4 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 so-called Narrow Wall, which were probably Severan in date, 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 the Turf Wall, above and on both sides of 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 constructions (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 broad foundations, and this left offsets, or points of foundation, where wing walls and foundations met Narrow Wall curtain. These offsets were all on the rear 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 River Tyne (pp 55, 109), was 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.

Facing page: 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; Brews 1927, 115; Hall 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. As 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 stone or clay bonded. In both the Broad Wall, and in the stone renewal of the Turf Wall, foundations often included flags at ground level, above which the Wall face was offset, which would have 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 clay 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 well have been the result of brush treatment of the wall top is not known for certain. In a reconstruction drawn for Simpson et al (1953b) the Wall is reconstructed with a boardwalk on the top, and a breastwork of split timber. Evidence from pollen analysis (p 117) at Applethorpe, suggests that the Wall would more likely have been hurled malle 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 change occurs at the junction of the lines of the River Irthing, near Bowness-on-Solway, where there are two successive earthworks with 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 mile 54 was built during the reign of Hadrian, while the remainder replaced after the return from the Antonine Wall (see Willis, this volume pp 34–9).

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 line replacement diverges from the original line...

WAYS IN WHICH THESE ASPECTS OF THE SYSTEM DITCH AND COUNTERSCARP TYPES IN THE CENTRAL (2004) HAS EXAMINED THE DIFFERENT TYPES OF MOUNDS. RECENT FIELDWORK BY WELFARE (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 BEENRecorded, AND PART OF IT HAS DEVELOPED FROM A MISUNDERSTANDING OF EARLY REFERENCES, PARTICULARLY THE DESCRIPTION OF THE DITCH SECTIONS BY PHILIP NOBLE (1911), WILMONT, MCKELVEY AND BIDWELL (2005), FOLLOWING SIMILAR DISCOVERIES AT BULDELL STREET, WALLSEND (BIDWELL AND WATSON 1989), WHICH OCCUPIES PART OF THE SOUTH BERM ON THE SOUTH HIP 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 THE DITCH HAS BEEN EXPANDED AND THE WORK REPORTED ON BELOW INDICATES THAT THE DITCH HAS BEEN EXPANDED AND THE REASON FOR THIS NO LONGER REMAINS CLEAR, AS IT HAS BEEN TRANSCENDENTAL EMPTINESS ON THE EDGE OF THE DITCH IN AREAS WHERE TURF WALLS 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 ALLOCATING ROAD. IN GENERAL, THE RIVER BANK IS CHARACTERISED BY A LOW, STEEP-SLOPING WALLED Ditch. 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 stone or earth banks to a width of 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, OR CONSTRUCTED OF WASHED-OUT LOAM. THE CAUSEWAYS WERE SURBORMED BY FREE-STANDING STONE GATES THAT WERE CLOSED FROM THE FRONT AND SIDE, AND THE VALLUM, AGAIN IN ECONOMICAL LONG, ALLOWS THE VALLUM TO BE BUILT IN CONSECUTIVE LAYERS AS THE DITCH WAS 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 ALLOCATING ROAD. IN GENERAL, THE RIVER BANK IS CHARACTERISED BY A LOW, STEEP-SLOPING WALLED Ditch. 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 stone or earth banks to a width of some 10m from the ditch edges.

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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 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 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...
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 orangy-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 (824) 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 survived.

**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 palaeoecological 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 Earl 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 Carrrauburgh (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 T29a, from which the slope becomes gentler up to the next summit at Mc29 (Tower Tye), 196m 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 Sharples 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 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 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.
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 upsoil. A light sandy loam of the Römering 1 association occurs over the sandstone towards Tower Tye (Usai 1999a, 6-8). The soil on 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 height of 12 courses high, gradually reduces in height and preservation until its line is no longer visible. 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 Sewingham, 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 rats. On the slope from Limestone Corner eastwards the ditch has been kept relatively free of silting by the excess ground water that runs down in it is 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 mutil and 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 first excavated. It was visited and photographed by James Coates, who made three paintings, one of which (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. Fewer than three centenial stones were found during the consolidation, and reported to Britannia by Anderson (Wright and Hassall 1972, 354; 1973, 349), who in more recent years six facing stones with quarry marks in the form of ‘V’s and ‘X’s (Hassall and Tomlin 1986, 333) have been noted by Alan Whitworth. In 1912, Philip Newbold identified the sites of T49b, T50a and T50b (Carrawburgh East and West), and excavated T29b (Limestone Bank). In his report Newbold (1913a) wrote the first discussion of the broad wall turrets 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 structure. The report also contains one of the first published ground plans of a turret (the plans of T49b, T50a and T50b 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 shallower gully lift (0.3m) deep and 38 (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 partial breach of the ditch. It was further postulated in the project design that the clearly defined counterscarp bank had been partly composed of upcast material in the direct 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 rehabilitation. 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 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 earthworks and research aims were:

Methods

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 system apart from the TBM. Trench BC1 examined the Wall, Wall ditch and counterscarp, and was located on the north side of the road, while 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 sections through the Wall were some 5m west of T29b. It measured 5m wide and 15m long, although only the centre 2.5m was fully excavated. The Vallum was fully excavated. Trench BC1 was at a level of 237.73mOD, while that for BC2, in the valley, was 196.47mOD. 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 England (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 B1. 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).

Palmynological 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 envisaged that this should be done apart from 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 recorded 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.

84

85
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...
The counterscarp (Fig 198) 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 north of the Wall ditch. 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).

**The berm**

The berm between the ditch and the Wall was 8m wide, and was almost level. The surface contemporary with the Wall was almost level, and the berm 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).
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.
Trench BC2
(Plan, Fig 201; Section, Fig 202)

Natural strata and soils
by M-R Usai and T ony 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 0.95m 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 disturbance 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 disturbance. 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 D avid Earle Robinson and T ony 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 comprised 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 hoots 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 (0.4–1.1%), 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, stellaria 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 to 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.
(3.9–13.3%), mostly comprising ferns, polypody and bracken, with minor occurrences of bog moss and moonwort.

The north berm of the V allum (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 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 deposited 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 (275–9, 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.

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 siltly 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 (228, 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 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

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Table I Black Carts, Hadrian’s Wall: pollen data summary percentages.

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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 occurrence: the clay from the top of the natural sequence, then the black shale and then the dolerite. It was noticeable that on the eastern flank of the mound 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).

Finds
Finds from the site generally comprised a number of modern intrusions 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).

Interpretation
The pre-Wall landscape
by David Earle Robinson and Tony Willmott

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. pollen analysis has evolved and is involved as an essential analytical tool to electronic knowledge 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-Peary and Barber, 1997; Dumayne-Clifford 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 coastal 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 grasses and high values for trees, shrubs and grasses. The only direct indication of arable agriculture is the presence of one possible cereal pollen grain. However, the broad plant type 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 are consistent with open scrubby woodland combined with heath and grassland. Values for grasses and shrubs are much less than those seen under the Vallum mound, and the spectrum of herbs present also reflects less 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 at Black Carts.

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 Walsend (Huntley 1995) or from adjacent to the Vindolanda fort and berm at Denton Bank, east of Newcastle upon Tyne (Huntley 1998). A mixture of alder woodland and open grass/edge dominated communities, but with no clear indication of arable agriculture, emerged from pollen records at the buried soil under the Newcastle Milecastle (Huntley 1988). At Wallowhouses, one of the core forts of the north Vallum mound itself that revealed a pollen spectrum indicating an essentially open woodland landscape, with a little woodland and cultivation; no pollen was found in the deposits sealed beneath the Vallum. Withers (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 (Wulff 1997). Arguably, the Black Carts area 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 have paid dividends despite initial concerns about their unpromising nature and have paid dividends despite initial concerns about their unpromising nature and have paid dividends despite initial concerns about their unpromising nature. Pollen analysis has revealed the presence, prior to wall construction, of a well developed cultural landscape of varying character, pastoral and arable, extending as a 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, and 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.
They have been found on virtually every modern excavation from Wallside to Carrwood (p. 128). The ditch and its berm showed no signs of the kind of natural occurring vertical fissures and horizontal bedding planes to do this. Some of the blocks won from the ditch may have been used, without further dressing, for the Wall foundations. The counterscarp was constructed using 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 west of Housesteads or of the Turf Border, preserving a buried soil horizon. It was formed by experiment (for simple surface 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 dolerite blocks oc...
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 the ditch, which was cut through gravel and sand, showing no primary silt and the angle of natural was hard red sand. Here the section collapsed 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 reposes 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 shales. This 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 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 re-cut (p 91) the initial fill was slumped clay from the top of the ditch profile and 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). The material of the marginal mound was 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.

**Transaction in Wall mile 50** (Appletree, Cumbria), 1999

*by Tony Wilmott, with contributions by James Wills 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 (2.8km) 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

**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...
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 recut and viewed on nine occasions (1896, 1906, 1920, 1930, 1949, 1959, 1969 and 1979), and in August 1979 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.” 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 (CIA). In 1979 Julian Bennett (for CIA) recorded the section and some pollen sampling was carried out by Nick Balaam, although the results of this work were not published. In 1980 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, unsel ective 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 and Palaeo-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 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 Vatulm mounds.
5. To compare the preservation and content of the pollen record from beneath the Turf Wall, counterscarp bank and Vatulm mounds.

Fieldwork methodology

A single trench, 5m wide and 100m long was excavated through the sequence of frontier features, to include the Vatulm 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 CIA. Field visits were made for geoa rchaeological 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.

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**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).

**Fig 214** The linear elements of the Hadrian’s Wall complex: four investigations 1983–2000.
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 395mm deep at 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 (1897/a, 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...
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.

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 50mm 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
The marginal mound lay on the southern lip of the Vallum ditch. It was 0.62m 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 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 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 deposit 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 profile of the ditch quite radically changed was a 320mm thick deposit of grey-brown clay silt (60) of reddish-brown sandy silt, 240mm deep. This deposit was overlain by further deposits of 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. Above 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 excavations as deliberate backfilling. It remains possible that these inclusions derived from a stony pocket within the natural boulder clay, and were simply an aspect of re-deposition in the construction of the 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. Above 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 excavations as deliberate backfilling. It remains possible that these inclusions 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...
the excavations of the section for previous Hadrian's Wall Pilgrimages. The latest cut revealed was cut 35 (fill 36), which was 1.7 m wide trench excavated in 1979 and re-excavated in 1989. During the 1989 excavation it was found that the 1979 trench had been filled. 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 1989 excavation. On the western side of the 1999 trench, over the limits of the 1979/89 excavation, the basal turf layer of the Turf Wall was seen. On the western side of the 1993 trench, excavation this had been cut by a number of other, sub-rectangular, features measuring c 3 m long. In one instance (35, 40) the feature had been re-cut on at least one occasion in the same place. These trenches may have been a first representation in the Turf Wall and for previous Pilgrimages, although their size shows that the section was not invariably completely exposed.

Pollin analysis by James Wells

Introduction

As noted above, the section of the Turf Wall at Appleby is one of the few areas where pollen analysis (Simpson and Richmond 1935b; Donaldson 1976; Wills 1992, 1994b. The analysis described in this paper (Wills 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 grassland, woodland dominated environment existed in the period prior to Wall construction.

Multiple profiles were taken from the Turf Wall cross section, which ensured the inclusion of the lowermost buried land surface. The analysis 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. Work in this area revealed that a turf layer was sampled both rather than the probable soil layer, which was very close (50mm thick). The two buried 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 one another was the pollen-dominated group of samplers in 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 site was the source for the turf removed from closer to a field boundary or woodland, the underlying similarity of populations post-construction.

The three 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 of the 1997 trench, one monolith and three Kubiena tins of sediment were revealed. One slide was expressed 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 for each level was prepared for pollen analysis. The samples were prepared for assessment for the Turf Wall cross section. In this way it was hoped to reveal any differences in the diversity of the local terrain from which turf was taken for Wall construction.

Pollin analysis of the Turf Wall ditch and Vallum ditch fills

It is worth stating immediately that pollen analysis of the fills of archaeological features is in many respects a difficult and interpret. Pollen to construction of the Wall with the main taxa represented being a mix of alder, beech, hazel (bough, oak and wild grasses. Additional species that were common in low numbers and in most samples were oak, hazel, heather and wild grasses.

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, figwort and vetches were present in all the variability in the pollen frequencies, but this was insufficient to suggest anything other than a local source area for the turbins.

A sampling strategy was proposed for the present project that could confirm and build on the results of the previous investigation.

Two samples (929/150mm and 926/205mm) were taken from the soil of the assumed source area on the Turf Wall. The basal pollen assemblage (sample 921/45mm) was the thickest and most continuous (sample 921/45mm) 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 source area of Turf Wall construction although alder appears to have increased locally. In the re-excavated Turf Wall context (925/165mm) 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 change in birch that has 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 deposits which were sampled. The sandy part was removed from closer to a field boundary or woodland, the underlying similarity of populations post-construction.

The samples were prepared for assessment (between 240 and 320mm depth) and has been identified as Prunus (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 ditches (sample 925/165mm) with both high hazel (42%) and alder (33%) values. There was much less grass and more oak (6%) and sedges (7%) were 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%).
HADRIAN'S WALL: ARCHAEOLOGICAL RESEARCH BY ENGLISH HERITAGE 1976–2000

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 plant 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 (TogS), (sampled from base of section).
2. Sample 906 (Contexts 52, 53): combined material from basal peaty layer (TogS) and turfs above.

All three sub-samples were soaked in water and subjected to gentle manual disaggregation. The resulting residues were sieved into several fractions (smallest mesh ¼ inch) and examined for plant (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:

This sample was soaked for several days before initial disaggregation in water. The small residue, which was mostly sand, contained a lot of charcoal and 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 prior to disaggregation. They were found to comprise mostly sandy/sandy, but basically very well humified organic material with some rootlets and 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 found were some woody roots, which might be remnants of some trees. A large residue remained in the peaty deposit from above before being deposited in bloc into the ditch. Some plant material was found to have become dry and not to have been fully wetted during processing (this is unlikely to be a function of the degree of waterlogging in that feature. Because of their raised position within the ditch fill these samples have provided additional useful information about the vegetation in and adjacent to 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 turf cutting with only alder and hazel were maintained for a significant period of time, and that there was also an underlying state of successional change in the vegetation on the Turf Wall.

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. The list of plant remains in the ditch fill sample is perhaps a function of the degree of waterlogging in that feature. Because of their raised position within the Turf Wall, the turfs of the Turf Wall – although containing some micro-stratigraphic integrity (the humic and bleached layers both remained in a more or less undisturbed state) – 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 adjacent to the Appletree area, which supplements that previously published for the present site and the Appletree East. It contains significant evidence that deforestation had taken place by the time of turf cutting with only alder and hazel having a local presence. There is still no evidence for arable agriculture, with ling and wild grasses (most particularly Dactylis glomerata) maintaining a significant presence. The pollen assemblage represents a mixture of upland heather and grassland vegetation and perhaps reflects the survival of plant macrofossils and insect remains, which have recently been established in 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 undisturbed subsoil.

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 striped 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 a suitable interface between the Appletree and the base of the counterscarp and Vallum mounds shows that clay was leached 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.

The fact that the newly discovered excavation of bog grasses, that had been only partially 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 of the north Vallum mound, which was 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 seems likely that stone overlies slumping. This shows that the stone is not primary, there is a possibility of the ist on the stripped clay surface would have been shovelled up and incorporated within the core.

The ditch itself showed no evidence in the Turf Wall ditch, and that actually existed as the primary filling of the Turf Wall ditch. Here there is evident variation in the size of the turfs used to build the Turf 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 decently sized, 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 are observations made in 1999 that suggest that the marginal mound was more likely 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 mound. It is likely that stone overlies slumping. This shows that the stone is not primary, there is a possibility even on the stripped clay surface.

The deposits of the north mound were constructed was clean sandy clay similar to that used to build the primary elements of the north Vallum mound. The north mound was constructed following the return from Antiquity Way, which was 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 may have broken into clods, and this explains the variation in the size of the turfs used to build the Turf 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 decently sized, 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.

While there is evidence that the Turf Wall at Appletree was thus constructed was clean sandy clay similar to that used to build the primary elements of the north Vallum mound. 

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

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 Mck62 (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.

Fieldwork methodology

Before the excavation the site was surveyed using a Martin-Clark Resistance meter and a Fluggate 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. 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.

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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, interspersed by intervals when the ditch served as a watercourse, resulting in the deposition of the finer particles. Shaping of the edges evidently reached a 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 terri tory 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 (2013). 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 sometime 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 stagnosol of the Dunsmore series, with clear evidence of wetness (Kesley 1985). The sample was superficially similar to earlier sections through the Vallum mounds at White Moss, 1.8m to the east of Haverfield 1895, 460–2; Hodgson 1897, 392), and a core sample taken in the vicinity of White Moss during vegetation monitoring 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,
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 uncultivated 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 marking the original vegetation cover remaining (Simpson and Shaw 1922, 417–18) and the lack of any evidence for it at Crosby suggests a similar arrangement here.

The Stone Wall (Figs 231–2)
The 0.9m 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 flaggs 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 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 a thin lens of black loam, representing the original turfs used in their construction. Each revetment was 1.5m wide, and materials of Turf Wall, and 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 intervallum area
As already noted, the deposits identified as representing the levelling of the Turf Wall continued for a further 20m beyond the gully that marked its south face. They directly overlie 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 (2041). 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 0.14m high (2042, 2062, 2082, 2084), indicating that the mounds were originally c. 6m 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 2085).

The Vallum berms
As excavated, the Vallum berms were about 8.9m 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 6.2m.

The ditch fills proved most difficult to interpret during excavation owing to the complex slipping, folding and even intertearing of the strata. Careful analysis, however, identified nine discrete deposits.

The primary silt, a well defined 60–200mm thick spread of yellowish-red clay on 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 they are represented in the analysis, indicating 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 250). Measuring between 120mm and 160mm from 80mm and 200mm 200mm 120mm, and many slantly inclined with respect to the horizon, these blocks cannot be anything other than decayed and degraded turf – 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 dumps/lampfills 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 turf 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 evidence emerging at Crosby.

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 large rimmed dish of Black Burnished Ware Category 1, type 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 (2013) – that thought to have derived from the final levelling of the counterscarp bank.

Interpretation

Excavation and soil analysis demonstrated that the area investigated 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 2.48–3.8m 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, or 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 Wall, although basic details are well attested (p 75) It is not unusual for the actual ditch to vary 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. That the material 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 turf, and then with turf and lime. The material of both works must have come from the Vallum mounds. The pattern resembles closely the situation at Cock mouth 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 aerial view. Vegetational growth over this 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 pre-Roman landscape in the vicinity of Crosby, it has been noted that siting of the Wall ditch seems to have continued until the end of the Neolithic or 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, so the weathering and appearance of the blocks present, suggests that the stone tumuli might have been natural erosion and collapse, the rump of the Wall core after the faces had been robbed. The rutted 'slow track behind the robbed Stone Wall presents the act of robbing.

**Discussion**

by Tony Wilnott

The four projects described above form a small corpus of modern excavation on 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 Spar project (p 257). As such they offer an opportunity to discuss a number of comparative aspects within the Wall’s morphology, construction and development of the frontier as a whole.

The pre-Wall landscape

by Tony Wilnott 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 difficult to determine the extent that the landscape of the peripheral areas varied in detail, since the Wall, as an artificial feature, was not in situ for any great length of time. It is therefore necessary to discuss a number of comparative aspects of the pre-Wall landscape in the region, in order to gain an impression of the potential significance of such 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 archaeological sequence with which to constrain the immediate pre-Roman landscape. As Bidwell and Watson (1996, 40) put it: “The overall pattern resembles closely the situation at 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 evidence in the form of pollen and soil 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 Wall sector.

As noted above, there are many sites on the eastern flank of Hadrian’s Wall to show a transition from pre-Roman natural erosion and collapse. From east to west these are: Walside (Bidwell and Watson 1989, 25); Walker Farm, together with cord rig at Cawfields Farm, Greenlee Lough and Haltwhistle (Bidwell et al 1988, 153); Wintercote, sites only 1.5km apart. At Walkside a late 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 the Wall, it is not apparent that this could have acted as a terminal 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 hoist prints are directly sealed by the Vallum mounds.

Evidence from the central sector of the Wall is sparse, although the existence of the Wall was evidenced by a pre-Roman settlement at Milking Gap and, on the area (Huntley 1999, 51). Moving towards the western end of the Wall, however, the situation is not so clear, and site-specific studies is confirmed by the evidence from the regional pollen evidence which shows that the pre-Roman environment was generally one of grassland, although variations from year to year were quite significant.

At Denton a long sequence of cultivation evidenced by ard marks appears to have been succeeded by reversion to grassland, possibly as much as 12 tons of sandstone rubble. The ard marks could date to the Neolithic or early 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 the Wall, it is not apparent that this could have acted as a terminal post quem, although this is the only such example.

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The period immediately before the construction of the Turf Wall, but had supported an acid grassland or moorland environment like that at Appleby. This shows a marked contrast to the situation a few miles west at Tarraby (Smith 1978) and at other sites in Carlisle and Tyneside (Bell 1979; Topping 1989, 177; McCarthy 2002, 41), which demonstrate the practice of Predrury Corner (land-management). Despite this, 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 by Ewanrigg, Swarthy Hill and Dobcross. Certainly, the lack of any evidence to question, and an immediate pre-Roman Roman period (Higham 1982; Jones and exceptions, most of them belong to the pre-Roman occupation. Consequently, it is usually argued that with only rare exceptions, most of them belong to the Roman period (Higham 1982; Jones and Wiltshire 1983). Indeed, the evidence for clearance and cultivation need not prove the dominance of a primarily arable regime, as some of these sites could result from a secondary stage in woodland clearance, the breaking of topsoil in order to promote suitable pasture or grazing (Richardson 1978; Bell 1979–103–4). Evidence for reversion to grassland following episodes of ploughing might also reflect the impact of the building of the Wall on the local population. Tolan-Smith (1996, 77) therefore suggests that the small mounds of waste material from the Wall builders was derived from the Tyne–Solway isthmus. This must have yielded sufficient stone to create the built ditch, but would not have yielded sufficient stone to create the built ditch, let alone blocks for Wall building. The quarrying of dolerite must therefore have taken place. It was shown during excavation that many of the stone blocks were in fact 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 bank 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. There might be necessary to add the site of Bradley Farm to the Turks Bank, where the ditch is generally V-sectioned, and it seems 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 200a).

The turf and stone curtain was examined in 1982 during the three major sections, and additionally in exposures during the Milecastle Project at Wallby (Wall mile 62/3, p 170), Grimsdale (Wall mile 68/9, p 180) and Wormborough (Wall mile 70, p 185). At Black Carts, the only section made through the pre-Roman period was a broad glacis with a V-sectioned ditch. Although this is discussed in detail above, this form of feature was characteristic of the whole length of the Wall. Although this is discussed in detail above, the superstructure built to the Turf Wall sector, at Appletree it measured 10.61m wide and was 2.97 deep, so that the Turf 29b feature Broad Wall sector, where the Wall is generally V-sectioned, it is clear 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 200a).

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material and the chippings lay on the ground surface. At Stanwix (Smith 1978, 23–4), Turf Wall material filled a hollow way to mark the desired line. This evidence suggests a deliberate effort to ensure that the integrity of the ditch and berm to the north of the line was maintained from the Turf Wall phase in these areas.

The stone successor to the Turf Wall was recorded on the south side. At Mc50TW (High House) and Birdoswald, the track was cut into the turf 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 recorded on the south side. 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, 201). The Turf Wall, and the construction of the Stone Wall there was set back from that of its turf-built predecessor (Hodgson and McKelvey 1962, 46). At Walby West and also at Grinsdale in Wall mile 68/69 (p 176) the facing stones of the flag foundation had a repetitive pattern. At Walby West, 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. As characteristic of the Stone Wall in this sector there was no foundation trench beneath these footing flags.
Table 2 Comparative dimensions of the width of Vallum elements from excavated sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>N berm</th>
<th>S berm</th>
<th>Total width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolfoxes</td>
<td>4.90m</td>
<td>6.60m</td>
<td>11.50m</td>
</tr>
<tr>
<td>West Denton</td>
<td>5.79m</td>
<td>5.79m</td>
<td>11.58m</td>
</tr>
<tr>
<td>Appletree</td>
<td>6.50m</td>
<td>8.90m</td>
<td>15.40m</td>
</tr>
<tr>
<td>Limestone Corner</td>
<td>6.78m</td>
<td>8.75m</td>
<td>15.53m</td>
</tr>
<tr>
<td>Crispin Eden</td>
<td>6.50m</td>
<td>8.90m</td>
<td>15.40m</td>
</tr>
</tbody>
</table>

(Heywood 1965; Bidwell and Holbrook 1989, 152). These occasional patches of metallising 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 116ft 6in (= 120 pes Monetalis). An explanation for the similar appearance of the Vallum is reinforced by the fact that this is the very stretch in which Heywood noted that the Vallum had taken place. In the presence 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 re-cutting of the Vallum ditch, as the ditch section showed no evidence at all for re-cutting. This is entirely consistent with the Black Carts and Appletree results. These three observations suggest that for a considerable part of the length of the Vallum the marginal mound may be primary, or at least near-primary. This idea is supplemented by the fact that, as in the stretch from Denton westwards to Halton Chesters (Bidwell and Watson 1996), the south berm is wider than the north.

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The numbering and structure of the milecastles

by Paul Austin, 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 to form an auxiliary, defensive line along the Roman frontier. 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 variability 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 ran across the turrets and towers, towards the interior of the frontier district. The external south-east and south-west corners are always rounded in the same way (example: Mc48 (Poltross Burn), T49a (Willowford East), T48b (Willowford West)).

The most variable factor of the milecastle is the general aspect of the barrier. The doubling of the milecastle is designed to provide a barrier to the invasion forces. The most common way of doing this is by doubling the ditch, and so creating a more formidable barrier. The most common way of doing this is by doubling the ditch, and so creating a more formidable barrier. The most common way of doing this is by doubling the ditch, and so creating a more formidable barrier. The most common way of doing this is by doubling the ditch, and so creating a more formidable barrier. The most common way of doing this is by doubling the ditch, and so creating a more formidable barrier. The most common way of doing this is by doubling the ditch, and so creating a more formidable barrier.