolerite could be easily and conveniently exploited. The upper surface is criss-crossed with natural fissures, and the upper bedding plane is shallow (some 300mm). The simple use of a crowbar in these fissures allows useful blocks to be broken from the surface, as was proved on site by experiment (for simple surface quarrying of this sort see Hill 2004, 47). Blocks usually have at least one clean, straight face, and it is these blocks that were used, without further dressing, for the Wall foundations. The counterscarp was constructed from less regular material. Surface working on a widespread, almost opencast method would create a great deal of small rubble. It is suggested that the heaps of such rubble to the north of the counterscarp represent the spoil from such a quarrying method. It may be that quarrying in this way to the north of the wall and ditch had the additional value of lowering the ground level slightly on the downslope, making the linear barrier still more formidable when viewed from *barbaricum*.

The Vallum excavation at Black Carts showed a number of features of interest. Firstly, the basic measurements of the work, estimated from those of the Vallum ditch and south mound and berm imply an overall width for the Vallum system in this area of 39.5m, or approximately 129.6ft. This is close to the standard theoretical width of 120ft (Heywood 1965, 85) or in Roman terms, one *actus* (*below* p 134). Small variations in the width of individual elements of the system are, as Heywood (ibid) pointed out, a function of different treatments of the Vallum to account for different soil conditions. They are also the result of the various post-construction histories of the monument, thus the edges of the ditch at Black Carts had slumped and there is evidence that the south mound had spread southwards by slumping and through the ploughing of the tail of the bank.

The south mound sealed the ard-scored subsoil and the hoof-marked topsoil, which was altered by the deposition of iron compounds and the resulting iron panning on its surface. The lower part of the south mound was built with boulder clay from the top of the ditch. Above this was shale and sandstone, and a thin skim of dolerite from the base of the ditch capped the mound. The quantity of dolerite used in the mound was small, and it seems likely that most of this material was deployed in the north mound. If so, then this would explain why the 18th-century Military Road veered off the line of the Wall; it would be utilising a ready-built, flat-topped stone bank ideal for the purpose. The conclusion from this must be that the south mound was constructed first using the spoil won from the top of the ditch. This seems to be the first time that this observation has been stressed in terms of building sequence, as other Vallum ditch sections have been located in areas where the geology was homogeneous throughout the depth of the ditch, and distinctions of the kind seen at Black Carts were not possible.

The Vallum ditch at Black Carts has a profile, which clearly demonstrates that no re-cutting has taken place. There are three clear phases: a primary silting, the collapse of the upper edges of the ditch, followed by a long sequence of natural silting with

waterborne sits, which continues today. This pattern of silting is very similar to that found elsewhere. At Denton in particular, the loose sandstone through which the top of the ditch was cut had collapsed into the corners of the square-cut ditch. This was deposited as a first fill, and lay at a steep angle against the edges of the ditch. It was followed by a sequence of sediments laid down by water action interleaved with debris collapse from the ditch side. As at Black Carts, there were no episodes either of deliberate filling or of re-cutting (Bidwell and Watson 1996, 35, 47).

Other excavated profiles show very similar patterns. At Halton Chesters the profile was cut through mixed deposits with clay at the top and shale beneath. The shape shows the clay eroded to a similar profile, although it remained sharp where cut through shale. Again there was no sign of a re-cut (Simpson 1976, 156–67). In Wall mile 63 on the line of the North West Ethylene pipeline the published section of the ditch, which was cut through gravel and sand, shows the corners silted first by collapsing upper edges and no re-cut (Drury 1996). At Irthington in Wall mile 58 the natural was hard red sand. Here the section shows no primary silt and the angle of repose of the ditch fill demonstrates that the bottom fill in the corners of the ditch comprised the eroded edges. The excavator, Richardson (1972b), remarked that the "steep sides of the ditch would inevitably result in rapid silting through deterioration of its lips." Even where the ditch was cut to a sloping profile in boulder clay at Appletree (p 106) the initial fill was slumped clay from the upper edges of the ditch.

It is clear from the above that extensive stretches of the Vallum in all parts of its length were not interfered with in terms of backfilling or re-cutting and were left to silt up or erode in a natural manner.

The marginal mound at Black Carts was constructed of clean material comprising clay at the base capped with black shale, in a similar, clearly sorted 'reverse natural stratigraphy' to that observed in the south mound. In addition, the marginal and south mounds shared the same stratigraphical relationship with the underlying strata. The logical conclusion from empirical observation alone is that the two mounds were not only contemporary, but simultaneously constructed. Both mounds were built of clean material derived from the ditch with the clay from the top of the ditch at the base, followed by shale.

The marginal mound has been little discussed since the work of Simpson and Shaw (1922) and Richmond (1950). It's problems were succinctly reviewed by Heywood in 1965. She favoured (although not without reservations (Heywood 1965, 91–3)) an interpretation of the mound as the result of cleaning out the ditch from time to time, but particularly as the result of a recomissioning of the Vallum following the retreat from Antonine Scotland. This interpretation has enjoyed general acceptance (Breeze and Dobson 2000, 131). At Black Carts, however, there is no evidence of any re-cut, or of any cleaning out. The slumping of the clay edges at the top of the ditch profile provided a stable angle of repose to the sides. The calculation of the quantity of clay that had slumped over the primary silt and the amount of material that had been eroded from a ditch edge of 70–5° gave a similar result, implying that no re-cutting of slumped material had taken place. The slumping was followed by natural silting. The material of the marginal mound was not characteristic of a scouring of the ditch, but of derivation from its original excavation. The investigation of the marginal mound at Black Carts has important implications (p 135), informed and supported by results from the similar transect cut at Appletree in Wall mile 50.

The metalling on the north berm of the Vallum adds to the number of sites where evidence for tracks associated with the Vallum have been found. These are discussed below (p 133).

Transection in Wall mile 50 (Appletree, Cumbria), 1999

by Tony Wilmott, with contributions by James Wells and Allan Hall

Introduction

This section reports on a transection in 1999 of the earthworks of Hadrian's Wall in the Turf Wall sector at the location known as Appletree, Cumbria (NY 597655). The site lies 1.9km west of Birdoswald Fort, within the short stretch (2.86km) of Hadrian's Wall between Mc49 (Harrow's Scar) and Mc51 (Wall Bowers), where the Turf Wall exists on a different line to its stone successor (Fig 212). Appletree represents one of very few places on the whole frontier where all of the linear components of the system can be found in good condition, accessible and

undisturbed by each other. These components are: the Turf Wall, Turf Wall ditch and counterscarp bank, the Vallum (including both main mounds, ditch, and marginal mound), and the Stone Wall ditch and counterscarp bank. The Stone Wall itself lies under the Banks-Gilsland road.

At Appletree the works are interrupted by the course of the Wall Burn and the track to Lanerton Farm, which cuts through all of the above elements except the Stone Wall and its ditch.

Previous work

Appletree is the site of the first discovery of the Turf Wall, by Francis Haverfield in 1895. Haverfield's excavation consisted of a section, which cut through the Turf Wall, the Turf Wall ditch, the counterscarp bank and the Vallum. A watercolour painting (Fig 213) of the section of the Turf Wall, ditch and counterscarp was made by Mrs E Hodgson and was published in the report on the work, together with a line drawing

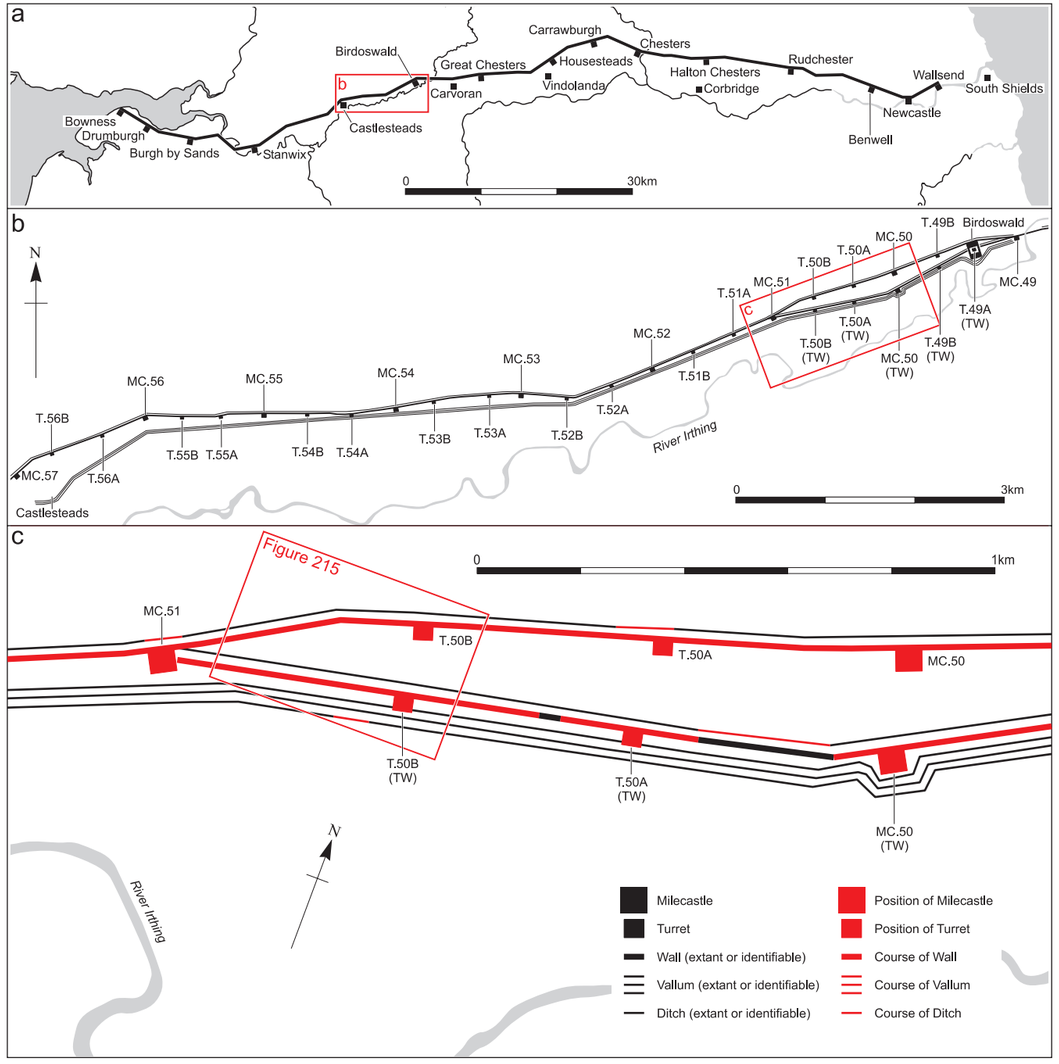


Fig 212 Appletree: location of Wall Mile 50 on Hadrian's Wall, and of Fig 215.

of the entire section (Haverfield 1897a). In 1896, the third Pilgrimage of the Roman Wall visited the site and viewed the section. It has since become a tradition that the portion of Haverfield's section that transects the Turf Wall is re-excavated periodically in order that it might be viewed by the participants in the decennial Pilgrimages of Hadrian's Wall. Within this context, the section had been re-cut and viewed on nine occasions (1896, 1906, 1920, 1930, 1949, 1959, 1969, 1979 and 1989), and in August 1999 the twelfth Pilgrimage and tenth viewing of the section took place during the course of the present project.

The site is not only notable for the discovery of the Turf Wall. Samples from the Turf Wall were submitted by F G Simpson and Ian Richmond to Dr Arthur Raistrick of Armstrong College for analysis. The samples contained identifiable pollen, which was published in a brief table. This seems to be one of the earliest archaeological realisations of the potential of palynological evidence. Simpson and Richmond (1935b, 246) wrote that:

> "The result is to tell us, not merely the fact that the Wall was here turf-built, but to indicate also the type of vegetation characterizing the surrounding landscape. Samples from the Turf Wall throughout Cumberland would enable us to reconstruct a detailed picture of the local flora in Roman days, a novel possibility beyond the dreams of older generations."

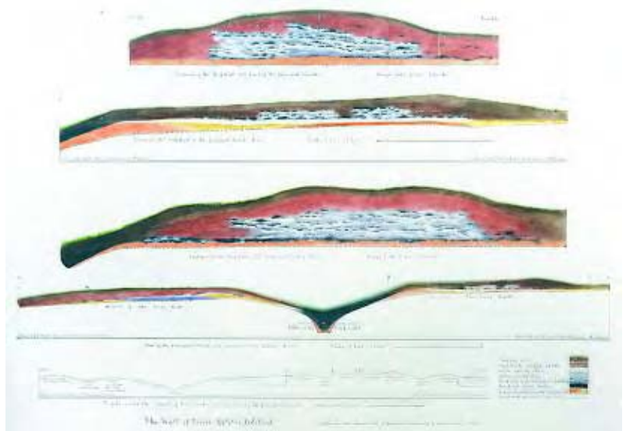


Fig 213
Appletree: the Turf Wall as recorded in 1895 in a watercolour by Mr T and Mrs E Hodgson (Society of Antiquaries of London).

It is an extraordinary fact that until 1979, Mrs Hodgson's watercolour painting was the only record of the section to be produced. On the occasions of the last two Pilgrimages, the Appletree section was cut by the staff of the predecessor organisations to the English Heritage Centre for Archaeology (CfA). In 1979 Julian Bennett (for CEU) recorded the section and some pollen sampling was carried out by Nick Balaam, although the results of this work were not published. In 1989 the staff of the Birdoswald excavation cut the section under the direction of the present writer (for CAS). The section was sampled for pollen and for soil micromorphological data by Maureen McHugh and Patricia Wiltshire, and was structurally recorded and published by Alan Whitworth and Kate Wilson (Whitworth 1992; Fig 214). The results of the scientific analyses undertaken by McHugh (1993) and Wiltshire (1992) were published in the monograph report on the 1987–92 Birdoswald excavation (Wiltshire 1997, 38–40). The work showed that the area had been extensively wooded before its wholesale, unselective clearance. Three clear episodes of burning indicated either primary woodland clearance or subsequent moorland management. When the Turf Wall was built, the area was dominated by wet moorland and bog. The Turf Wall was thus built across grazed moorland, which had been cleared of trees some considerable time previously. The conclusions on the nature of the pre-Roman environment and the fact that turfs were obtained to build the Wall from the immediate vicinity were confirmed by additional palynological work during the present project (Wells 1999).

In 1975 the late Charles Daniels excavated a section through the works in advance of a gas pipeline. This work took place somewhat to the east of the present site, but has never been published except in summary form (Goodburn 1976, 309), although a pollen report has been produced (Donaldson 1976). For ease of reference it will be referred to here as Appletree East.

Project Background

The 1999 excavation was designed to maximise the information recovered from the re-cutting of the Appletree section for the Pilgrimage, in view of the possibility that

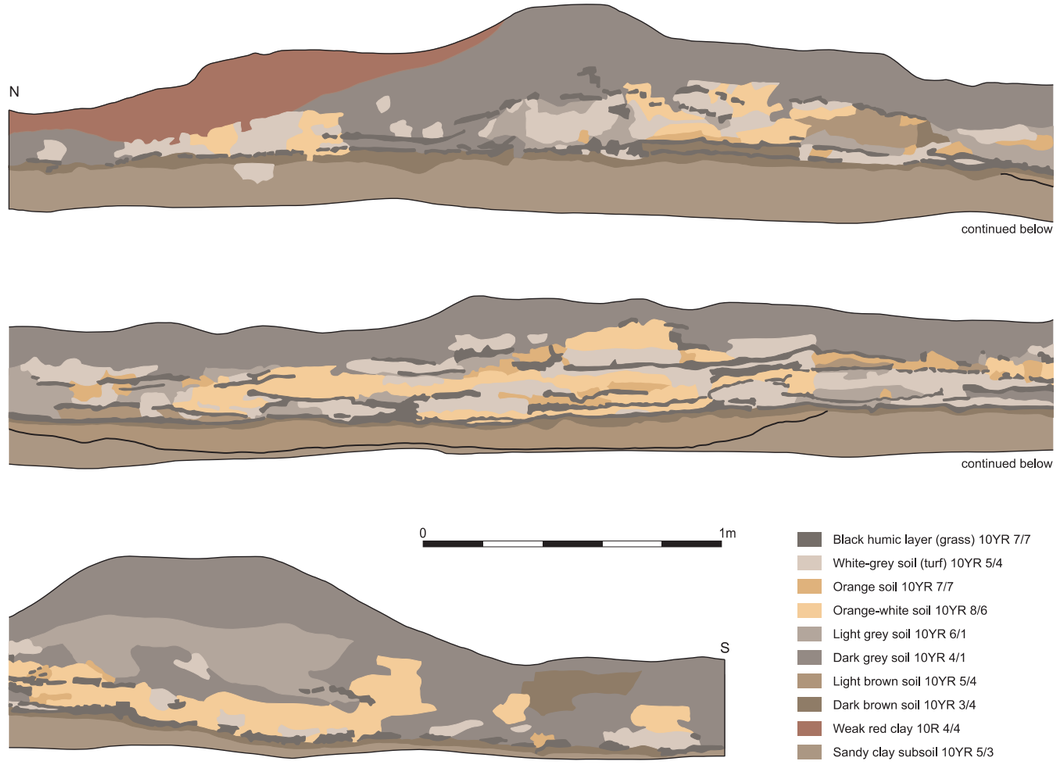


Fig 214
Appletree: the Turf Wall as recorded in 1989 by Alan Whitworth and Kate Wilson. Colour key added by John Vallender.

this may be the last time that such a viewing occurs. It was considered useful to place the Turf Wall at Appletree into its wider context by sectioning all of the associated earthworks in order to examine stratigraphic relationships. The principal objectives were:

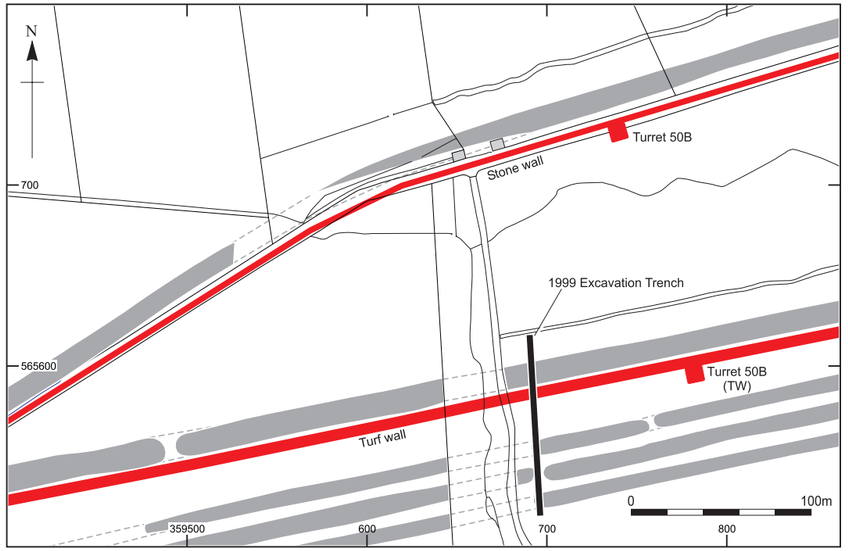
1. To establish whether the sequence of building the Wall was identifiable in the gross stratigraphy.
2. To test existing theories and assumptions on the sequence of construction of the various elements.
3. If (as generally assumed) the Turf Wall was the first element to be constructed, to establish whether the surrounding landscape was denuded of turf to provide materials.
4. To establish whether such denudation is apparent beneath the counterscarp bank and the Vallum mounds.
5. To compare the preservation and content of the pollen record from beneath the Turf Wall, counterscarp bank and Vallum mounds.

Fieldwork methodology

A single trench, 3m wide and 100m long was excavated through the sequence of frontier features, to include the Vallum mounds and ditch, the Turf Wall, its ditch and counterscarp bank (Figs 215–17). The line of the traditional excavation of the Appletree Turf Wall section was utilised, and extended to north and south. The trench was excavated to the level of the natural clay subsoil, sectioning all of the features of the complex. All excavation was done by hand with the exception of the removal of turf over flat areas where it was possible to use a machine. The backfilling and reinstatement was mechanical, with turf laid back by hand. Recording followed the methods currently in use by the CfA. Field visits were made for geoarchaeological advice by M-R Usai (1999b). Palynological samples from the Turf Wall and ditch fills were taken and assessed by J Wells (1999), while A Hall (2000, 2003) analysed samples for plant macrofossil remains.

Fig 215
Appletree: location of trench excavated in 1999.

Fig 216
(opposite and page 108)
Appletree: plan of trench excavated in 1999.



Structures and stratigraphy

The excavated structures and features comprised the various elements of the frontier system. These are described in order from north to south (Figs 216–17).

The glacis (Fig 218)

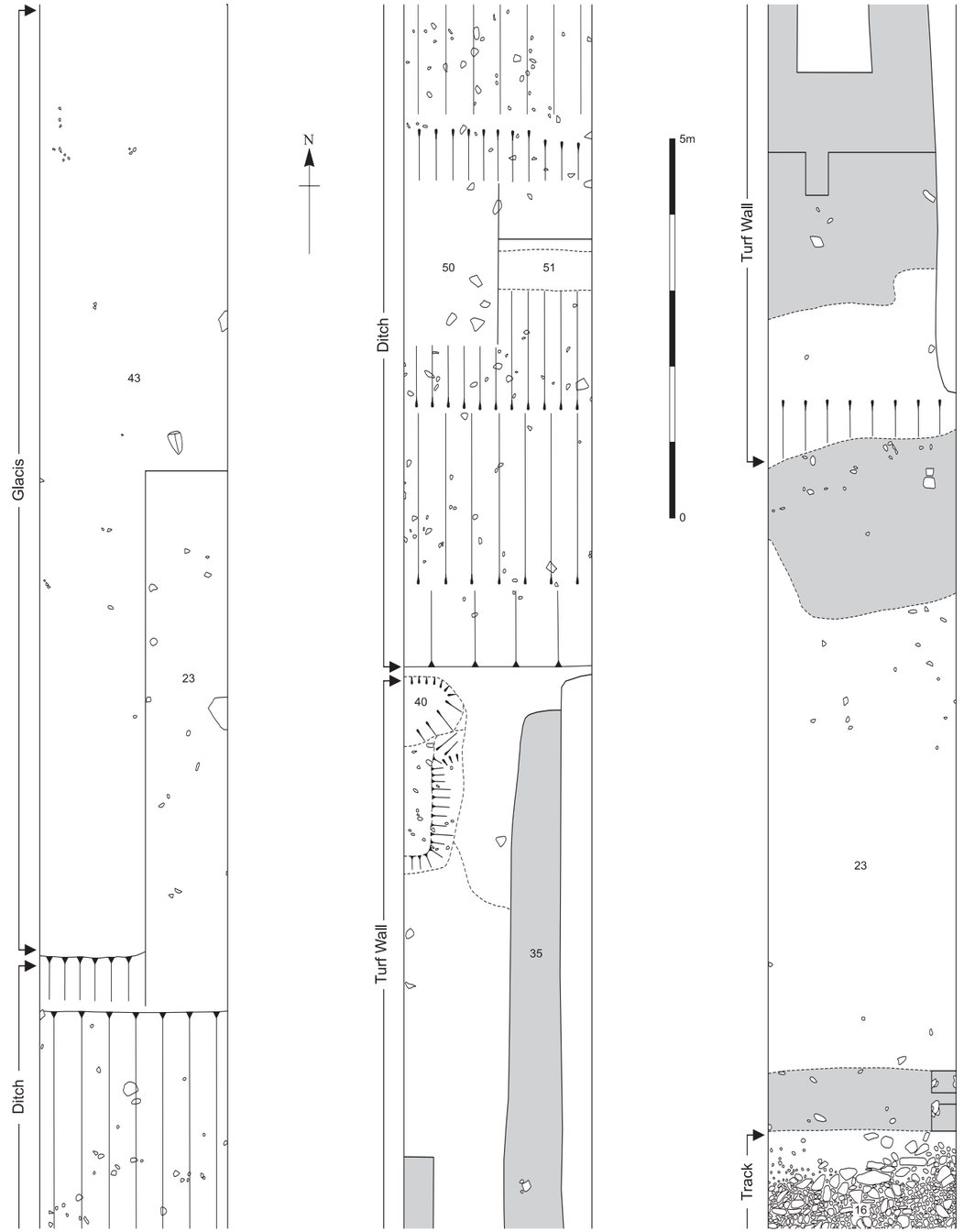
The glacis to the north of the Turf Wall ditch consisted of a low, broad mound 16.5m wide and 0.49m in surviving height. The height was consistent across the entire width of the earthwork, and may have been truncated by agricultural or other activity. The bank was constructed of greyish-pink clay with some small stones (43). This material lay directly upon the surface of the undisturbed, natural whitish-pink clay (23). There was no organic interface between the two deposits, indicating that the mound was laid directly on a surface that had been denuded of turf and topsoil.

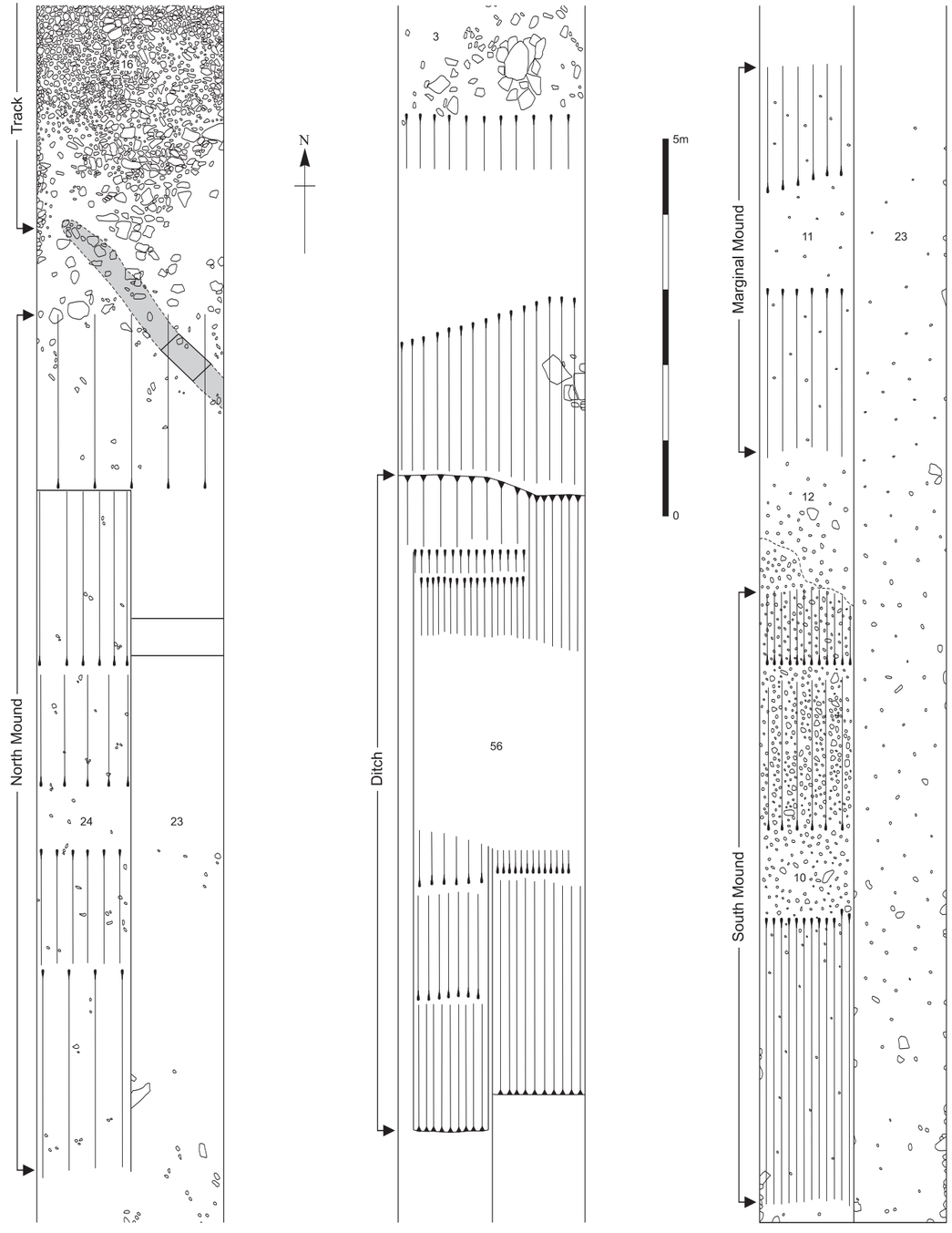
The Turf Wall ditch (Fig 219)

The ditch was broad, at 10.61m, and measured 2.97m in overall depth. The angle of slope of the sides varied, being slightly shallower at the top than at the bottom, but the average slope was in the region of 40°. There was no indication of a drainage channel or 'ankle breaker' in the bottom. The bottom fill of the ditch comprised a 110mm deep layer of spongy black peat (51) above which was a deposit of slumped boulder clay (50) 160mm deep. This boulder clay was in turn sealed by a thick (0.46m) layer of material comprising organic and sub-soil deposits, within which the outline of individual turfs could readily be discerned (45). This thick layer had clearly been tipped from the south side, as it was thicker and higher against the south edge of the ditch. The upper fill (44) was 305mm deep at in the centre, and comprised a friable deposit of light-grey sandy clay with occasional stones. This material represents the natural silting of the ditch after the deposition of the re-deposited turfs and before the development of the modern topsoil (01), which comprised the top 210mm of the fill of the ditch.

The Turf Wall (Figs 213–14, 220)

Beneath the Turf Wall, as Haverfield (1897a, 186) had observed, "the subsoil was found to be overlaid by a black line 1–2in [25.4–50.8mm] thick." This distinct horizon (53) represents the vegetated old ground surface at the time when the Wall was constructed. It is the pollen from this deposit that is so important in demonstrating the nature of the landscape at the time of the Wall's construction. Above this the Turf Wall material (54) survived to a height of 0.45–0.5m and was 9.5m deep. The first layer of turfs was laid upside-down, grass-to-grass, on the ground surface, and




Track
North Mound
Ditch
Marginal Mound
South Mound
N
5m
0
16
3
11
23
12
56
24
10

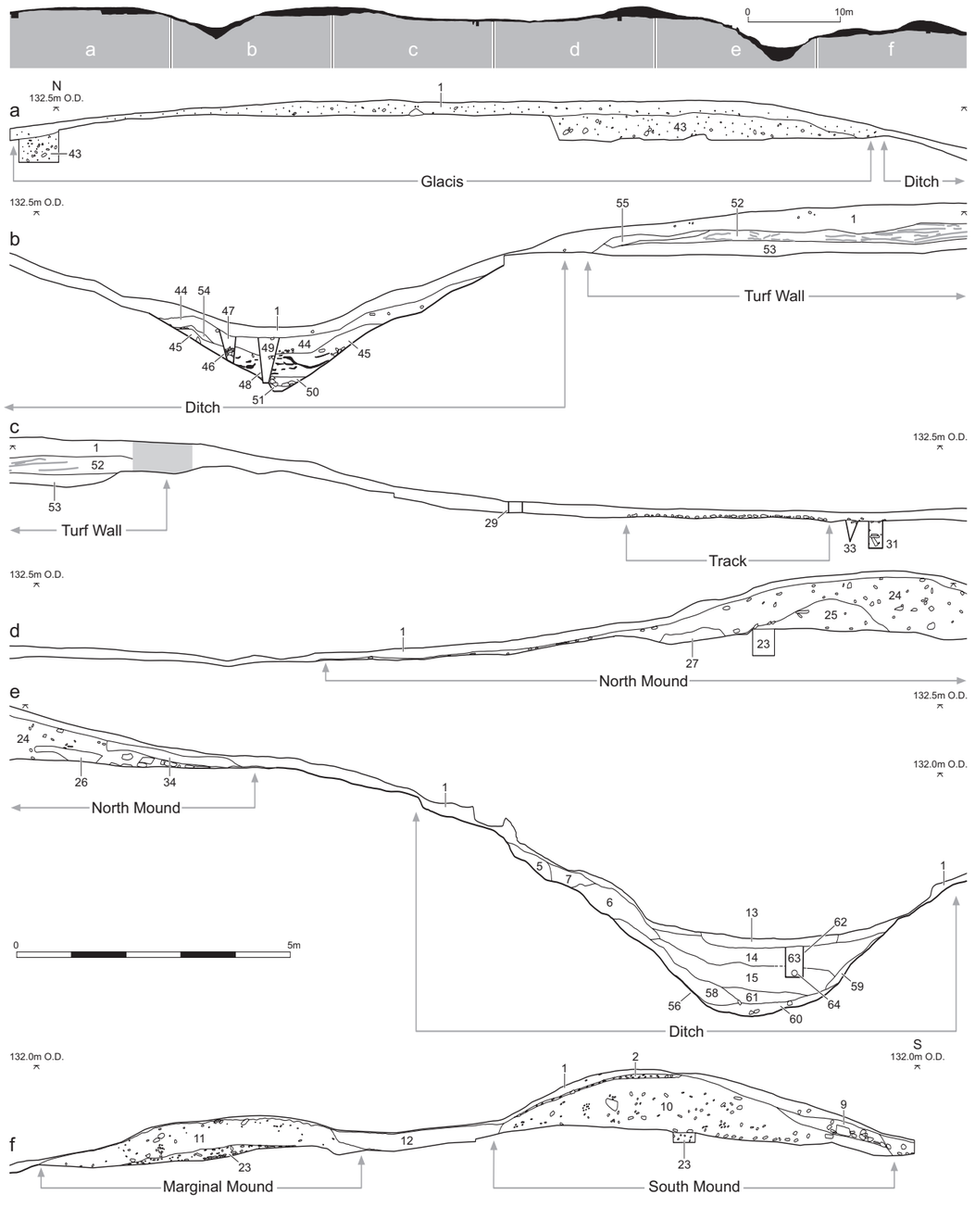

a
b
c
d
e
f
0
10m
N
132.5m O.D.
Glacis
Ditch
Turf Wall
Track
North Mound
Marginal Mound
South Mound
132.0m O.D.
S
0
5m

Fig 217 (previous page)
Appletree: east-facing section of trench.

Fig 218
Appletree: box section through glacis, showing no line between the natural clay and the bank material.

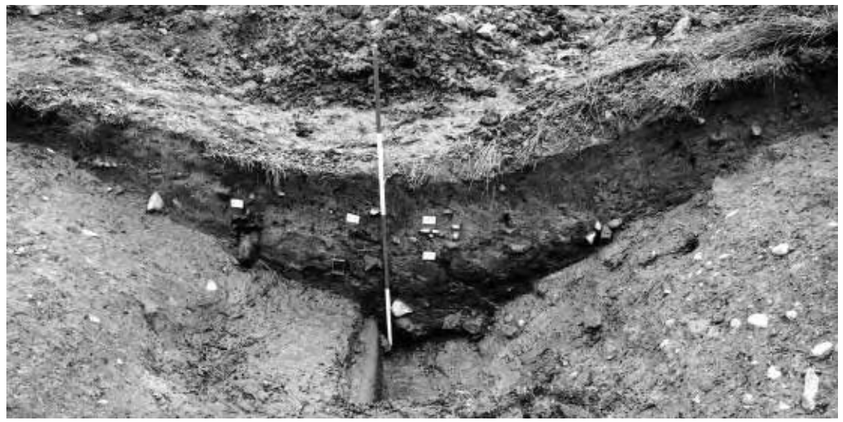


Fig 219
Appletree: section through the Wall ditch. Note the distortion of the profile of the base through the insertion of a modern ceramic field drain.

Fig 220
Appletree: section through the Turf Wall excavated in 1999.

the second layer was then placed grass-side uppermost. No clear evidence existed for a regular, 'brickwork' construction. The centre of the Wall comprised a soil dump, and turfs of widely varying sizes were levelled with mineral soil. On the north edge of the Turf Wall was a dump of clay (55).

The track (Fig 221)

To the south of, and parallel to the Turf Wall, at a distance of 5.59m lay a metalled track (16). The concentrated metalling was 2.17m wide, but stone had spread northwards for a further metre. This spread probably resulted from ploughing or other later disturbance. The stones of the track were predominantly rounded river pebbles, with a moderate scattering of angular or sub-angular pieces of greyish sandstone, and occasional large sandstone pieces. None of the stone showed any sign of having been dressed. The track comprised a single layer of metalling 40–60mm deep laid directly on the natural boulder clay. As with the counterscarp bank there was no sign of any organic turf layer beneath the track.

Fig 221
Appletree: metalled track between the Turf Wall and the north Vallum mound.

Fig 222
Appletree; section through the north Vallum mound. Note the pale primary core.

The north Vallum mound and berm (Fig 222)

The north edge of the north Vallum mound lay 12.13m to the south of the track. It was 9.2m in maximum width, including some post-construction slumping, which was particularly noticeable on the southern side. It survived to a height of 1.07m. The mound was raised upon a slight natural ridge. The first elements in its construction were three smaller mounds, which were later embodied in the greater earthwork. Beneath the northern and southern edges there were a pair of dumps of light-orange sandy boulder clay (26, 27), each measuring 1.20m wide and 0.2m high. Between them was a 'core-mound' of yellowish-grey, stony boulder clay (25) 2.54m wide and 590mm high. This material was placed on ground previously denuded of any turf or topsoil (Usai 1999a). The material of the 'core-mound' was so similar to the natural boulder clay that it was necessary to excavate a small sondage into the underlying clay in order accurately to distinguish between the *in situ* natural (23) and the built mound. This difference was only discernible through a slight contrast in compaction as the mound material was

slightly more friable. The main body of the mound was constructed from brownish-red stony boulder clay (24).

Between the foot of the mound and the Vallum ditch there was a 4.61m wide berm. Above a deposit of material that had slumped from the mound was a spread of stones 2.5m in width (03; Fig 222). This comprised a lower deposit of large, irregularly shaped, flat stones over which was a patchy layer of small, rounded pebbles. The area of intact stone spread at the foot of the north mound was protected from erosion and other disturbance by an overlying deposit (34) of red-brown sandy silt, which was probably weathered down from the top of the Vallum mound. The stones were not, therefore, primary. A group of flat stones (04) on the northern lip of the Vallum ditch, 2.15m to the south of the intact surface, appeared to comprise a part of this spread which had slumped into the ditch.

Fig 223
Appletree: the Vallum ditch looking north from the marginal mound.

The Vallum ditch (Fig 223)

The ditch (56) was 10.23m broad at the top. Its original profile had relatively shallowly sloping sides, averaging *c* 45°, and a concave base 3.12m wide. The relatively shallow profile was probably an attempt to prevent too much slumping of the boulder clay-cut sides. The ditch was 4.33m deep measured from its lip on the south berm. The bottom fill of the ditch comprised a primary silting (60) of reddish-brown sandy silt, 240mm deep. This was followed by the slumping of the clay sides of the ditch, resulting in the deposition against each side of silty clay layers (58, 59). This had the effect of altering the profile of the ditch quite radically, creating a more stable angle of repose for the ditch sides, within which subsequent silting took place. The first deposit to form after the sides slumped was a sticky, dark-grey humic clay silt (61) 260mm deep. The main body of the silting above this comprised a dark silty clay with a considerable damp organic content (15). A large amount of brushwood was found within this deposit, which was 470mm deep. On the north side of the ditch this layer was overlain by further deposits of silty clay derived from slumping of the clay edges of the ditch (05, 06, 07). Above (15) and the slumped clay was a 320mm deep layer of greenish-grey clay-silt with a substantial organic content (14). This, like (61) and (15) had the appearance of naturally accumulated, horizontally laid, water deposited silt, and represented a long period of waterlogging and natural accumulation, akin to marsh formation. The brushwood found within the sequence appears also to have been naturally deposited through the decay of bushes, which had grown in the ditch, or on its edges. The uppermost layer within the ditch (13) was the modern, active, vegetated soil. It comprised a highly organic, waterlogged, dark-grey clay-silt, which differed from the topsoil on the rest of the site, but which clearly represented the latest phase of the natural processes that had caused the deposition of earlier silt layers.

The marginal mound

The marginal mound lay on the southern lip of the Vallum ditch. It was 6.12m wide and 0.512m in maximum height. The mound comprised light orange-brown silty clay, with lenses of clean reddish and grey sand, and occasional stones (11), all of which occur as constituents of the natural glacial boulder clays of the area. It was raised directly on the natural boulder clay (23),

causing some confusion as to where the interface between mound and natural surface lay. There was no sign of any buried soil or old ground surface beneath the marginal mound.

The south Vallum mound (Fig 224)

This mound was 8.5m wide and survived to a height of 1.13m in the centre. It was separated from the marginal mound by a flat berm 2.39m wide. The main body of the mound consisted of a dark red-brown re-deposited boulder clay (10), identical to the clay on which it was raised; and as with the north mound, it was necessary to excavate a sondage into the natural clay in order to establish where the base of the mound was – like the north mound the difference was in its compaction. There was no trace beneath the mound of any buried soil or old vegetated ground surface.

On the south side of the mound, the red clay was overlain by a thin deposit of yellow-orange silty clay (09), also re-deposited. The top of the mound was covered with a surface of small, rounded pebbles (02), which were interpreted during the excavation as deliberate metalling. It remains possible that these derived from a stony pocket within the natural boulder clay, and were simply an aspect of re-deposition in the construction of the mound.

Post-Roman activity

The post-Roman archaeology of the site consists partly of the gradual silting-in of the two ditches, which is described above. The topsoil (01) that developed over the site was a grey-brown clay silt, except in the Vallum ditch, where it was altered by constant waterlogging (13). On the berm between the south Vallum mound and the marginal mound, a thick (0.32m) deposit of topsoil developed (12). The improvement of pasture in the area required the excavation of land drains. Two of these (48, fill 49 and 46, fill 47) were cut in the Turf Wall ditch fill, one in the Vallum ditch fill (62, fill 63), and three (29, fill 28; 31, fill 30; and 33, fill 32) in the vicinity of the track.

In the part of the trench that sectioned the Turf Wall ditch, most of the material removed comprised disturbed backfill from

Fig 224
Appletree: section through the south Vallum mound.

the excavations of the section for previous Hadrian's Wall Pilgrimages. The latest cut revealed was cut 35 (fill 36), which was clearly the 1.7m wide trench excavated in 1979 and re-excavated in 1989. During the 1989 excavation it was found that the 1979 trench had been lined with polythene. Following this lining enabled the 1989 trench to follow exactly the edges of the 1979 trench.

The Turf Wall section in the east side of this cut was protected by a series of galvanised steel sheets. These served to support the section edge, and very effectively maintained a clean section for examination. The sheets were replaced following the 1999 excavation. On the western side of the 1999 trench, outwith the limits of the 1979/89 excavation, the basal turf layer of the Turf Wall was seen in plan. On the western edge of the excavation this had been cut by a number of other, sub-rectangular, features measuring *c* 3m long. In one instance (37, 40) the feature had been re-cut on at least one occasion in the same place. These trenches must represent openings in the Turf Wall for previous Pilgrimages, although their size shows that the section was not invariably completely exposed.

Pollen analysis

by James Wells

Introduction

As noted above, the section of the Turf Wall at Appletree has previously been subject to pollen analysis (Simpson and Richmond 1935b; Donaldson 1976; Wiltshire 1992, 1997). The latest of these investigations (Wiltshire 1992) analysed a single sequence, which incorporated three organic layers, the lowest of which was interpreted as the pre-wall land surface. The pollen results revealed that a relatively open, probably grazed moorland existed immediately prior to construction of the Wall with the main taxa represented being a mix of alder, birch, hazel, oak, heather and wild grasses. Other species present in low but consistent numbers were sedges, ribwort plantain, ferns and bracken. There was some variability in the pollen frequencies, but this was insufficient to suggest anything other than a local source area for the turfs.

A sampling strategy was proposed for the present project that could confirm and build on the results of the previous investigation. Multiple profiles were taken from the Turf Wall cross section, which ensured the inclusion of the lowermost buried land surface. In this way it was hoped to reveal any spatial variability in the pollen record of that one layer. In addition it was decided to sample the fills of the Turf Wall and Vallum ditches in order to establish the potential of the pollen record of the sediments in these features. Monolith samples were taken from three points along one cross-section of the Turf Wall (TWS). One monolith and three Kubiena tins of sediment were also taken from the Turf Wall ditch (TWD) where organic horizons were revealed. Finally, one monolith tin was taken of the very organic sequence in the base of the Vallum ditch (VD). A sub-sample from each level was prepared for pollen analysis using the methodology outlined in Barber (1976). Andrew (1990), Moore *et al* (1989) and the Ancient Monuments Laboratory pollen reference collection were used for critical identifications. One slide was prepared for each sampled level and all were counted to either a minimum of 100 grains of land pollen or all pollen in 10 traverses of the slide, whichever was first achieved. Nomenclature follows Stace (1991). All results detailed in the following sections are based on a limited amount of data produced during an assessment exercise.

Results

The results of the pollen assessment are presented in Appendix 2, Table A3. Although pollen concentrations have not been calculated, the number of exotic *Lycopodium* spores per level have been included in the table; in broad terms a low value suggests higher pollen concentrations.

Pollen was generally well preserved and present in high concentrations in all levels. The main taxa represented in all samples were alder, hazel, heather and wild grasses. Additional species that were common in low numbers and in most samples were oak, ribwort plantain, polypody and bracken.

Turf Wall samples

In all the Turf wall contexts (Sample numbers 924–6) the main taxa listed above dominated each sample, while both ribwort plantain and bracken also present in all contexts. Pollen frequencies vary between samples but in general terms both alder (10–20%) and grass (15–20%) values are relatively stable. Hazel and heather values fluctuate so that in five of the eight samples, hazel values are between 10–20% and ling is

at 40–50% – in the other three samples this situation is approximately reversed. Values per sample for ribwort plantain are variable (< 1–8%), but the mean is *c* 4%.

Two samples (925/150mm and 926/205mm) were taken from the soil of the assumed buried land surface underneath the Turf Wall. Uncertainty during sampling of the third proposed sample from this layer (924) meant that a turf layer was sampled rather than the probable soil layer, which was very discrete (50mm thick). The two buried land surface samples showed a considerable amount of similarity in their respective pollen assemblages, both being samples dominated by ling. The only aspect of these two assemblages that might distinguish them from the rest of the ling-pollen-dominated group of samples is the high values of ribwort plantain in each.

It is therefore hypothesised that the three hazel pollen dominated samples (924/95mm, 926/165mm and 926/165mm) may indicate a turf source area at some distance (< 10m) from the immediate location around the construction site. If such a distinctive split between the ling and hazel dominated samples had not been revealed then the variability of the pollen frequencies could have been dismissed in terms of ultra-local variability in floral – and therefore pollen – distributions, and this must remain a possibility. The source area of the hazel-dominated turfs is probably still from very close to the site and the higher values of hazel may suggest that the turf was removed from closer to a field boundary or woodland edge. The underlying similarity of the pollen spectra from all turf and buried soil samples certainly indicates that the source area was local.

Pollen analysis of theTurf Wall ditch and Vallum ditch fills

It is worth stating immediately that pollen analysis of the fills of archaeological features is notoriously difficult to interpret. Pollen taphonomy, local pollen bias, poor dating and lack of off-site data for correlation are some of the many problems faced by the investigator. Only a very detailed and meticulously planned sampling strategy can help overcome some of these problems. The present investigation was not at this level, although it was considered worthwhile assessing the organic-rich deposits of the two fills on the basis that they may hint at the subsequent changes to local plant populations post-construction.

Turf Wall ditch samples:
Two samples (921/45mm and 919/50mm) were taken from the Turf Wall ditch fill. As noted above, the bottom fill was a naturally deposited peat, over which was boulder clay slump, followed by dumped turfs from the Turf Wall. The basal peat was sampled, (sample 921/45mm) as was the thickest and most continuous (sample 919/50mm) organic deposit within the dumped turf.

The stratigraphically lower sample, 921/45mm revealed a pollen spectrum similar to the hazel-rich turf samples, the main differences being the high alder (39%) and low ling (3%) values. Grasses remain well represented at 19%. This suggests that the commencement of deposition occurred in an environment not dissimilar to that at the time of Turf Wall construction although alder appears to have increased locally. In the re-deposited turf layer, sample 919/50mm, the pollen assemblage has hazel dominating at 70% of Total Land Pollen (TLP). Alder maintains a significant presence (10%) as do grasses (13%), but, significantly, there is a marked increase in birch to 5% TLP. This result comes from turfs that have been re-deposited from the upper part of the Turf Wall, and probably further reflects the diversity of the local terrain from which turf was taken for Wall construction.

Vallum ditch samples:
The basal section of the Vallum ditch fill was recovered in a monolith (927), and incorporated some of the underlying natural sand and gravel. Overlying this was a sequence of organic-rich silts, 440mm of which was retrieved. A section of wood, either a root or a branch, was in the section (between 240mm and–320mm depth) and has been identified as *Fraxinus* (ash) by Rowena Gale. Two samples were prepared for assessment for pollen – one from the top (927/45mm) and one from the base (927/375 mm) of the recovered material.

The lowermost sample has a broadly similar pollen assemblage to that recorded from the base of the Turf Wall ditch deposits with both high hazel (42%) and alder (33%) values. There was marginally more oak (6%) and sedge (7%) pollen recorded than in other samples, and previously unrecorded occurrences of pine, willow and a possible cereal grain. The uppermost sample is markedly different from any of the other assessed samples, being dominated by alder pollen (96%).

From this limited evidence it is only possible to say that the deposits of the Vallum ditch might have commenced accumulating in an environment similar to that at the time of construction. At some time later the local environment became dominated by alder. This resurgence of alder was not picked up in the Midgeholme Moss pollen diagram (Innes unpublished) and so would indicate that this increase in alder was probably a very local event.

Plant Macrofossils

by Allan Hall

Introduction

Samples of up to 10 litres of sediment were collected for the investigation of turfs within the Turf wall. This was undertaken as part of an English Heritage-funded project to study archaeological turfs. The opportunity was also taken to examine material from one of the basal fills of the Turf Wall ditch. In the event, the ditch fill proved to contain considerable quantities of insect remains, which were examined briefly by Harry Kenward.

Methods

Subsamples of 3kg were taken from three of the samples collected:

1. Sample 903 (Context 53): lowermost peaty layer in Turf Wall (?OGS), (sampled from base of section)
2. Sample 906 (Contexts 52, 53): combined material from basal peaty layer (?OGS) and turfs above.
3. Sample 902 (Context 45): basal peaty fill Turf Wall ditch

All three sub-samples were soaked in water and subjected to gentle manual disaggregation. The resulting residues were sieved into several fractions (smallest mesh 0.3 mm) and examined for plant remains (and other components) under a binocular microscope. The abundance of remains was scored on a semi-quantitative scale from 1 (one or a few fragments or individuals) to 4 (abundant, a major component of the whole sub-sample). Selected remains, especially insects, were extracted for further examination. The residues were boiled gently with a little sodium carbonate to facilitate further breakdown of the peaty sediment and then were re-examined, using sieves as before.

Results

Sample 903:
The small- to moderate-sized residue consisted mostly of un-disaggregated humic silt/amorphous peat and clay, with sand with a little gravel. There were some angular pieces of charcoal up to 10mm, and moderate numbers of *Cenococcum* (soil fungus) sclerotic (resting bodies). After boiling with alkali, a much smaller residue was obtained, of which the largest fractions were sand and charcoal. There were a very few poorly preserved insects of no interpretative value.

Sample 906:
This sample was soaked for several days before initial disaggregation in water. The small residue, which was mostly of sand, also contained quite a lot of charcoal and some *Cenococcum* sclerotic, but no other remains apart from two rather fresh-looking (presumably modern) grass caryopses.

Sample 902:
Some lumps of peaty material were examined prior to disaggregation. They were found to comprise slightly silty/sandy, but basically very well humified organic material with (?)ancient rootlets and some other vegetative fragments. The initial disaggregation resulted in a large residue, mainly of pellets of amorphous organic sediment, with sand and some clasts of clay and a little gravel. Also noted were some woody roots, which might be penecontemporaneous, eg roots growing into peaty deposit from above before being deposited en bloc into the ditch. Some plant material appeared to have become dry and not to have been fully wetted during processing (this is unlikely to be a function of the long period of sample storage of nearly one year, however).

There was a modest range of identifiable plant remains, of which the more abundant were nutlets of sedges (of more than two kinds), and of (?)tormentil (mostly rather well preserved), as well as shoots of the moss *Ceratodon purpureus* (again, usually well preserved, with rhizoids-root-like structures attached, and in some cases the remains of perichaetial leaves indicating material that had been fruiting). Most of the plant material, however, was somewhat worn, especially the mosses (other than *C. purpureus*). According to Dr H Kenward reports (pers comm) the rather large assemblage of beetles among the insect remains was typical of what might be found in poor, rough grazing land. It included *Geotrupes* and *Aphodius* dung beetles, some ground beetles and larval apices of click beetles ('wireworms'). The state of preservation of the remains varied, consistent with an origin in turfs (were there is typically a mixture of old, partly decayed, specimens and fresh corpses).

Disaggregation following treatment with dilute sodium carbonate produced a much smaller residue in which the coarser (> 2mm) material consisted of woody root fragments. A single caryopsis of the heath grass, *Danthonia* and a pinnule (frond) fragment of bracken, *Pteridium,* were the only additions to the list, although a modest number of beetle remains were also released by this additional processing.

Discussion

The two samples from the Turf Wall failed to provide firm evidence for the nature of the vegetation growing on the turfs at the time they were cut. In this respect they do not provide any corroborative evidence to add to that from the pollen analysis of the same deposits. The presence of modest amounts of charcoal from branch or trunk wood in both the samples from the Turf wall is perhaps unexpected. The most likely explanation for its occurrence here is that it formed during the burning of brushwood cleared from land in the vicinity of the Wall during its construction. It may then have become incorporated into the earthwork because the fires had been lit on turfs that were subsequently cut and placed into the Turf Wall.

Taken overall, the list of plant taxa from the ditch fill sample is not inconsistent with the acid grassland vegetation existing in the area of the site today (and the nature of the insect remains seems consistent with this). If, as seems to be the case, the biological remains represent material derived from turfs, they indicate that areas of cropped turf were, indeed, established by this time. It might, however, be argued that (unless the turfs had been brought from some distance) such vegetation must have been established locally in order for any reasonable sized turfs to be cut at all.

One feature of the Turf Wall ditch fill assemblage was the presence of moderate quantities of the moss *Ceratodon purpureus.* This species is common in a variety of unshaded habitats on bare soil (especially on heathland, but also on fallow land), on walls and on rotten wood. Watson (1968, 155) notes that "it is a conspicuous plant in its typical state in spring, when patches of bare ground or burnt heathland are often purple with the countless setae [the stalks bearing spore capsules] of fruiting *Ceratodon.*" Certainly, it has been noted in the succession following burning on lowland heaths and commons – for example in Middlesex (Richards 1928) and Surrey (Summerhayes and Williams 1926) – typically at a stage after the ash left from bonfires has become leached. It seems reasonable to suggest that disturbance to the acid grassland/heathland in the area caused by the builders of the Turf Wall led to the establishment of such patches of *Ceratodon*, which were subsequently incorporated into the monument and thereafter fell with turfs from the Wall's decay into the ditch below.

The much better state of preservation of plant remains in the ditch fill sample is perhaps merely a function of the greater degree of waterlogging in that feature. Because of their raised position within the turf wall bank, the turfs of the Turf Wall – although retaining some micro-stratigraphic integrity (the humic and bleached layers had seemingly undergone very little mixing over the centuries) – had mostly decayed except for the most resistant materials.

Interpretation

The pollen and plant macrofossil assessments have provided additional useful information about the vegetation in and around the Appletree area, which supplements that previously published for the present site and Appletree East. It confirmed that deforestation had taken place by the time of turf cutting with only alder and hazel maintaining a significant local presence. There is still no evidence for arable agriculture, with ling and wild grasses dominating the pollen record, and thus suggesting a grazed moorland environment. The presence of waterlogged re-deposited turfs in the ditch facilitated the survival of plant macrofossils and insect remains, which confirmed the view of the local vegetation at the time of Wall construction.

The sequence of building activity at Appletree was very clear. First, the line of the Turf Wall must have been surveyed

and laid out on the ground. The Wall was built on an intact vegetated land surface while the counterscarp and Vallum were constructed on ground that had been truncated by the removal of turf and topsoil. This shows that the turf on each side of the strip on which the Wall was to be built had, across a large area, been removed for use as building material, and placed directly on the marked-out strip.

The key factor in the relative dating of the other features of the complex is the fact that they all appear to have been built upon the stripped clay land surface that was the product of the construction of the Turf Wall. It is important to attempt to judge how long vegetational regeneration would have taken, although without experimentation this is not a simple matter. The difficulty encountered in finding the interface between natural clay and the base of the counterscarp and Vallum mounds shows that clay was heaped upon clay, and that all interfacial material, including all active soils, had been comprehensively removed. It is unlikely under such circumstances that vegetation would return quickly, as it would have had to grow upon sterile clay. It was, however, noticed during excavation that any rhizomatous roots, such as those of bog grasses, that had been only partially removed in stripping, would recover quickly, and green shoots from such rhizomes were visible after some five weeks in late summer. Similarly, the presence of the moss *Ceratodon purpureus* may indicate a possible agent of regeneration. It is possible, therefore, that limited regeneration occurred quite quickly after the construction of the Wall, but a wholesale re-growth would have taken much longer – a matter of years.

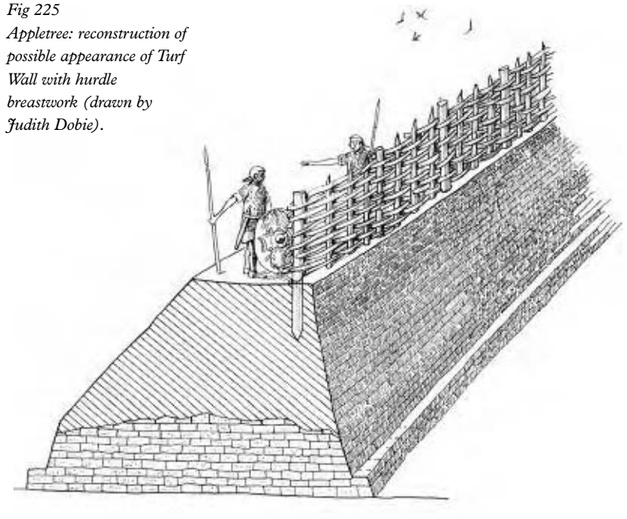


Fig 225
Appletree: reconstruction of possible appearance of Turf Wall with hurdle breastwork (drawn by Judith Dobie).

The Turf Wall at Appletree was thus constructed by removing turf from a broad area in the vicinity. Both here and at Appletree East the lines of individual turfs were observed in the fabric of the Wall. The pollen evidence in both cases, however, shows that the vegetation was not grass sward, rather wet grassy moorland. This being the case, there would have been few areas in which 'regulation'-sized and shaped turfs could be cut. Most of the turfs would have broken into clods, and this explains the variation in the size of the turfs used to build the Wall. The experience of the Appletree excavation team in attempting to cut turfs at the start of the work (for replacement after backfilling) was an instructive piece of experimental archaeology in this regard, as it proved almost impossible to cut decent sized turfs. It seems likely that good-sized turfs would have been used for the faces of the Wall, while smaller turf pieces, clods and any loose soil left on the stripped clay surface would have been shovelled up and incorporated within the core.

There is evidence at Appletree that clay from the ditch was also used to reinforce the north face of the Turf Wall (Whitworth 1992, 53). This echoes the use of clay instead of turf at Garthside (Simpson and Richmond 1935b), although in fact the Wall builders used whatever materials were to hand, prompting Breeze's (1982) remark that 'earth Wall' might be a better description.

The pollen evidence from the area of Appletree may address the question of the treatment of the top of the Wall. The impression gained is of an open area, with alder and birch scrub in the vicinity. One natural resource that seems to have been in short supply was large timber. The reconstruction of Mc50 TW (High House) presented by Simpson *et al* (1935b) shows a timber boarded Wall-walk, and a split-timber breastwork. This would be a profligate waste of a scarce resource, and seems inherently unlikely. The birch and alder scrub vegetation, however, might have produced material suitable to the manufacture of woven wattlework hurdles. If the Wall was equipped with some form of breastwork, the use of such hurdles is more probable (Wilmott 2001a, 45, fig 12; Fig 225).

The dimensions of the Wall ditch varied in the Turf Wall sector, although in the few excavated exposures it is generally V-shaped in profile (p 131), as at Appletree. It seems likely that the ditch was cut to as steep a profile as possible given the ground conditions, although the surviving profile might have been altered in different places by cleaning and erosion. The material derived from the digging of the ditch was deposited to the north of the ditch in a very broad, low, smoothed-out bank or glacis (*sensu* Welfare 2004).

The Turf Wall was destroyed when the Stone Wall was constructed as its replacement. The lapse of time between the construction and destruction of the Turf Wall is demonstrated at Appletree by the stratigraphy in the Turf Wall ditch. Here there was time for a peaty primary deposit to form, and for the clay edges of the ditch to slump on top of it before the turfs of the Wall were dumped into the ditch from the north. The deposition of the demolished Turf Wall into its ditch is also observed to the east at Birdoswald (Wilmott 1997, 47).

The fact that the newly discovered track, situated 5.59m to the south of the Turf Wall was laid directly on the stripped clay surface suggests that it was an early feature, associated with the Wall in its turf phase. It cannot, therefore be interpreted as part of the Military Way, which was constructed following the return from Antonine Scotland. By the time this was built, vegetation regeneration would surely have occurred. The track was narrow, at 2.17m wide, and may have been short-lived, as it showed no signs of resurfacing. It also lacks the structural features of the Military Way, which is generally much broader at some 6m (Breeze 2006), well built of stone and cambered. Only a little way to the west of Appletree, between Pike Hill and Mc53, the road was found some 12m south of the Wall. It was substantially constructed, complete with stone kerbs (Simpson and McIntyre 1933b) and very unlike the Appletree track. A number of other options for the context of this track have been considered (*see discussion* pp 133–34).

On the Vallum, several of the observations made in 1999 contradict those reported by the original excavator. Haverfield (1897a, 187) stated that "the two principal mounds ... rest ... on a distinct though broken black line of original surface. The old surface line beneath the marginal mound is also plain" The present project found no evidence to support this; on the contrary, there was no black line at all, broken or not, beneath the principal or marginal mounds. A feature of interest was the sequence of construction apparent in the north Vallum mound. The three small primary mounds were built using dumps of the upper, natural light-orange, sandy, boulder clay. It is possible that these were constructed as marking-out mounds and subsequently incorporated in the greater mound of dark, reddish coloured lower clay. The south mound was entirely constructed of this lower clay. Unlike at Black Carts (p 101), therefore, the north mound was the first to be worked on.

The stone spread on the berm has previously been explained as a metalled road or patrol track. The stones are very rough and irregular for this, and do not appear as metalling in the way that the new track does. Also, the relationship of the stones with the north mound is that the stone overlies slumping. This shows that the stone is not primary. There is a possibility even that this material has spread from a post-medieval boundary wall now destroyed.

The 1999 section showed that the material of which the marginal mound was constructed was clean sandy clay similar to that used to build the primary elements of the north Vallum mound. When guiding the fifth Pilgrimage of 1920, Mrs Hodgson stated that the marginal mound was more mixed than the larger mounds and was considered to be the result of cleaning out the ditch (Hodgson 1920, 283). The marginal mound was, in fact, only more mixed because of the inclusion of bands of silty sand, which occur within the natural upper boulder clay. This material was extremely clean, with none of the organic admixture that one might expect from material cleared from the bottom of a wet ditch, and that actually existed as the primary filling of the Turf Wall ditch. The ditch itself showed no evidence in section that re-cutting or cleaning had taken place. The natural slumping of the sides created a stable angle of repose within which organic silts developed. The burden of the evidence would seem to suggest that the marginal mound was constructed using the upcast spoil from the original excavation of the ditch.

Transection in Wall mile 61 (Crosby-on-Eden, Cumbria), 1980–4

by Julian Bennett

Introduction

This report summarises the results of excavation and geophysical survey work undertaken in 1980–1 and 1984 on the line of Hadrian's Wall at Wall mile 61 (Crosby-on-Eden), Cumbria, in advance of the laying of a gas pipe-line. The work was funded by the then British Gas Corporation, and was directed by the writer for the then Central Excavation Unit, English Heritage.

The site

The Crosby transection across Hadrian's Wall was dug at Ordnance Survey Grid Reference NY 4460 6063, a point some 330m east of the recently confirmed site of Mc62 (Walby East) (pp 170–3; Figs 226–7). The local drift geology hereabouts consists of reddish-yellow boulder clay, over which are fine and coarse loamy soils, slowly permeable and seasonally waterlogged. In this area, it is believed that the Hadrianic frontier comprised a ditch and turf curtain in its first phase, with the addition of the Vallum in a second phase, and the replacement of the turf curtain by a Stone Wall in a third (cf Daniels 1978, 18–19 and 30–1). At this particular point the curtain was believed to underlie the minor road from Wallhead to Walby, for a slight hollow visible in the field to the north was generally accepted as marking the line of the ditch, while an even slighter hollow in the field south of the road was considered to reflect the course of the Vallum. In 1980 both of these fields were used for pasture, although archaeological evidence indicated that a root crop had been grown on them at some earlier date.

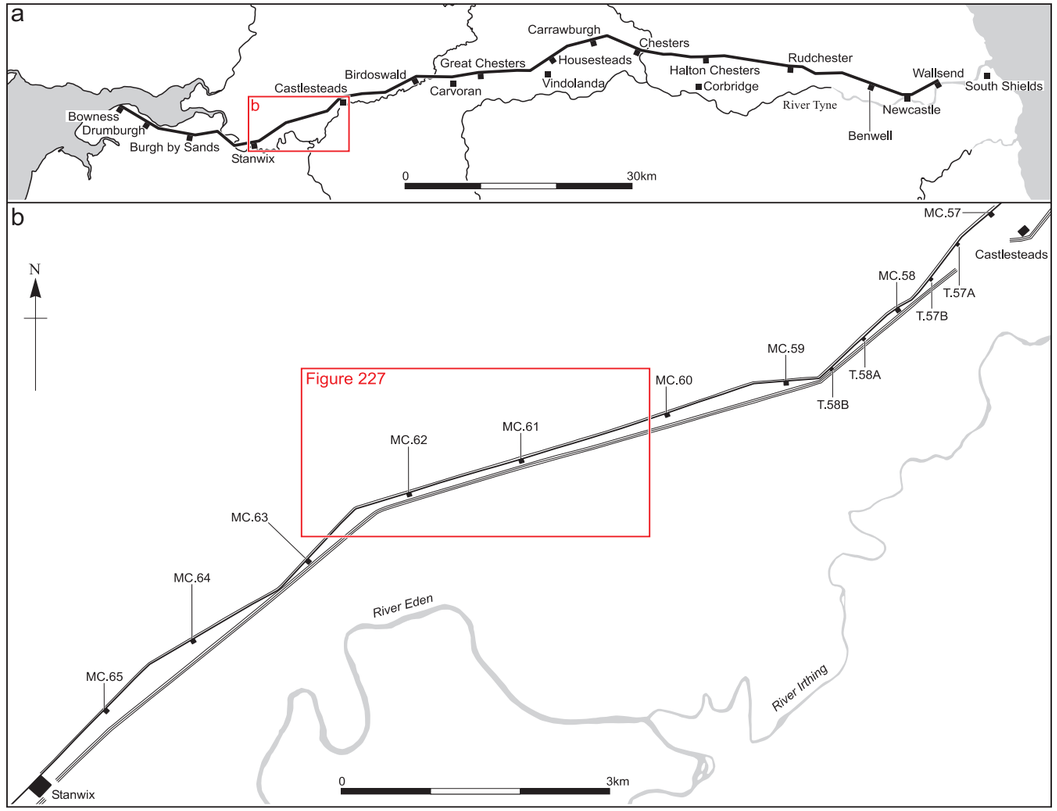


Fig 226
Crosby-on-Eden: location of Wall Mile 61 on Hadrian's Wall.

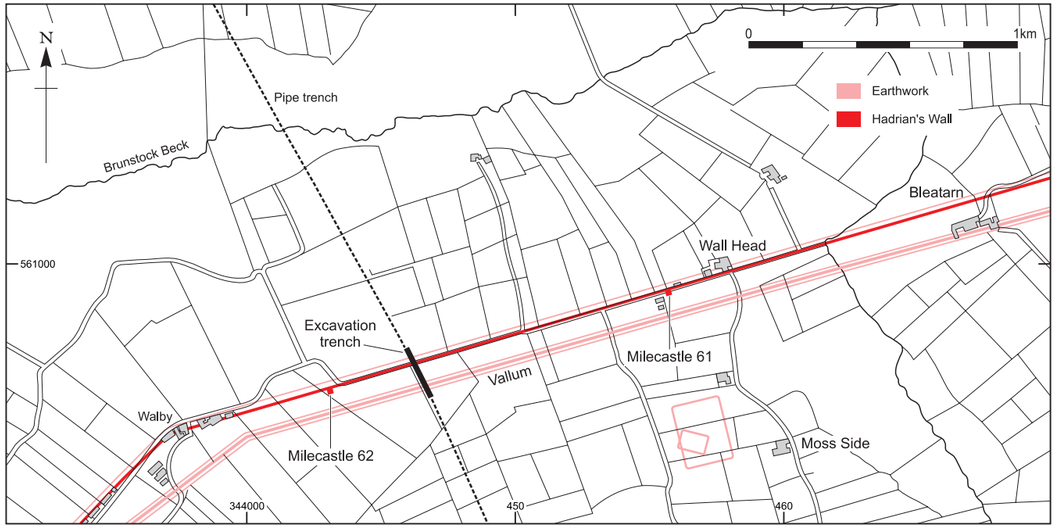


Fig 227
Crosby-on-Eden: location of excavation trench.

Fieldwork methodology

Before the excavation the site was surveyed using a Martin-Clark Resistance meter and a Fluxgate Magnetometer (Gater and Miller 1980). The whole area proved magnetically quiet, the few anomalies located reflecting local drainage networks and igneous deposits within the boulder clay. Eight resistivity traverses, however, identified a marked linear belt of increased resistance in the assumed area of the Vallum, and isolated areas of higher resistance nearer the road. The size and pattern of the principal anomaly suggested a metalled roadway, but later excavation revealed it to be the Vallum ditch, the well drained fill contrasting markedly with the waterlogged undisturbed subsoil on either side. The smaller anomalies noted to the north were thought to indicate either a trackway, a well drained ditch or a small bank, but excavation revealed them to be the levelled and spread remains of the Turf Wall.

Using the geophysical survey results as a guide, the 1980–1 transection was laid out along the line of the proposed pipeline for a total distance of 171m on either side of the Walby–Wallhead road, a baulk being left for the road itself (Fig 228). The width of the transect was adjusted to enable fuller excavation of the Wall and Vallum areas, with narrower connecting sections where few archaeological features were anticipated. The topsoil was removed mechanically, the archaeological features revealed planned and then examined by hand, although flooding and subsidence precluded the total emptying of the Wall ditch.

In 1984, when the pipeline was finally cut through the area, the Walby–Wallhead road was closed, allowing the intervening baulk to be removed to examine and record the archaeological features beneath it. A record was made by both the British Gas Corporation and the writer.

Structures and stratigraphy

The major excavated features were the various components of the frontier system, and are described in order from north to south.

The counterscarp

The deposit immediately beneath the counterscarp throughout the North Trench was a heavily leached, light-coloured sandy-loam (2004). It was identified as a truncated subsoil horizon from which the original surface had been removed (Keeley 1985). It is presumed that this was the result of the removal of turf for the construction of the Turf Wall curtain. There was no indication of any pre-Wall cultivation, although depressions and hollows with a very dark-grey silty fill indicated areas where there had been localised waterlogging in the pre-Wall period.

Directly over the truncated subsoil there was a low transverse mound of mixed humic sandy soils (2002), evidently the original counterscarp formed when the Wall ditch was dug, using material excavated from the ditch. The absence of any sealed organic material at the interface between the

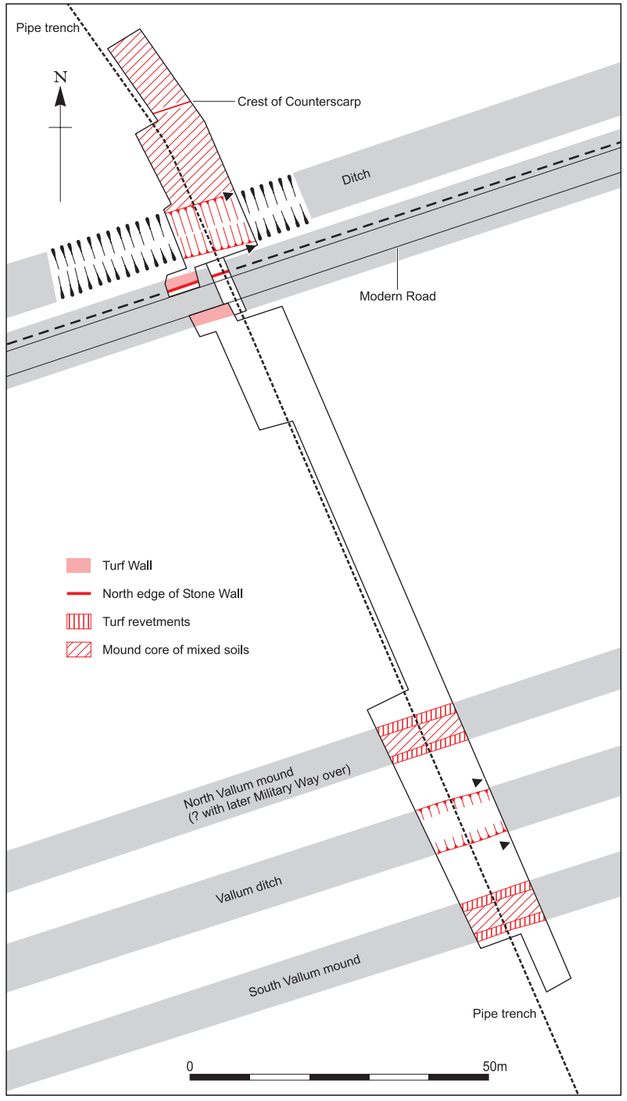


Fig 228
Crosby-on-Eden: plan of excavation trench.

truncated soil and the material of the counterscarp indicates that no vegetational regeneration had taken place, and therefore that no great length of time intervened between the removal of the original turf and the formation of the counterscarp. There was a pronounced 0.4m high 'crest' to this feature some 14m from the north edge of the North Trench and 17m to the north of the excavated northern edge of the Wall ditch. From this 'crest' the counterscarp tailed off in both directions. To the north this was quite rapid, taking place within 0.9m of the crest, although occasional spreads of the material were detected at the very northern end of the trench, while to the south it diminished with a much gentler slope, to disappear at the edge of the Wall ditch. The profile therefore, with its steeper slope to the north, was the reverse to what is traditionally expected, in which the scarp is considered to be contiguous with the north edge of the Wall ditch.

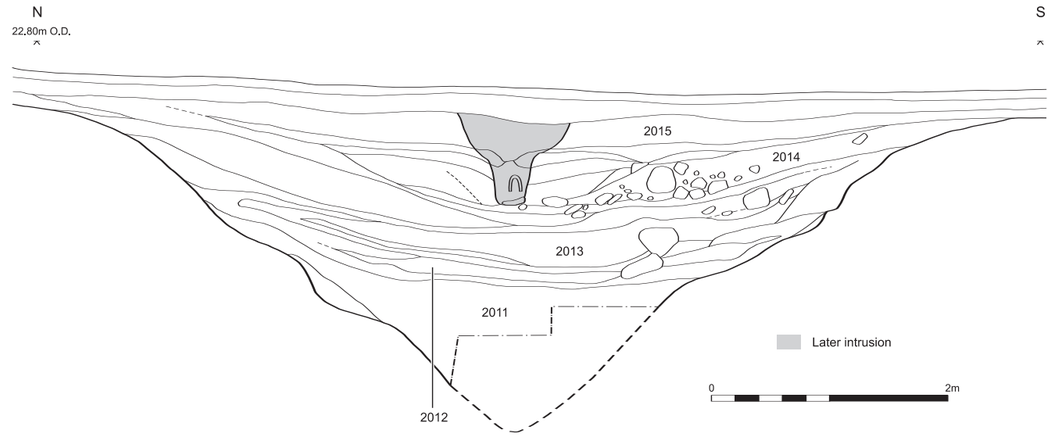
The Wall Ditch (Figs 229–30)

The Wall Ditch was 8.1m wide at subsoil level. While subsidence and flooding precluded its complete excavation, the preservation of the original cut beneath the primary silt demonstrated that it was originally V-sectioned, with sides of about 40, and was about 6m wide at subsoil level and 3m deep from the modern ground surface; 2.7m from the subsoil horizon.

The fill embodied five principal stratigraphical units. The primary silt, a reddish silty clay (2011), had a reasonably level upper surface, suggesting that it formed and stabilised in waterlogged conditions. The bulk of this deposit evidently derived from natural erosion and slumping of the ditch sides relatively soon after it was cut, thus preserving the original profile. The absence of any stone construction debris indicated that it had formed before the Turf Wall was replaced by the Stone Wall.

The primary silt was sealed by a well defined secondary deposit, consisting of alternate layers of peat and sticky grey clay interleaved with lenses of progressively lighter coloured and finer sandy material (2012). These laminated deposits suggest a phase when there was standing water within the ditch, allowing the peat to form, interrupted by intervals when the ditch served as a watercourse, resulting in the deposition of the finer particles. Slumping of the edges evidently reached its maximum during this phase, while the discovery of two roughly dressed sandstone blocks and loose masonry chippings in the southern part of the general matrix indicated that it had formed during construction of the Stone Wall.

The tertiary fill consisted of lenses of a sticky and sandy clay (2013), presumably the result of further erosion of the ditch sides. On the south side of the ditch, it was sealed by the fourth fill, a firm deposit of dark brown sandy clay almost solidly packed with weathered and eroded sandstone blocks (2014). More than 50 large blocks were present, together weighing some 12 tonnes, but there was only a single dressed facing stone among them. The general nature of the deposit, the eroded nature of the blocks, and the presence of only a single dressed facing stone, suggests that it derived from the core of the Stone Wall some time after the facing stones



had been robbed for re-use elsewhere. The final fill consisted of alternate lenses of clay and sand (2015). These appeared to be deliberate levelling deposits, and their general nature suggested that they were formed by the re-deposition of part of the remnant counterscarp once mechanical cultivation of the adjacent field began on a regular basis.

The berm (Fig 231)

The space between the excavated southern edge of the Wall ditch and the surviving northern edge of the Turf Wall varied in width from 1.9m to 2.4m, a discrepancy resulting from the differential erosion and removal of deposits at the edge of both features. When allowance is made for both the probable original width of the ditch and the north face of the Turf Wall, the berm was evidently not less than 4m wide in its primary state. Spreads of sandstone chippings on the berm (2035) presumably derive from the construction of the Stone Wall. It is not clear, however, to what extent the original area of the berm may have been eroded before this occurred. That said, ephemeral spreads of masonry chippings detected in the upper levels of the ditch fill suggested that at the time the Stone Wall was constructed the south edge of the ditch had already eroded back to a line not far north of that located during the excavation.

The Turf Wall (Fig 231)

The fossilised subsoil identified beneath the counterscarp bank and its spread core was also located beneath the remnant Turf Wall (2031). Here, however, thin spreads of dark, compressed organic matter of varying depth on its upper surface suggested surface vegetation left *in situ* together with its associated root system. In places this spread was somewhat thicker, filling hollows in the original subsoil, which were considered to be the result of a combination of frost action, waterlogging and localised erosion. Soil analysis subsequently substantiated these observations, identifying the soil as a stagnopodzol of the Dunsmore series, with clear evidence of wetness (Keeley 1985). The sample was superficially similar to earlier sections through the Vallum mounds at White Moss, 1.3km to the east (cf Haverfield 1895, 460–2; Hodgson 1897, 392), and a core sample taken in the vicinity of White Moss during the excavation validated this comparison. There was no evidence to suggest that the buried ground surface at Crosby had ever been cultivated, and it was considered most likely that the soil had originally supported acid grassland or moorland vegetation before the construction of the Turf Wall.

The north edge of the Turf Wall was indicated by a cohesive mass of laminated dark-grey friable loam (2032) laid directly over the *in situ* vegetation. Owing to later disturbances, this only survived 0.2m high and 0.5m wide, and for a maximum west–east distance of 2m, but it was possible to identify discrete lines of organic material within the matrix,

Fig 229
Crosby-on-Eden: east - acing section of Wall ditch.

Fig 230
Crosby-on-Eden: east-facing section of wall ditch during excavation.

Fig 231
Crosby-on-Eden: plan of the Turf Wall and its stone successor in relation to the berm and Wall ditch.

presumably the surfaces of individual turfs used in its construction. A spread of similar material, if somewhat less compacted or extensive, was located to the south of the Walby–Wallhead Road (2033). Likewise laid directly on the uncleared surface of the pre-Wall soil, it survived to a maximum height of 0.25m, with occasional lenses of dark organic material marking individual turfs. It was delimited to the south by a discontinuous gully (2034), 0.8m wide and 0.1m deep, thought to be a water run-off from the rear face of the Turf Wall, and indicating that its maximum width at this point was 9m (29ft 6in).

The surviving matrix of the Turf Wall south of the Walby–Wallhead road merged without any clear break into spreads of dark-grey and brown clay- and sandy-loams (2036), which in turn sealed the gully marking the south edge of the Turf Wall curtain. Nowhere more than 0.18m deep, these deposits extended south of the gully, where they lay directly over the truncated subsoil horizon, gradually diminishing in thickness until they petered out some 20m beyond it. A 2m wide spread of sandstone chippings marked the upper surface of the deposit, suggesting that it represented both surviving core and re-deposited core material from the Turf Wall, spread out and levelled at the time the Stone Wall was built.

The Stone Wall (Figs 231–2)

The 0.3m deep foundation trench for the Stone Wall (2035) was cut through the remains of the Turf Wall. The footings themselves had been mainly removed except for a single row of clay-packed sandstone flags left *in situ* along and against the north side of the foundation trench (2038). While later robbing had destroyed all evidence for the south face of the foundation trench and Wall, the minimum width of the robber trench was recorded as 2.8m. Consequently it is safe to assume that the Stone Wall here was originally built to Intermediate Gauge, at 2.75m (9ft) wide.

The intervallum area

As already noted, the deposits identified as representing the levelling of the Turf Wall

Fig 232
Crosby-on-Eden: flagstone foundation of Stone Wall and material of Turf Wall, looking north.

continued for a further 20m beyond the gully that marked its south face. They directly overlay the truncated subsoil throughout, indicating that this area had been stripped of turf before their deposition, and that vegetation had not regenerated in the interim, although occasional spreads of dark organic material marked what had once been waterlogged hollows in its surface.

Despite a careful search, there was no evidence for the Military Way in the intervallum area. At White Moss, 1.3km east of the excavation site, the *agger* of this road can yet be seen running between the Wall and Vallum for some distance, before veering south towards the north Vallum mound as it passes south of Wallhead. East of the River Irthing, the Military Way is known to have been built on the line of the north Vallum mound after this had been systematically breached (Simpson and Shaw 1922, 417–18) and the lack of any evidence for it at Crosby suggests a similar arrangement here.

The Vallum mounds

The north and the south Vallum mounds proved to be identical in form and build. Careful dissection revealed that they sealed a thin lens of black loam, marking the original vegetation cover remaining *in situ* on the original underlying leached subsoil (2061). The original revetments for both mounds were indicated by parallel, compacted and laminated masses of firm black loamy soil with thin lenses of organic material, representing the original turfs used in their construction. Each revetment was 1.5m wide and stood to a maximum of 0.18m high (2062, 2064, 2082, 2084), indicating that the mounds were originally *c* 6.5m wide overall. Between each revetment were dumps of yellowish-red clay, with occasional spreads of friable loam, evidently individual turfs or fragments thereof, forming the make-up for the mound cores (2063 and 2083).

The Vallum berms

As excavated, the Vallum berms were about 8.9m (29ft) wide, although the probable original profile of the Vallum ditch indicates that they were initially *c* 9.25m (30ft 3in) across. It was possible to identify the truncated subsoil horizon on both berms, for they had been covered by 150mm thick spreads of multi-coloured clay, generally reddish or yellowish in colour (2066 and 2086). Similar spreads were noted beyond each Vallum mound, again lying directly over the truncated subsoil (2065 and 2085). The spread to the north of the north mound extended to a maximum distance of 10.67m into the intervallum area. These deposits were so close in colour and composition to the material used in the mound cores that, in the light of evidence for the deliberate obliteration of the Vallum ditch (*see below*), it is reasonable to conjecture that they derive from a deliberate levelling of the Vallum mounds. If so, the absence of any sealed organic layer at the interface between the truncated subsoil and the spread mound material suggests firstly, that these areas had been initially stripped of turf (presumably for constructing the mound revetments), and secondly, that the mounds were levelled before the regeneration of any surface vegetation.

There was no evidence whatsoever for any metalling on either berm that might relate to the 'Vallum patrol-track' identified at other points along the Vallum's course (Horsley 1732, 120; Williams 1983, 35–9; this volume pp 133–4).

The Vallum ditch (Figs 233–4)

Excavation revealed the Vallum ditch to be 7.5m wide at subsoil level, 5.3m wide at the bottom, and 1.6m deep from the present ground surface – 1.2m from subsoil level. Rapid erosion had sealed the original edges of the ditch cut, however, showing the sides to have been cut to a constant

angle of 73. By projecting this angle towards the subsoil level, the original width of the ditch could be established as *c* 6.2m.

The ditch fills proved most difficult to interpret during excavation owing to the complex slipping, folding and even interleaving of the strata. Careful analysis, however, identified nine discrete deposits. The was the primary silt, being a well defined 60–200mm thick spread of yellowish-red clay over the ditch bottom (2071), presumably derived from rapid weathering of the ditch sides. It was sealed by three separate peat deposits. Two of these (2072 and 2073) had formed in the angle at the junction of the ditch edge and the surface of the primary silt, on the two opposite sides, and should represent the growth of vegetation in these somewhat shaded and protected zones. Interestingly enough, and confirming the interpretation, the deposit to the north, the side exposed to the sun, was only 1.5m wide, while that to the south, in the shade, was almost 2m across.

The peat deposit on the north side (2072) was in turn overlain by a mass of dark loam (2074), which contained identifiable blocks of mineralised topsoil with dark edges, indicating decayed vegetation (Fig 230). Measuring between 120mm 200mm 80mm and 200mm 200mm 120mm, and many slightly inclined with respect to the horizon, these blocks cannot be anything other than decayed and degraded turfs – the angles at which they lay suggesting they had been thrown into the ditch bottom. Above them was a mass of red clay (2075), evidently representing slumping from higher up the north slope of the ditch.

A similar sequence was revealed on the south side of the ditch, although in this case the peat (2073) was sealed by a mass of mixed grey and yellow-red clays (2076), and this in turn was covered by a loose deposit of light grey clay (2077), both deposits evidently deriving from successive slumping of the southern edge of the ditch. On both the north and the south sides, however, these well defined dump/slump fills were interleaved with the third and final peat formation (2078) in such a manner as to suggest they had been deposited while it was forming, that is, while it was still waterlogged, yet at some unknown interval after the initial peat growths had fully developed.

Considered together, these levels might suggest a localised sequence whereby vegetation had been allowed to grow over the primary silt on both edges of the ditch, after which there had been a period of waterlogging during which turfs were deliberately thrown into the ditch in combination with some natural slumping of the ditch edges. Some confirmation for the sequence is provided by the

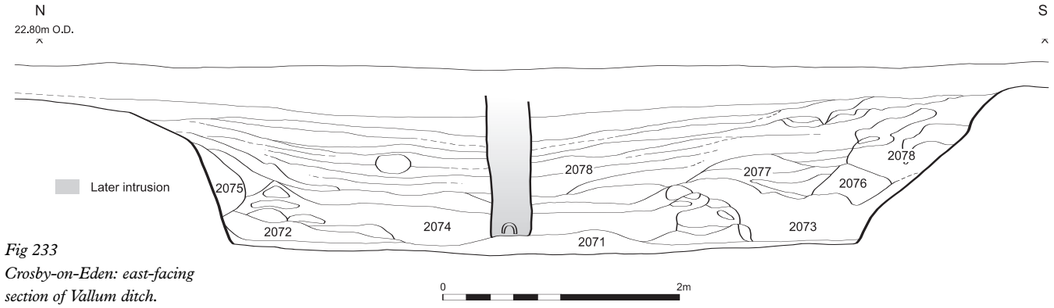


Fig 233
Crosby-on-Eden: east-facing section of Vallum ditch.

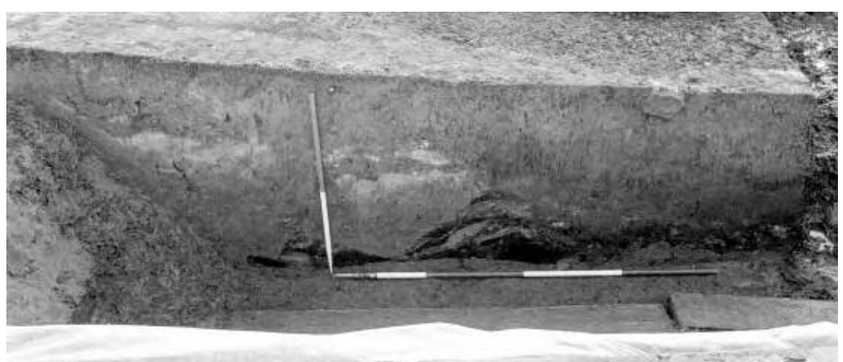


Fig 234
Crosby-on-Eden: Vallum ditch section during excavation.

behaviour of the upper levels of the final peat formation on the south side of the ditch, for it had evidently been compressed and forced to bulge upwards by the initial slumping on this side.

The ninth, and final, ditch fill was formed from alternate lenses of yellow-red clay soils (2079). Not only did their colour and character suggest that they derived from the adjacent Vallum mounds, but the uppermost layers actually merged with the similar spreads on the Vallum berms.

Wall robbing

The robber trench for the Stone Wall, containing many small sandstone pieces (2039), merged with a wide hollow to the south of the Wall line (2041). The base of this also contained several sandstone pieces, and was scored with several north–south ruts, of varying widths, suggesting that it represented a later trackway making use of spread debris from the Wall robbing to provide a hard surface. This seems to be the road along which carts laden with stone from the Wall travelled during robbing, and is the predecessor of the modern road (for a similar rutted robbing road cf Wilmott and Rahtz 1985, 47).

Finds

Very few artefacts were found during the excavation. A single piece of unworked struck brown flint, discovered in the topsoil in the intervallum area, was the only putative evidence for pre-Roman activity, but could be of any date. Five sherds of Roman pottery, however, were recovered from the fill of the Wall ditch. Four of these came from level 2013, the tertiary fill, which followed on from the construction of the Stone Wall, and they were identified as coming from cooking pots and a plain rimmed dish of Black Burnished Ware Category 1, types current from AD 120–?350. The fifth sherd, from a grey ware jar of a type assigned to the period AD 80–130, was found in the uppermost ditch fill (2015) – that thought to have derived from the final levelling of the counterscarp bank.

Interpretation

Excavation and soil analysis demonstrated that the area transected at Crosby was not cultivated in the period immediately before the construction of the Turf Wall. Instead, it had supported an acid grassland or moorland environment. The extent of the fossilised truncated subsoil located during the excavation indicated that turf, presumably for the construction of the Turf Wall, had been removed from a linear strip not less than 24.38 m wide north of the Wall and not less than 19.81m to the south, with turf lying beneath the course of the Wall curtain left *in situ*. The north edge of the Turf Wall was marked by a built revetment, behind which were spreads of soil that seemed to represent degraded turf blocks and additional fills dumped to level-up the horizontal courses. These extended for a width of 9m, and probably comprised the foundation for the Turf Wall rather than of the curtain proper. Assuming that the turf stripped from the area of the counterscarp bank was used to construct the curtain, the digging of the Wall ditch logically followed construction of the turf barrier. It was originally cut to a sharp V-profile, at about 6m wide and 2.7m deep at subsoil level. Variations in the profile and dimensions of the Wall ditch no doubt reflect a combination of local soil conditions, later cleaning and subsequent erosion, among other circumstances. It is not known when the Turf Wall was replaced by its intermediate stone successor, and no new evidence emerged at Crosby.

As with the Turf Wall, there have been relatively few extensive excavations on the Vallum, although basic details are well attested (p 75) It is not unusual for the actual dimensions of the Vallum ditch to vary quite considerably from the ideal (pp 74–5). Such variations, like those in the Wall ditch, usually result from local soil conditions, the solid, comparatively well drained boulder clay of the Northumberland uplands, for example, allowing a deeper ditch than the low-lying sandy-clay soils of the Solway Plain. At Crosby the greater width recorded for the base of the Vallum ditch can be explained by its shallowness, although the angle of rest in both sides, at 73°, is directly comparable to sections recently recorded at Throckley and Wallhouses (Bennett 1983, 41; Bennett and Turner 1983, fig 7). A probable explanation for the shallow ditch might be deduced from the soil analysis, which demonstrated that the general area was periodically waterlogged in ancient times. In such circumstances, there was little to be gained by digging the Vallum ditch to any great depth. The mounds were apparently founded on turf that had been left *in situ*, implying that there had been time for vegetation to regenerate between the building of the Turf Wall and the construction of the Vallum. Parallel revetments were built on this strip to retain a core of mixed soils, doubtless the upcast from the Vallum ditch.

The revetments themselves were built of stacked turf. Assuming that all the spoil from the ditch was used in their

construction, then the Mounds were probably not much more than *c* 1.5m high, and most likely finished off with a flat top.

The fill of the Vallum ditch at Crosby was very unlike that at Black Carts and Appletree. Vegetation formed over the primary silt on both edges of the ditch, and then the ditch was deliberately backfilled, first with turfs, and then with clay, both of which materials probably came from the Vallum mounds. This pattern resembles closely the situation at Cockmount Hill (*J Roman Studies* 1940, 163–4), where a lateral section through one of the later crossings of the Vallum ditch was made. Here the ditch edges had eroded and the ditch silted, almost to an angle of rest. Vegetational growth on the collapsed material indicated a time-lapse of 5–15 years before the causeway was formed with re-deposited material from the Vallum mounds. The parallel is so close that it is reasonable to conclude that the excavation at Crosby cut through a secondary deliberate crossing.

While there was little direct evidence for the late- or post-Roman history of the Wall in the vicinity of Crosby, it has been noted that silting of the Wall ditch seems to have continued until it was sealed by the deposition of a thick layer containing perhaps as much as 12 tons of sandstone rubble, evidently derived from the substance of the Stone Wall. The virtually complete absence of facing stones from this deposit, and the weathered appearance of many of the blocks present, suggests that the stone tumble represented natural erosion and collapse of the rump of the Wall core after the faces had been robbed. The rutted hollow track behind the robbed Stone Wall represents the act of robbing.

Discussion

by Tony Wilmott

The four projects described above form a small corpus of modern excavations on the linear elements of the Hadrian's Wall system in a number of locations along the frontier. A further example from this volume can be added; the section of the Vallum undertaken as part of the Birdoswald Spur project (p 257). As such they offer an opportunity to discuss a number of comparative aspects of the morphology, construction and development of the frontier as a whole.

The pre-Wall landscape

by Tony Wilmott and Julian Bennett

The first issue to be addressed is that of the nature of the landscape on which the Hadrian's Wall system was imposed. It is only very recently that evidence for this aspect of the history of the Wall zone has been gathered, despite the prescience of Simpson and Richmond (1935b, 246; this volume p 75) in their recognition of the potential significance of pollen evidence. The immediate local pollen and stratigraphic evidence to be found beneath the Wall and Vallum provide, in combination with the regional picture from bog pollen sequences (Huntley 1999) a powerful tool for understanding the immediate pre-Roman landscape. As Bidwell and Watson (1996, 40) put it: "The building of the Wall produced one of the most important prehistoric monuments in northern England by sealing and preserving a transect of the pre-Roman landscape some 73.5 English miles in length."

The exploration of this resource of buried soils and pollen records is an essential aspect of the study of Hadrian's Wall. It gives evidence for the nature of the pre-Roman landscape and landscape use within which the frontier system developed, and it can also give an insight into the process of construction of the Wall and the difficulties inherent in the operation, particularly for the Turf Wall sector.

Black Carts adds to a growing list of sites on the eastern flank of Hadrian's Wall to show evidence for pre-Wall ploughing. From east to west these are: Wallsend (Bidwell and Watson 1989, 25); Walker (Jobey 1965, 80); Byker (McKelvey and Bidwell 2005, 10); Newcastle fort (Snape and Bidwell 2002, 1527); the Westgate Road Milecastle (Harbottle *et al* 1988, 153); West Denton (Bidwell and Watson 1996) – where furrows of a cord rig system also pre-date Roman features; Denton West Road (Bennett 1998); Throckley (Bennett 1983, 55–8; Frain *et al* 2005, 36); Rudchester and Halton Chesters (Gillam *et al* 1973, 84–5); Wallhouses (Bennett and Turner 1983, 66); and Carrawburgh (Breeze 1972, 85; 1974).

North of the Wall at Greenlee Lough, ard marks associated with cord rig earthworks lie beneath a Roman temporary camp (Topping 1989, 162). The ard marks at Rudchester are also demonstrably part of a system of cord rig agriculture, and the evidence from Tarraby Lane near Carlisle (Smith 1978) has also been identified as potentially part of a cord rig system. Cord rig underlies the ramparts of the one of the temporary camps on Haltwhistle Common (Topping 1989, 170–1).

At Throckley, Bennett *et al* (1983) showed that the ground had been ploughed on several occasions before the building of the Wall. They suggest that the short lengths of the marks might indicate deep-ploughing episodes, initially to clear the ground, but subsequently to break up land that had been left fallow. Reynolds (1980, 100–3) has suggested that such marks would not survive regular ploughing to a consistent level, as this would tend to produce a ploughzone or tilth of uniform depth (as modern ploughing does). Ard marks would survive in those cases where deep ploughing penetrated below this tilth from time to time. Reynolds suggests regular cultivation with lighter tools, and the use of the ard when land needed to be taken back into cultivation after standing for a period of time. This interpretation would also be viable for the Black Carts ard marks, which lay below the plough soil stratum that took the imprints of hoofs.

Bennett *et al* (1983) suggest that the ard marks could date to the Neolithic or Bronze Age and to the primary episodes of ploughing in the area, and point out that the potential date of the agriculture attested by these marks might span a very long period of prehistory. Although cord rig clearly underlies several Roman installations, it also has a potentially long time frame (Topping 1989, 171).

There is no evidence to suggest that all of the sites were in cultivation at the same time, or that they were cultivated immediately prior to the construction of the Wall, indeed at Byker the evidence was that an episode of ploughing took place before the development of the grassland landscape that existed when the Wall was built (Bidwell and McKelvey 2005, 10). Despite this differentiation, however, the fact that at most sites, like Black Carts, there is no intermediate soil horizon between the plough-marked soil and the Roman works above might suggest that time lapses between ploughing and construction were not very long.

At Denton a long sequence of cultivation evidenced by ard marks appears to have been succeeded by reversion to grassland, possibly with some scrub. The furrows (possibly made with the use of an ard) of cord rig that followed (Bidwell and Watson 1996, 17) represented a single ploughing episode, probably in the year before the construction of the Wall. The excavators note that if the ploughing and seeding took place in autumn, the farmer might have been expelled by the Roman army in the spring, at the start of the building season, and would thus have been unable to harvest his crop. At Newcastle ard marks pre-date cord rig, which was overlain by early, pre-fort Roman activity (Snape and Bidwell 2002, 15–29). At South Shields, a Middle Iron Age round house was overlain by Late Iron Age plough marks prior to the laying of the earliest Roman surfaces (Burnham *et al*, 1993, 284). Here at least there is an archaeological sequence with a C^{14} date to act as a *terminus post quem*, although this is the only such example.

At Black Carts, however the time-lag also appears to be short as the ard marks and hoof prints are directly sealed by the Vallum mound.

Evidence from the central sector of the Wall is sparse, although the existence of the settlements at Milking Gap and Bradley Farm, together with cord rig at Cawfields Farm, Greenlee Lough and Haltwhistle Burn (Topping 1989; Woodside and Crow 1999, 130–1) suggests the continuation of a mixed farming economy in these areas also, either before or during the Roman period. On the western fringes of the uplands of the central sector, at Appletree and Birdoswald a more pastoral landscape is apparent, and settlements were sparse.

The patchwork landscape is clearly shown by the contrast between the pre-Roman situation at Birdoswald and Appletree, sites only 1.5km apart. At Birdoswald, a dense, damp woodland was felled by the builders of the Turf Wall, while at Appletree, they encountered open, grazed moorland (Wiltshire 1997). On the other hand, it has been suggested that dense woodland characterised the area north of the Wall at Fozy Moss (Dumayne 1994), and on the spur that was later the site of Birdoswald fort (p 203). This picture from localised, site-specific studies is confirmed by the evidence from the regional pollen evidence derived from wetlands, which demonstrates that the principal effort of deforestation had occurred before the Romans arrived in the area (Huntley 1999, 51).

Moving towards the western end of the Wall, at Crosby soil analysis demonstrated that the area transected was not cultivated in

the period immediately before the construction of the Turf Wall, but had supported an acid grassland or moorland environment like that at Appletree. This shows a marked contrast to the situation a few miles west at Tarraby (Smith 1978) and at several sites in Carlisle (Charlesworth 1979; Topping 1989, 177; McCarthy 2002, 41), which demonstrate the practice of prehistoric agriculture. Despite this, on the basis of the available evidence, it is easy to conclude that the Tyne–Solway isthmus west of the River Irthing was less densely cultivated than the east.

Such indeed seems confirmed by the relative paucity of 'native' settlement sites in the area when contrasted with the numbers identified in Northumberland, Tyneside and Durham. That said, while settlements of this generic type are seemingly absent from the immediate environs of Crosby, there are notable concentrations on both sides of the Solway Firth, especially in the upper reaches of the various river valleys, and round houses of Iron Age type have now been located in Carlisle at the Lanes and the Cumberland Infirmary site (McCarthy 2002, 45), and in the immediate area (Higham and Jones 1976). The blanks in our distribution maps, however, might easily reflect a lack of fieldwork rather than a lack of prehistoric population: compare, for example, the almost total lack of settlement evidence for Annandale, an area populous enough to warrant its own Roman census official in the Trajanic period (Rivet 1982).

The few settlement sites that have been comprehensively excavated in the region have produced no undisputed evidence for pre-Roman occupation. Consequently, it has been argued that with only a few exceptions, most of them belong to the Roman period (Higham 1982; Jones and Walker 1983). This view has been questioned, and an immediate pre-Roman phase has since been tentatively identified at some sites, as at, for example, Boustead Hill, Ewanrigg, Swarthy Hill and Dobcross Hall (Bewley 1986; 1992; Higham 1986a). Certainly, the lack of any evidence to support the idea of a massive population influx in the region in the Roman period, together with the sheer number of sites represented and the evidence for pre-Wall cultivation at Tarraby Lane and Carlisle, provide *a priori* evidence that some at least should pre-date the Roman period, although by how long is not known (Bewley 1986, 33–4).

The attested evidence for clearance and cultivation need not prove the dominance of a primarily arable regime, as some of these could result from a secondary stage in woodland clearance, the breaking of topsoil in order to promote suitable pasture or grassland for grazing (Reynolds 1980, 103–4). Evidence for reversion to grassland following episodes of ploughing might represent a land-management regime in which the rotation of fallow played a part, to allow land to recover. It is clear from the available evidence that a mixed landscape greeted the builders of the Wall, involving arable cultivation where ground conditions permitted, pastoralism, and patches of residual natural vegetation. This evidence for agricultural land use begs the question of the impact of the building of the Wall on the local population. Tolan-Smith (1996, 77) has stated that, as well as the immediate impact on mobility from north to south; the area for arable cultivation was drastically lessened. Higham (1986a) has estimated that 85–120,000ha of land would have been confiscated by the imposition of the corridor between the Wall and the Vallum. It has long been suggested that settlements were abandoned during the construction of the Wall. The classic example is at Milking Gap near Mc38, where an enclosed settlement of five round houses lying between the Wall and the Vallum may have been abandoned when the Vallum was constructed, as the few Roman finds there need not date after *c* AD 130 (Gillam 1958). If this is the case, then it might be necessary to add the site of Bradley Farm (Woodside and Crow 1999, 44).

The case for the abandonment of these settlements rests on an assumption, namely that the area between the Vallum and the Wall was forcibly depopulated. It is clear that a great deal more evidence is required in order to approach an understanding of the impact of the imposition of the frontier upon the existing agricultural population of the Wall zone, particularly on the eastern flank where cultivation appears to have been more extensively practised, although confiscation and expulsion is a very clear possibility.

Frontier works

The ditch, glacis and counterscarp bank

The projects produced three cuttings across these elements: at Black Carts, Appletree and Crosby-on-Eden.

The work at Black Carts was particularly informative in demonstrating the reaction of the Wall builders to the presence of the quartz-dolerite geology through which they had to pass. Although this is discussed in detail above (p 101) it is appropriate here to summarise the findings. That the ditch was excavated from west to east in this sector has long been known from the analysis of the unfinished ditch at Limestone Corner (p 74), where the decision was made not to continue with the ditch to any significant depth. The creation of the Wall ditch was, however maintained, and although this ditch was shallow and narrow, it was made to appear more formidable by the construction of a narrow, quite high, built, drystone counterscarp bank constructed on the northern lip. The careful siting of the counterscarp on the top of a natural ridge used the terrain to help in the creation of the illusion that the ditch was more formidable than it actually was. The ditch was cut through dolerite, but would not have yielded sufficient stone to create the built counterscarp, let alone blocks for Wall building. The quarrying of dolerite must therefore have taken place. It was shown during excavation that natural fissures and bedding planes make it possible to lever out at exposed surfaces blocks of dolerite with roughly square faces. It is suggested that the small mounds of waste stone, which form a feature of the counterscarp to the north of the built bank, derived from the opencast working of dolerite over a broad area to the north of the Wall.

The dimensions of the Wall ditch varied throughout the length of the Wall depending on the ground conditions. As we have seen, the variation at Black Carts was extreme. In the Turf Wall sector, at Appletree it measured 10.61m wide and was 2.97m deep, while at Crosby 6m wide and 2.7m deep at subsoil level. In both cases it was cut to a near V-shaped profile. These measurements might be compared with those recovered at other sites west of the Irthing: at Walby, where it was U-sectioned, the ditch was 10.51m wide 3.73m deep (Richardson 1978); at Hadrian's Camp it was V-sectioned, where it measured 8.53m wide and 3.5m deep Richardson 1972); and at Tarraby, where it was 6.47m wide and at least 1.82m deep (Smith 1978, 24). The ditch is generally V-sectioned, and it seems likely that it was cut to the steepest profile possible given ground conditions, with alterations to the original profile being caused by erosion, cleaning, slumping and similar events (Wilmott 2006a). The material from the ditch at Appletree and Crosby was incorporated into the glacis. At neither site was there any berm between the ditch and glacis; the bank continued the line of the ditch edge in a shallow slope, probably intended to avoid slumping of the bank material. At Appletree the glacis was a very broad, low, smoothed-out clay bank, while at Crosby the evidence suggests a steeper edge to the north of the bank than against the ditch edge.

In general terms, the excavations on the ditch have served to show that Welfare's (2004) distinction between the counterscarp bank and the glacis is a valid one. At Black Carts there is a clearly defined bank, while Crosby and Appletree both feature a low, broad glacis. It is clear that different ground conditions provoked different responses, and that the counterscarp bank was probably used to make a shallow ditch appear more formidable. The work has also shown that the idea that there was a standard ditch profile that was ideally V-shaped with a basal square-sectioned slot to be false; an aspect treated in greater detail elsewhere (Wilmott 2006a).

The curtain

The stone and turf curtain was examined in the three major sections, and additionally in exposures during the Milecastles Project at Walby (Wall mile 62/3, p 176), Grinsdale (Wall mile 68/9, p 180) and Wormanby (Wall mile 70, p 185). At Black Carts, the only section made through the primary Stone Wall, all that survived was a single-course foundation of Broad Wall gauge with the superstructure built to Narrow Wall specification. This pattern was predictable for this area, especially as both T29a and T29b feature Broad Wall wing walls and points of reduction to the narrow curtain, the features that so puzzled Newbold (1913a; this volume p 83). The foundations of the Wall were built of dolerite blocks, although there was evidence that the superstructure, or much of it at least, was constructed of sandstone from nearby outcrops. The argument that dolerite was won from the shallow ditch and from opencast quarries to the north of the ditch is made above (p 101).

The suggested removal of dolerite building material from a broad surface area at Black Carts echoes the well attested open-area removal of turf for the construction of the Turf Wall west of the Irthing. This was graphically demonstrated at both Appletree and Crosby-on-Eden. At

both sites it could be demonstrated that the line of the Wall was marked out, and turf was then removed from the areas north and south of the Wall line. The Wall was built by piling this material onto a band of turf that was left *in situ* to mark the desired line. This was most clear at Appletree, where the base of the glacis, the Vallum mounds, and the track to the south of the Wall were all placed upon natural boulder clay that had been denuded of turf and topsoil, and on which no regeneration had taken place. At Crosby, the glacis was similarly constructed on ground denuded of turf and topsoil, although the Vallum mounds showed humic bands between the mound material and the subsoil, suggesting either that the ground had not been stripped to the south of the Wall, or that the Vallum had been built here after regeneration had taken place.

The destruction of the Turf Wall took place when the Stone Wall was constructed as its replacement. The lapse of time between the construction and destruction of the Turf Wall is demonstrated at Appletree by the fill pattern in the Turf Wall ditch. A peaty primary deposit formed, and the clay edges of the ditch slumped on top of it before the turfs of the Wall were dumped into the ditch from the north. The deposition of the demolished Turf Wall into its ditch has also been noted at Birdoswald (Wilmott 1997, 47). On other sites, such as Crosby-on-Eden (p 123), Stanwix (Smith 1978, 23–4) and Burgh-by-Sands (Austen 1994, 39) the Turf Wall material was not deposited into the ditch. This is probably because at Appletree and Birdoswald the construction of the Stone Wall on a new line, and the provision of a new ditch, made the primary Turf Wall ditch unnecessary. West of Mc51 the new stone Wall was built on the line of the Turf Wall, and it was necessary to retain the primary ditch. At Crosby it is the occurrence of masonry chippings within the ditch that defines the point at which the stone Wall was constructed. As at Appletree, primary silt was followed by slumping, and the chippings appeared in the subsequent natural silting sequence. In this area it may be presumed that the Wall material was removed and deposited or spread elsewhere. At Crosby this is graphically illustrated by the fact that spread material from the Turf Wall covered an area 20m wide to the *south* of the Wall. This also was partly sealed by masonry chippings from the building of the stone Wall. By contrast on the berm between Wall and ditch there was no spread Turf Wall material, and the chippings lay on the ground surface. At Stanwix (Smith 1978, 23–4), Turf Wall material filled a hollow way to the south of the Wall. This evidence suggests a deliberate effort to ensure that the integrity of the ditch and berm to the north of the stone curtain was maintained from the Turf Wall phase in these areas.

The stone successor to the Turf Wall was recorded at Crosby, but was also seen in three other locations during the Milecastles Project. At Crosby, the Wall was almost totally robbed, although a single row of flat flags lay along the north side of the foundation trench. As is characteristic of the Stone Wall in this sector there was no foundation trench beneath these footing flags (cf Simpson 1913, 301; 1932, 150). As elsewhere, the face of the Stone Wall was set back from that of its turf-built predecessor (Hodgson and McKelvey 2006, 50). The minimum width of the robber trench, and thus the Wall foundation, was 2.8m. All of the exposures of the Wall made during the Milecastles Project showed the same foundation pattern. At Walby West, in Wall mile 62/3 the width was about the same as at Crosby (although most of the foundation was found, the excavation stopped just short of the south face (p 125)). This is typical of the flag foundation width of 2.75–2.89m, which is found to the west of Mc53 (Simpson *et al* 1934b, 134; Hodgson and McKelvey 2006, 46). At Walby West and also at Grinsdale in Wall mile 68/69 (p 176) the facing stones of the flag foundation had a linear crack some 240mm from the face. This represents the pressure point where the face of the curtain wall stood on the flag foundation, which was offset to the north, and is a virtual signature feature of the stone Wall in the former Turf Wall sector (Richmond and Gillam 1952, 19; Caruana and Fane-Gladwyn 1980, 21). At Wormanby (Wall mile 70; p 185), where a single course above the flags survived, a very slight offset was recorded on the south side. At Wormanby also, the stone Wall was cut into a remnant of the Turf Wall as at Crosby. Though turf work survived also at Mc 61 (Walby East; p 174), there was no trace of it at Walby West.

East–west communications

The project has produced some evidence for east–west communications in the form of the track discovered at Appletree immediately behind the Turf Wall, and the presence of 'metalling' on the Vallum berms.

The Appletree track was clearly an early element in the Wall system, as it was constructed on ground stripped of turf for the building of the Turf Wall. It lay close to, and functioned with the Turf Wall before the replacement of the Wall in stone to the north in the late Hadrianic period (p 111). This is the third observation of such a track. At Denton a metalled track was laid down immediately behind the stone Wall, either when the Wall was built or shortly thereafter. Three layers of metalling were found here, with dating evidence to suggest that the track survived in use into the third century (Bidwell and Watson 1996, 34). To the west at Tarraby Lane, Stanwix an unmetalled hollow way some 10m south of the Turf Wall was filled with the spread debris from the demolition of the Turf Wall (Smith 1978, 23–4) which here took place after the return to Hadrian's Wall in the 160s (recent doubts on the Roman date of this feature (Bidwell 1999b, 23) would seem to be misplaced given the source of the filling of the hollow way). Although these observations may be of the same phenomenon they are clearly not manifestations of the later Military Way, as the construction of the Military Way is far more substantial. Bidwell and Watson (1996, 34) compare the Denton track with the nearest observation of the Military Way at Lemington, where it was built of substantial stones set in boulder clay (Tait 1962, 142). A similar comparison may be made between the small metalling of the track at Appletree and the description of the Military Way at Pike Hill (Simpson and MacIntyre 1933b fig 28), where the road kerb and metalling was also of large stones. All three of these observations show that the track was early in the building sequence. At Appletree it is clear that the track was built to relate to the Turf Wall, and the same is true at Tarraby as here the track predated the replacement of the Turf Wall in stone.

It has been suggested (Bidwell and Holbrook 1989, 153) that to the east of Portgate a service road lay south of the Wall, connected by tracks at least to the fort at Benwell via the Vallum gateway at the fort, and possibly to other milecastles and turrets. This, they suggest, would have lain well to the south of the Wall, and Bidwell and Watson (1996, 34) deny the possibility that this could be represented by the Denton track. Noting that communications to the postulated service road would have been obstructed by the building of the Vallum, they conclude that the track might have been laid out either while the Vallum was being built or shortly thereafter to make communication possible between milecastles and turrets to the north of this barrier.

The Appletree track was a substantial feature, but there is a problem with its course. An excavation in 1936 between Mc50TW (High House) and Birdoswald, at a distance of 237.75m (260yds) east of the former, was undertaken to examine the relationship between the Vallum and the Turf Wall (Simpson and Richmond 1937, 171–2). This showed a space 12.19m (40ft) wide between the Turf Wall and the Vallum ditch, there being no north Vallum mound in this area. This space became narrower, at 6.1m (20ft), 365.76m (400yds) farther to the east. No trace of the track was reported. If the track had been at a consistent distance from the Turf Wall (5.59m at Appletree) it would have been noticed, probably beneath the spread remains of the Turf Wall, which were observed over a thin vegetation line between the line of the Turf Wall and the Vallum. It is possible that the track veered away southwards from the parallel course and was either cut by the ditch or overlain by the mound of the Vallum. Such an explanation is more likely at Mc50TW, where the track would need to be diverted to the south in order to pass south of the milecastle. The description of the 'patrol track' at Mc50TW (Simpson and Richmond 1937, 170), situated on the south berm of the Vallum, recalls the Appletree track, and it is conceivable that this is a remnant of this track partially overlain by the south mound. Only further excavation will clarify the place of the track in the chronology and function of the Wall, however.

Metalling was observed on the south berm of the Vallum at Black Carts and on the north berm at Appletree there was a stone spread, also seen in an earlier cutting near the 1999 excavation site at Appletree East (Daniels 1978, 217). Metalling on the south berm has otherwise been found only at Burgh-by-Sands (Austen 1994, 41).

On the north berm metalling has been observed at Black Carts (where wheel ruts cut into it are unlikely to be of Roman date), and also in Wall mile 30, west of Limestone Corner (Appendix 2). Elsewhere it has been recorded at Carvoran, High Shield (Wall mile 38), Mosskennels (Wall mile 35), near Mc34, and Down Hill (Wall mile 20)

(Heywood 1965; Bidwell and Holbrook 1989, 152). These occasional patches of metalling were probably installed for short-term local reasons, and cannot be regarded as part of a road system on the berm as once thought. As shown above there is considerable doubt over the alleged Roman date of the 'metalling' at Appletree.

The Vallum

The Vallum was fully sectioned at four points during the projects reported upon in this volume: at Crosby, Appletree, Birdoswald (pp 255–8) and Black Carts. In addition the surviving mounds were examined at Throckley in Wall mile 9. The earthwork has been sectioned in a number of locations since it was first cut in 1893 at Great Hill (Soc Antiqs Newcastle 1894), and its general symmetrical form as a steep sided, flat bottomed ditch with flanking berms and mounds on each side is very well established. The overall intended width of the Vallum is in the order of 120 feet (Swinbank 1965, 85), and the actual intention was probably to span a width of one *actus* (= 120 *pes Monetalis*, = 116ft 6in, = 35.51m). Though this measurement is on average fairly consistent, the variations noted in the three sections reported here are typical of the range recorded through excavation (Table 2). The design was varied to meet local conditions, in particular the nature of the subsoil and geology. Variations such as the presence or absence of kerbs to the mounds, revetment to the ditch or differing ditch profiles are therefore largely matters of local detail rather than broader significance (Swinbank 1965, 85–6).

It is generally considered that the defining and most important element of the Vallum was the ditch, as this was a continuous feature laid out from end to end of the work, and completed whatever the difficulties. The classic example of this is the point where the ditch cuts through the dolerite outcrop at Limestone Corner, where the ditch was cut, deep and flat bottomed, through the solid dolerite. This was graphically shown in the Black Carts section, where the contrast between the continuous Vallum ditch and the compromise reached for the Wall ditch could not have been plainer. In the original plan causeways across the ditch were left only at the forts.

Spoil derived from the ditch was deployed in the mounds. It was possible at Black Carts to determine which mound was built first from the order of deposition of re-deposited natural strata in the mound. The south mound consisted of the clay and shale derived from the upper natural strata, with a thin cap of dolerite. The dolerite quarried from the bottom of the ditch must, therefore have been used to form the north mound, and this later provided a good foundation for the 18th-century Military Road, obviating the need to destroy the Wall itself in this area. The implication is clearly that the south mound was built first. There are very few places where similar conclusions can be reached. At West Denton Tait's (1962) excavation showed that the south mound was first laid out by building a mound revetment using turf stripped from the site, and was then constructed with the clay from the upper geological layers, capped with stone. The north mound was largely constructed with, and was kerbed by, stone from the deeper strata, and was thus built second. At Denton (Bidwell and Watson 1996, 35) the south mound consisted of clay and small sandstone fragments, while the north mound appears to have contained more sandstone. It is possible again that the south mound was the first to be built here. At Down Hill (Soc Antiqs Newcastle 1894, xxvi), the upper sandstone is deployed in the south mound, and underlying fireclay in both, but the south

Table 2 Comparative dimensions of the width of Vallum elements from excavated sites.

	N mound	*N berm*	*ditch*	*S berm*	*S mound*	*total width*
Wallhouses	4.40m	6.60m	8.00m	7.10m	(min) 3.60m	(min)29.70m
Denton	5.95m	8.15m	5.70m	9.50m	6.80m	36.10m
West Denton	(19ft) 5.79m	(26ft) 7.92m	(24ft) 7.31m	(32ft) 9.75m	(18ft) 5.49m	(119ft) 36.26m
Black Carts	–	–	7.50m	7.90m	8.10m	–
Appletree	9.20m	4.61m	10.23m	8.10m	8.50m	41.05m
Limestone Corner	6.78m	7.60m	8.75m	8.30m	6.10m	37.53m
Crisby-on-Eden	6.50m	8.90m	6.20m	8.90m	6.50m	36.90m

mound would appear to have been the first built. There is no consistency throughout the length of the Vallum however, as at Halton Chesters the lower part of the ditch was cut through shale, which was used in the south mound (Simpson 1976, 159–61) implying that here the south mound was the second to be raised. Similarly at Appletree the north mound contained a core of the upper, yellow boulder clay sealed by the lower red clay, while the south mound was built second, using the lower red clay only.

The marginal mound, which lies on the south lip of the ditch, and occupies part of the south berm, has long been understood to represent material derived from the cleaning out of the Vallum ditch. This idea must be questioned as a result of the excavations at Black Carts and Appletree. At Black Carts a substantial marginal mound was built of clean material, clay and shale, like the south mound itself, and it directly overlay a subsoil scored with ard marks – in the same stratigraphic relationship as the main south mound. On the face of it, empirically, stratigraphically, the two mounds should be contemporary. Given the clear sequence of slumping followed by silting that we have seen in the ditch fill, the marginal mound is not derived from cleaning out the ditch, unless – and only unless – it was taken from the ditch after an early episode of slumping of the edges, and that this clearance was undertaken with archaeological scrupulousness, being entirely taken back to the clean rock-cut ditch bottom and edge. An explanation for the similar appearance of a clean marginal mound at nearby Limestone Bank has been sought in the idea that the bank was the result of rapid clearance of early slumping due to frost action (Daniels 1978, 33). A similar conclusion was reached where the material of which the marginal mound was constructed was clean sandy clay similar to that used to build the primary elements of the north Vallum mound. In neither case did the ditch section show any evidence in section that re-cutting or cleaning had taken place. The natural slumping of the sides created a stable angle of repose within which organic silts developed. The burden of the stratigraphic evidence indicates that the marginal mound was constructed using the upcast spoil from the original excavation of the ditch. Similarly, in 1958, a section west of Mc42 at Cawfields showed a large marginal mound composed of clean material comparable with the south mound upcast. Heywood (1965) noted that this could hardly be evidence for a re-cut of the Vallum ditch, as the ditch section showed no evidence at all for re-cutting. This is entirely in accord with the Black Carts and Appletree results.

These three observations suggest that for some of its length the marginal mound may be primary, or at least near-primary. This idea is supplemented by the fact that often, as in the stretch from Denton westwards to Halton Chesters (Bidwell and Watson 1996), the south berm is wider than the north. Thus at Denton the measurements are 9.5m (S berm) and 8.15m (N berm) and at Halton Chesters 7.2m (S berm) and 6m (N berm). The phenomenon has also been noted at Wallhouses (Bennett and Turner 1983, 67–8), where the measurements are 7.1m (S berm) and 6.6m (N berm), and at Heddon-on-the-Wall (Tait 1962). It seems possible that in these areas provision was made for a marginal mound, which was never actually built. At Cawfields the berms of the Vallum again are wider on the south than the north, was set out with great precision (Simpson 1976, 116–19). The appearance of a deliberate three-mound Vallum is reinforced by the fact that this is the very stretch in which Heywood observed a marginal mound of clean material, and suggested that this was not the result of ditch-cleaning, as there was no evidence in the ditch for re-cutting.

Simpson and Shaw (1922), in a paper written before much excavation on the Vallum had taken place, concluded that the Marginal Mound was the result of ditch cleaning, and that this "operation obviously resulted in considerable enlargement as well" (Simpson and Shaw 1922, 366), suggesting that the cleaning of the ditch had been carried out beyond its original edges, cutting away the original ditch and creating a new, broader one. If so, then no evidence of the earliest ditch would survive. In the same place they note that "later examination uniformly confirms the first conclusions, that the disturbed and discoloured material of which this mound is composed represents a later clearing or re-cutting of he Ditch." The number of interventions backing this statement up was tiny. That this assumption remained in circulation is shown by an interim statement (*J Roman Studies* 1940, 163) on a section at Cawfields excavated in 1939. Here,

according to the excavators, the ditch "had been re-cut as the presence of the well known marginal mound attests." On the published section of the ditch an entirely conjectural 'original profile' is shown is a dotted line (cf Wilmott 2006a). The assumption that the ditch was re-cut and made larger, to a different profile to an accepted 'standard' shape, was based purely on the presence of the marginal mound and its current interpretation. Heywood's subsequent work at Cawfields, demonstrating a clean marginal mound, the apparent care in the layout of the three-mound Vallum in this sector, and the evidence in low-lying gound at Cawfields that the ditch edges had been revetted in turf founded on flagging (*J Roman Studies* 1940, 163–5) – surely the primary form of the ditch here – casts grave doubt on the interpretation of the marginal mound as resulting from a re-cut.

The systematic slighting of the Vallum with causeways every 41m (45yds) or thereabouts, and has been fully discussed by Simpson and Shaw (1922) and by Brenda Heywood (1965). The causeways were presumably constructed by shovelling the material from the breach made in the mounds back into the ditch to create a crossing, and this was demonstrated by excavation at Wallhouses (Bennett and Turner 1983, 75). Excavations at Cockmount Hill in 1939 across the axis of a crossing (*J Roman Studies* 1940, 163–5) showed that the sides had eroded rapidly and growth had taken place before the causeway had been built, and the same was true of a causeway near Walby (Richardson 1978). At Wallhouses (Bennett and Turner 1983, 67–8) another causeway was encountered, and it seems likely that the fill of the Vallum ditch observed at Crosby-on-Eden was also the result of the construction of a causeway. Based on observations between Wall Burn and Whittledean, Shaw and Simpson concluded that the Vallum was reconditioned (Simpson and Shaw 1922, 414–16). The date later put on this operation was the return from Antonine Scotland. This interpretation has enjoyed general acceptance (Breeze and Dobson 2000, 131). The evidence was that in this stretch there were gaps in the main mounds, no causeways, and a marginal mound. This led to the view that the marginal mound was the product of the removal of causeways and of the re-cutting of the ditch, especially as the marginal mound was not breached by the causeways. The latter consideration may not be crucial, as Simpson and Shaw (1922, 402) observed that the main mounds were not always totally breached to full depth to create the crossings, and in places the depth to which they are breached may be about the height of the marginal mound. The observation was further made that at Cockmount Hill and at Carrawburgh, where a sequence of surviving causeways ended, the marginal mound began. It seemed also that the ditch was wider in these areas, so the enlargement of the ditch was argued. This is where the observations that at Hare Hill, Down Hill, immediately west of Limestone Corner (Appendix 2), and near Mc23, the marginal mound is comprised of loose and dirty material, come into play (Heywood 1965, 91–2), as the interpretation was that the marginal mound was created when the crossings were removed and the Vallum reconditioned. This conclusion does not explain the situation at Wallend Common (Simpson and Shaw 1922, 401), where there is a ditch, no causeways, but breaches in the mounds, and no marginal mound. More importantly the whole idea is thrown into disarray at Black Carts, where, as the OS map shows, there are many extant crossings, but between two of these, excavation has showed a substantial, apparently early, marginal mound built of clean material, and no evidence whatever for the re-cutting of the ditch.

The issue of the marginal mound and its relationship with the crossings remains ambiguous at best. It is important, because if the mound is primary it is a second obstacle to the south, making the earthwork even more formidable as an obstacle than is currently understood. In the 13th edition of the 'Handbook', Charles Daniels certainly swung towards the view that it was an early aspect of the scheme, saying (Daniels 1978, 33) that "The date of the 'marginal mound' is also uncertain: in many cases it comprises silty material cleared from the ditch, although near milecastle 42 it was mostly clean soil. It has been connected with the late clearing of the ditch, but it probably belongs much earlier in the history of the barrier."

5
The Hadrian's Wall Milecastles Project: 1999–2000

by Tony Wilmott

with contributions by Paul Austen, Polydora Baker, Julian Bennett, Nicola Hembrey, Peter Hill, J P Huntley, Helen Moore, David Shotter and Jacobo Weinstock

The numbering and structure of the milecastles

by Paul Austen, Tony Wilmott and Julian Bennett

A major part of the first plan for Hadrian's Wall (p 72) was the provision of milecastles and turrets. It is generally assumed that there were 81 milecastles, designed to be located at intervals of one Roman mile (1,480m). There is some considerable variation in the precise spacing, often introduced in order to take account of topographical features, and consequently several milecastles remain imprecisely located. Between each pair of milecastles were two evenly spaced turrets. For convenience of reference, the structures are numbered from the east, and the universal numbering system invented by Collingwood (1930) and refined by Birley (1961, 71–7) assumes the existence of these interval structures all the way from Wallsend to Bowness-on-Solway. Milecastles (Mc) are numbered 0–80, and turrets (T) are referred to by the letters (a) and (b) after the number of the milecastle to their immediate east, together with their local names. For example: Mc48 (Poltross Burn), T48a (Willowford East), T48b (Willowford West), Mc49 (Harrow's Scar).

The milecastles were built to be integral with the curtain wall, which invariably acts as the north wall of these structures. Although the known milecastles conform to a generally recognised overall plan, there is no such thing as a typical milecastle. The only feature common to all is a pair of single-portal gates in the centres of the north and south walls, connected by a central roadway. Those milecastles that have been investigated, or that are known as upstanding earthworks show that they were generally about 18–23m long and about 15–18m wide, although there is considerable variety in size and shape.

Some were built with their long axis parallel to the curtain wall (short axis milecastles), while in most the long axis runs north–south (long axis milecastles). The external south-east and south-west corners are always rounded in the same way as fort corners, but there is diversity in the interior face of the corners: some reflect the curved face of the exterior, while others have right-angled internal corners.

The form of milecastle gateways also varies. There are four recognised types (most recently discussed in detail by Hill and Dobson 1992, 33–7). Type I is a simple form, in which two pairs of responds are provided on the north and south sides of the wall, through which the gate passes. This would have allowed the construction of an arch at the front and rear of the gate. Type II, found on Narrow Wall structures, has a set of arch responds for the outer face of the gate only, and Type IV is a variant of this form found in Broad Wall milecastles. The distinction between Types II and IV lies in the different size of masonry employed, although Hill and Dobson (1992, 35) have shown this distinction to have little useful meaning. It seems possible that the flush piers provided on the inside of this gate type were intended to support a timber lintel in place of an arch (ibid). The final gate form, Type III, had two pairs of arch responds, but the inner pair projected back into the milecastle. This may have been to increase the floor area in the tower above, and the existence of this type of gateway on both the northern and southern sides of this kind of milecastle has been held to suggest the existence of a tower over each gate (ibid, 36).

The most variable factor of the milecastles appears to be the plan of the interior buildings, where the number and dimensions of buildings vary substantially from one installation to another.