The Needles Eye enclosure, Berwick-upon-Tweed

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SUMMARY

A substantial oval enclosure identified as a cropmark on aerial photographs lies at the top of the cliffs at Needles Eye, a short distance to the north of Berwick-upon-Tweed. Excavations undertaken across the westernmost portion of the enclosure in 2005, in advance of the development of an extension to an industrial estate, revealed significant archaeological remains. The evidence suggested that the enclosure was initially bounded by a palisade, subsequently replaced by a series of ditches on an increasingly large scale. Despite the fact that only a small proportion of the interior was exposed, significant artefactual assemblages were recovered, and of note was evidence of salt-processing carried out within the settlement enclosure during the Late Iron Age. This is the most northerly instance in Britain of such activity in the Iron Age. Analysis of the pottery assemblage demonstrates contact between the inhabitants of the enclosure and settlements further afield in the Cheviots. It is proposed that Needles Eye was a gathering place for the wider community where salt and other commodities may have been traded and exchanged. Following the infilling of the enclosure ditches there was a period of unenclosed settlement, and a dense cluster of pits of first- to second-century AD date demonstrate that the former enclosure continued as a focus for occupation.

INTRODUCTION

A PROGRAMME OF ARCHAEOLOGICAL INVESTIGATIONS was undertaken between 2004 and 2005 on a site on the northern outskirts of Berwick-upon-Tweed proposed for development by Berwick-upon-Tweed Borough Council as an extension to North Road Industrial Estate (subsequently renamed Ramparts Business Park). The stretch of coastline to the north of Berwick is dominated by steep cliffs, and in the vicinity of the site is the Needles Eye natural arch after which the area is named. The site, centred at NT 9880 5540, is roughly rectangular covering *c.* 10 ha. At the time of the investigations it was an open field, bounded to the west by the A1 trunk road, to the east by the East Coast mainline railway, to the north by arable fields, and to the south by the industrial estate (fig. 1).

Northumberland County Council Conservation Team (NCCCT) recommended that a phased programme of archaeological work be undertaken, and this was funded by Berwick-upon-Tweed Borough Council. An archaeological desk-based assessment (Bullen Consultants 2004) confirmed the archaeological significance of the site; cropmarks identified on aerial photographs suggested that a substantial sub-circular enclosure was located towards the eastern limit of the site, continuing beyond the railway line (fig. 2). Geophysical survey by GSB Prospection Ltd, on behalf of Northern Archaeological Associates (GSB 2004), identified the presence of a number of features of potential archaeological interest, including a

Fig. 1 Site location (Based on the Ordnance Survey map © Crown copyright).

Fig. 2 Aerial photograph of cropmarks, looking south-west. Reproduced with the permission of Tim Gates.

substantial ditch in the eastern portion of the site. The cropmark evidence and geophysical survey indicated that the enclosure covered an internal area of some 1.26 ha (fig. 3).

Following the geophysical survey, the area proposed for development was reduced and an evaluation of this area, by trial-trenching, was undertaken by Pre-Construct Archaeology Limited (PCA) in December 2004 to February 2005 (fig. 3). Significant prehistoric remains were uncovered across the easternmost third of the development site (PCA 2005a) and open area excavation was undertaken March–June 2005 as there was no possibility of preservation *in situ*.

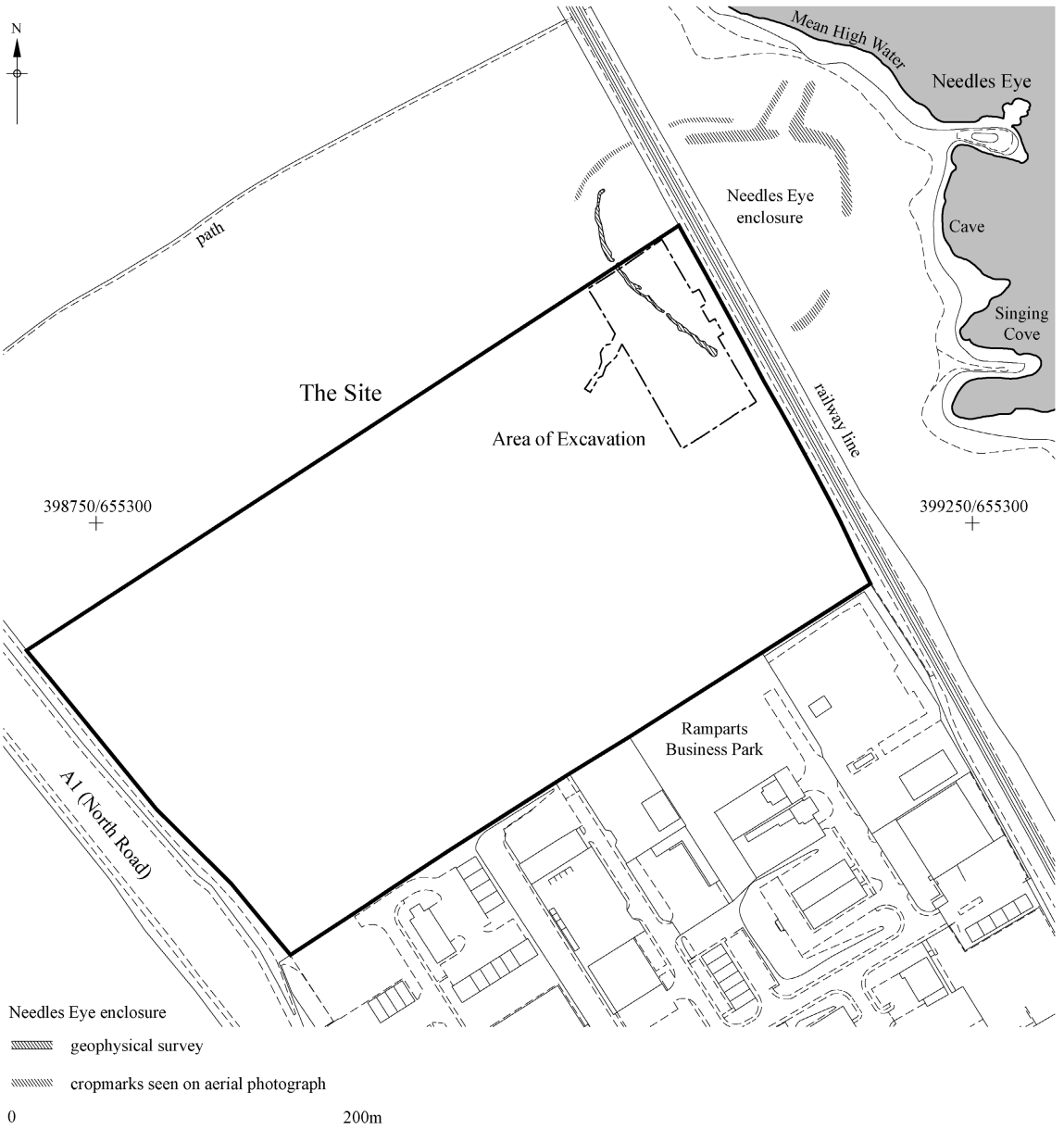


Fig. 3 Area of excavation showing the enclosure ditches identified by geophysical survey and on aerial photographs. (Based on the Ordnance Survey map © Crown copyright)

GEOLOGY AND TOPOGRAPHY

The Needles Eye enclosure lies on the coastal plain to the south of the Lammermuir Hills, 2 km north of the northern banks of the River Tweed and *c.* 3 km NNW of the mouth of the river. The underlying solid geology at the site is Carboniferous limestone which is overlain by thick deposits of glacial till (Taylor *et al.* 1971). The edge of the sea cliffs (at about 25 m OD) lies less than 150 m from the edge of the development site, and less than 50 m from the eastern boundary of the enclosure as identified as a cropmark (fig. 3). The precise location of the cliff edge during the Later Iron Age is not known, but erosion is likely to have been relatively minimal due to the hardness of the limestone cliffs in this area. The rock is laid down as a series of thick horizontal strata of variable strength and resistance to erosion; this has resulted in geological features such as headlands, caves, stacks and arches along this stretch of coastline (Guthrie *et al.* 2009, 42), including the arch known as Needles Eye. The rate of erosion of this part of the coastline has been calculated at around 0.01 m per year (Guthrie *et al.* 2009, 49), suggesting that the cliff edge could have been around 20 m further east at the beginning of the first millennium AD if this rate has remained constant. This coastline is macrotidal; the difference between mean high and low spring tides being over 4 m at Amble (NTSLF 2007). At the base of the cliff is a lower vegetated slope leading down to a rocky foreshore, a wide expanse of which is exposed at low tide, in places over 300 m wide (Guthrie *et al.* 2009, 42). Relative sea level has been falling in north Northumberland since the late Holocene, and models suggest a continued fall to present levels due to local isostatic uplift, estimated at 0.71 mm per year over the last 4000 years. Based on this rate, sea level at the beginning of the first millennium AD may have been over 1 m higher than at present.

The overall development site slopes down from west to east, reflecting the general topography of the area. The highest ground is along the south-western boundary of the site at *c.* 63.5 m OD, and the lowest towards the south-eastern corner at *c.* 42 m OD. Within the general slope are considerable localised undulations, with raised spurs, mounds and platforms. Beyond its boundaries, the site is overlooked by higher ground to the west. To the east, beyond the railway line, the general slope continues, albeit at a lesser gradient. The excavation area occupies a distinct, roughly level and slightly raised platform at *c.* 46 m OD; to the south and west, the ground slopes away gradually.

ARCHAEOLOGICAL BACKGROUND

The archaeological record for Iron Age settlement in south-eastern Scotland and north-eastern England is dominated by hillforts and enclosed settlements. Large numbers of hillforts survive as upstanding earthworks in the uplands, but aerial photography has demonstrated that hillforts and defended settlements are also present in some numbers in the lowlands (Gates and Deegan 2009, 149). Palisaded settlements, generally curvilinear but occasionally rectilinear, vary considerably in size from small homesteads to substantial and complex settlements (Harding 2004, 68; Gates and Deegan 2009, 144). On present evidence it seems that palisaded settlements were most common in the region between the Tyne and Forth in the first half of the first millennium cal. BC (Gates and Deegan 2009, 142). Excavations at hillforts in the region between the Tyne and Forth have demonstrated that many were originally established as palisaded enclosures (Gates and Deegan 2009, 142). The distribution of palisaded settlements may thus have been much more widespread, with such sites being masked by

later hillforts. The scale and complexity of hillfort earthworks varies considerably as does the size of the enclosed area (Harding 2004, 58). At the largest end of the scale are substantial hillforts such as Eildon Hill North and Traprain Law, in southern Scotland, which have been linked to the Selgovae and Votadini tribal groups respectively, and Yeavering Bell, on the edge of the Cheviots, which covers 5.6 ha. However, most hillforts are of much smaller proportions and are generally hard to distinguish from enclosed settlements. Closely datable artefactual material is generally scarce at hillforts, so those excavated prior to the advent of widespread radiocarbon dating programmes cannot be precisely dated and have generally been attributed to the last few centuries of the pre-Roman Iron Age (Harding 2004, 58). Within the vicinity of Needles Eye, excavations have been undertaken at an oval multivallate enclosure at Murton High Crags, located *c.* 6 km to the south-west (fig. 4). The earliest occupation was an unenclosed settlement of timber roundhouses subsequently enclosed by defensive circuits with an internal area of *c.* 0.7 ha (Jobey 1987, 176). An uncalibrated radiocarbon date of 180+/-80 BC came from the earliest defences and one of the enclosed timber roundhouses produced a date of 110 +/-100 BC. A subsequent phase of apparently undefended settlement, occupied until the late second or early third century AD, was characterised by stone-built roundhouses: at least nine examples have been recorded.

Single-ditched rectilinear or curvilinear enclosures are a common settlement type in the region and range in date from the mid first millennium BC to the Roman period (Haselgrove and Allon 1982, 44), although they are generally of late pre-Roman Iron Age or Roman date (Gates and Deegan 2009, 158). Such enclosures are well-documented in the uplands, but aerial photographic surveys and recent developer-funded excavations have demonstrated that these settlements are also prolific along the Northumberland and East Lothian coastal plains (Petts and Gerrard 2006, 53; Haselgrove and McCullagh 2000, 1). Unexcavated rectilinear enclosures with internal stone-built roundhouses have traditionally been dated to the late first and second centuries AD on morphological grounds; however, without excavation it is not possible to determine for certain the date of individual settlements (cf. Harding 2004, 181; Petts and Gerrard, 2006, 53) and the use of a building type as an indication of date should be treated with caution. Excavations at a rectilinear enclosure at Doubstead, *c.* 7 km south of Needles Eye (fig. 4), suggested that it was established during the Late Iron Age or early Roman period (Jobey 1982).

Settlement was well-established in the Cheviots by the Middle to Late Iron Age, with numerous small farmsteads and hillforts testifying to a well-defended agricultural landscape (Topping 2008). In the south of the area, enclosures are mainly rectangular, whilst, north of the River Coquet, curvilinear enclosures are more frequent. The distribution of hillforts is particularly dense along the valleys in the Cheviots; ten hillforts are known in both the Breamish and College valleys (Petts and Gerrard 2006, 39).

The Needles Eye enclosure was situated within the Roman frontier zone during various periods of Roman occupation. By the mid AD 80s, a road, known as the Devil's Causeway, had been constructed, branching off from Dere Street just to the north of Corbridge and running northwards along the coastal plain to the fort at Learchild on the River Aln, and to the fort postulated at the mouth of the Tweed, a short distance to the south of Needles Eye (Jobey 1973, 51; 1987, 172; Breeze and Dobson 2000, 11). The Devil's Causeway was maintained into the early fourth century (Breeze and Dobson 2000, 143) and a Roman military presence may have been in the vicinity of Needles Eye throughout much of the Roman period, despite the fact that it was over 80 km to the north of the frontier for much of the Roman occupation of Britain.

That occupation seems to have had little visible impact upon native settlement in the Tyne-Forth region. Later stone-built settlements overlie the defences of some hillforts (Gates and Deegan 2009, 153) and although stone-built roundhouses have traditionally been seen as being indicative of a Roman date, some stone settlements, such as Fawdon Dean in the Ingram Valley, date from the Late Iron Age (Frodsham and Waddington 2004). Excavations and a subsequent comprehensive radiocarbon dating programme at Broxmouth hillfort in East Lothian have shown that stone houses at this hillfort were of pre-Roman Iron Age date and that decommissioning of enclosure boundaries is not necessarily associated with a Roman date (Harding 2004, 59; Armit and McKenzie forthcoming).

Several cropmarks identified on aerial photographs within the near vicinity of the Needles Eye enclosure are interpreted as being of possible Iron Age or Romano-British origin, though none of these has been excavated. A recent landscape study of the Till-Tweed region (Passmore and Waddington 2009) includes detailed survey and analysis of three collections of aerial photographs taken in the valleys of the Rivers Till and Tweed (Gates and Deegan 2009). A greater number of hillforts and defended settlements were identified in low-lying parts of the Tweed Valley and along the coastal plain between the Rivers Tweed and Tyne than had previously been recognised. This has obvious implications for population density and for territorial organisation in the lowlands (Gates and Deegan 2009, 153). Sites identified within the two grid squares on the OS 1:10,000 scale quarter-sheets closest to the Needles Eye enclosure are plotted in fig. 4. Less than 1 km to the south-west is a circular or D-shaped enclosure at Conundrum South (fig. 4.5), surrounded by two ditches and having a maximum internal diameter of around 75 m. The scheduled hillfort at Camphill (National Monuments Record (NMR) Monument No. 4224), a sub-circular enclosure bounded by three concentric ditches with an internal area of *c.* 0.2 ha, lies just under 2 km to the south-west of the Needles Eye enclosure (fig. 4.2). A rectilinear annexe with an internal area of *c.* 0.4 ha contains cropmarks of two possible roundhouses; such annexes occur on a number of lowland forts, and Gates and Deegan (2009, 154–5) suggest that these may have been added at a late stage in the occupation of hillforts and could be a clue to Romano-British settlement in the lowlands. The D-shaped hillfort at Halidon Hill (NMR Monument No. 4227), *c.* 2.5 km to the south-west of the Needles Eye enclosure (fig. 4.3), covers an area of 0.26 ha. Two entrances are visible, in the south-east and south-west corners, both of which have linear ditches and double-ditched trackways leading east and west from them. Also in the very near vicinity of Needles Eye is Prior House 2 (fig. 4.10), a small oval enclosure defined by a single ditch with an internal area of around 0.08 ha. Without excavation it is not possible to prove which of these sites are contemporary, but the number of cropmarks sites identified in the Needles Eye environs does indicate that this coastal region may have been quite extensively exploited and settled during the Late Iron Age and early Roman period.

THE ARCHAEOLOGICAL EXCAVATION

The excavation area, located in the north-eastern corner of the development site, was rectangular in plan and measured *c.* 105 m by *c.* 55 m (fig. 3). An irregular western extension and two small extensions to the east were excavated to expose archaeological remains that continued beyond the limits of the main excavation area. The total area investigated was *c.* 0.55 ha. A brief for the archaeological excavation was prepared by NCCCT (2005) and a Project Design was compiled by PCA (2005b). A post-excavation assessment report on the

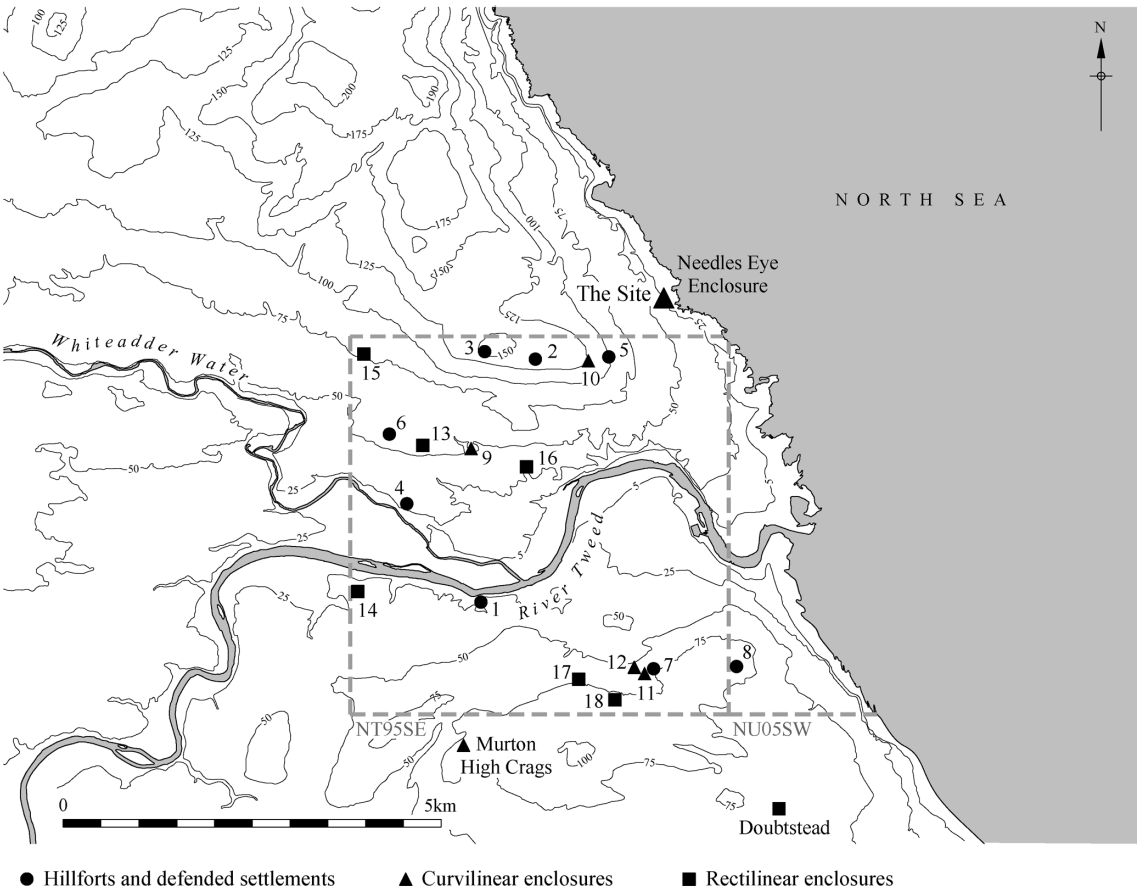


Fig. 4 The topography, and the cropmark sites in the vicinity, plotted in OS grid squares NT 95 SE and NU 05 SW (after Gates and Deegan 2009). Key to cropmark sites, identified by their National Monuments Record Monument Number (See www.pastscape.org.uk).

Ref.	NMR Monument No.	Name	Ref.	NMR Monument No.	Name
1	4216	Canny Shiel	10	1384384	Loanend E.
2	4224	Camphill	11	1384335	Prior House 2
3	4227	Halidon Hill	12	1384402	Prior Hill W.
4	4272	Whiteadder Bridge	13	4273	SE Baldersbury Hill 1
5	1384294	Conundrum South	14	4278	West Ord 1
6	1384297	Baldersbury Hill	15	1384290	Baitstrand W
7	1384335	Prior House 1	16	1384299	High Leatham S
8	6554	Springhill	17	1384305	Ord Mains SER
9	4233	White Damhead Burn	18	1384318	South Ord

findings of the excavation was compiled by PCA and this contains full details of all methodologies employed during the fieldwork and the initial post-excavation analysis (PCA 2006). The Northumberland HER holds a copy of this report. The site archive, comprising written, drawn and photographic records, along with the artefactual and biological material recovered from the investigations, will be deposited at an appropriate location under the site code NRB 05. Full specialist reports undertaken for the publication stage of the work are available in the digital archive which can be accessed at www.pre-construct.com.

In this publication text, context numbers assigned on site during the excavation are listed in square brackets, e.g. pit [224]. A series of enclosure ditches were assigned a sequential number in post-excavation to simplify description, and these are listed in this publication text as, e.g., Ditch 1.

THE ARCHAEOLOGICAL REMAINS

PHASE 1: NATURAL DEPOSITS

Modern overburden, which varied in thickness from *c.* 0.40 m–1 m, was removed by mechanical excavator, and for the most part revealed the upper interface of the natural 'drift' sub-stratum into which archaeological features were cut. This drift material — encountered within all evaluation trenches investigated across the development site — largely consisted of clay-rich deposits with patches of gravel. Considerable variation was observed within the sub-stratum exposed across the main excavation area. It generally comprised yellowish brown, pinkish brown, and grey sandy silt with areas of sandy clay. The excavation area was located on a slightly raised sandy plateau at a level of *c.* 46 m OD, a localised free-draining area compared to the relatively poorly-drained land around it. Undulations in the topography are likely to have been more pronounced in past times as colluvium had accumulated in the bases of natural depressions. The sandy plateau on which the excavation area was situated may therefore have once been more pronounced than in recent times.

PHASE 2.1: POSSIBLE PALISADED ENCLOSURE

The earliest surviving archaeological features recorded at the site were two narrow linear features, aligned north-west to south-east, recorded for a total distance of 35 m. Feature [140], which measured 12.70 m by 1 m by 0.45 m deep, had a rounded terminal at either end and moderately steep sides and concave base (fig. 5). Three small postholes were situated close to the eastern edge of this feature, near to its north-western terminal. Less than 2.50 m to the north-west was the truncated terminal of another linear feature [95] of similar profile and dimensions. Its western edge was recorded in two further areas, this feature having been largely truncated by later ditches.

The profile and dimensions of the Phase 2.1 linear features are similar to features identified as palisade trenches at other enclosed sites in the region, such as the curvilinear enclosure at Whittingehame Tower, in East Lothian (Haselgrove *et al.* 2009a, 28), and the enclosure at Murton High Crags (Jobey 1987). No stone packing was evident within the Needles Eye features, though it is possible that this had been removed. The scarcity of stone packing in a palisade trench at the curvilinear enclosure at Standingstone, East Lothian, suggested to the excavators that it had been removed ahead of the construction of a second palisade (Haselgrove *et al.* 2009b, 56). Another possibility is that the Needles Eye features had contained a

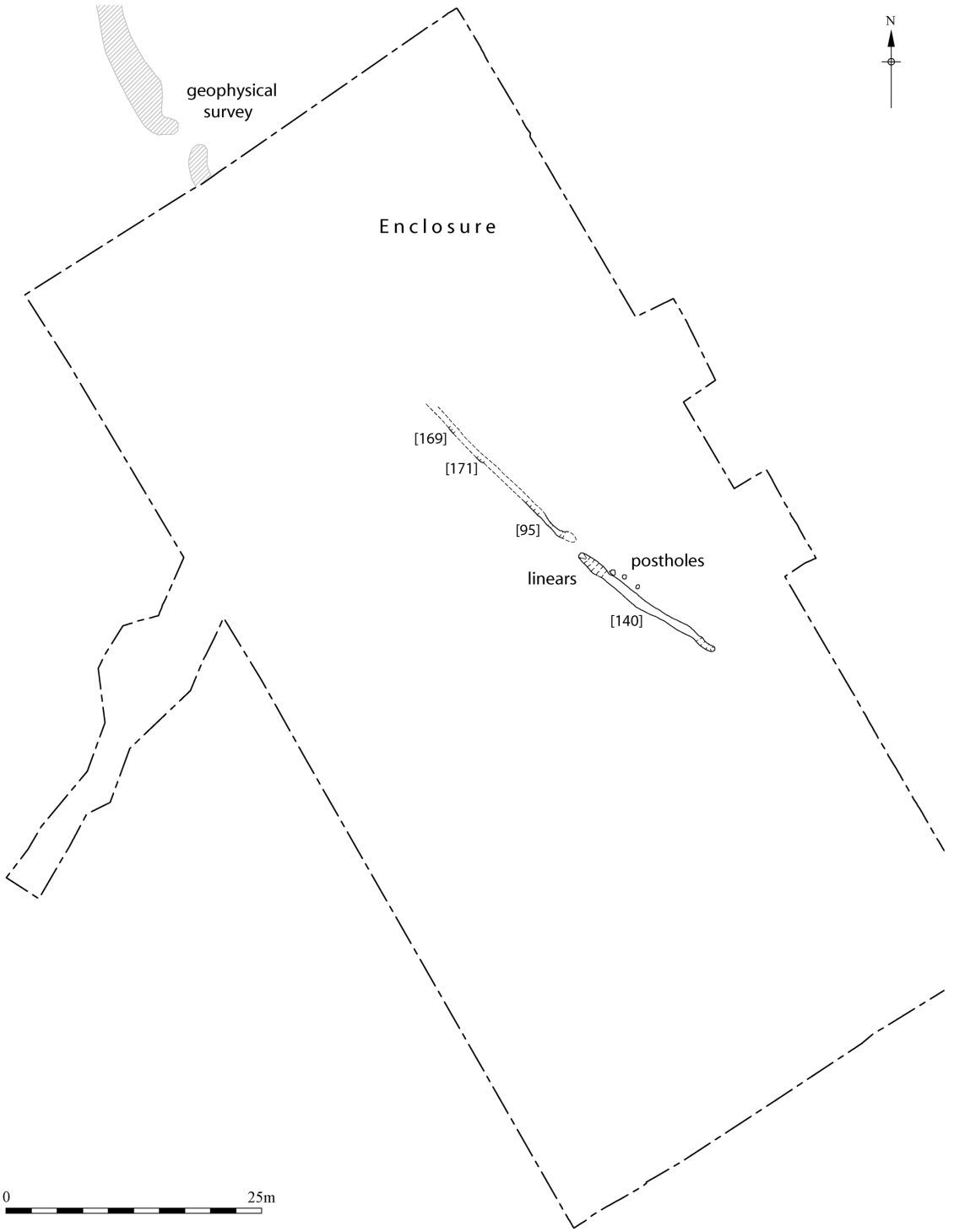


Fig. 5 Phase 2.1 features

continuous row of posts, negating the need for packing, as suggested for a palisade trench at the Chester House rectilinear enclosure, on the coastal plain to the south of the River Coquet (Holbrook 1988, 52). The subsequent enclosure ditches at the Needles Eye enclosure closely followed the alignment of the Phase 2.1 features, and it is thus possible that its first incarnation was as a palisaded enclosure, dismantled ahead of the construction of the ditched enclosure. No artefactual material was recovered from the Phase 2.1 features, so the date of origin of the Needles Eye enclosure is not known.

PHASES 2.2–2.5: THE NORTHERN ENTRANCE OF THE DITCHED ENCLOSURE

The enclosure was subsequently bounded by ditches, aligned north-west to south-east, which had evidently silted-up and then had been reinstated several times. An entrance into the enclosure was located within the northern part of the excavation area and as the precise location of this entrance varied over time, it was possible to identify four phases of ditches (Phases 2.2–2.5) in this part of the site (fig. 6). Beyond this entrance, these ditches were truncated by the ditch of the latest enclosure, so that it is not possible to determine if Phases 2.2–2.5 represent reinstatements of the entire enclosure circuit, or localized modifications to the entrance.

Phase 2.2 Ditch 1 comprised the south-eastern terminal of a ditch which measured 2.10 m wide by 1.30 m deep and which survived for a length of 3.45 m (fig. 6). The terminal was square in plan with rounded corners and steep sides, stepping down to a near vertical-sided slot, *c.* 0.60 m deep and 0.90 m wide, with a concave base. The basal slot is reminiscent of a palisade slot, but no stone post-packing was present and the ditch fills demonstrate that this had been an open feature with the slot perhaps relating to periodic clearing out of the ditch. (At Standingstone a ditch of similar profile and dimensions also had a vertical-sided narrow basal slot interpreted by the excavators as not representing a palisade slot: Haselgrove *et al.* 2009b.) On both of the upper sides of Ditch 1, but not in the basal slot, was a deposit of reddish pink sandy clay, *c.* 0.15 m thick, apparently representing a deliberate lining which was perhaps used to consolidate the upper sides of the ditch where the localised sandy natural sub-stratum may have been liable to erosion and collapse. The fill of the basal slot comprised yellowish brown silty sand and gravel, probably derived from weathering and slumping. The upper portion of the ditch was infilled with a deposit of silty sand and gravel, 0.45 m thick. A feature, initially thought to be a lightly-fired ceramic object, was found in the upper part of this fill; further analysis suggested that this was actually where a small timber upright had burnt in situ and the surrounding localised clayey natural deposit had become hardened. An upright timber may thus have marked the enclosure entrance at some stage after Ditch 1 had begun to silt up. The latest deposit within Ditch 1 comprised sandy silt, up to 0.20 m thick. An opposing terminal could not be identified for Phase 2.2 due to extensive truncation by later phases of activity, but the entrance must have been at least 3.60 m wide as a 'causeway' of undisturbed ground this width was exposed to the south-east.

Ditch 1 was truncated to the north-west by Phase 2.3 Ditch 2; this had a rounded terminal at its south-eastern end and measured 2.70 m wide by 1.20 m deep; it survived for a distance of 4.40 m (fig. 6). Two sections were excavated through Ditch 2; one at its terminal, the other *c.* 2 m to the north-west at the intersection with a Phase 2.7 ditch. Ditch 2 was similar in profile to Ditch 1, with a steep-sided and concave-based slot which, at its most pronounced, was 0.44 m wide by 0.40 m deep (section 1, fig. 6 and section 5, fig. 11). At the terminal, a primary silty sand fill [148], which was up to 0.15 m thick, produced a single sherd of pottery. The

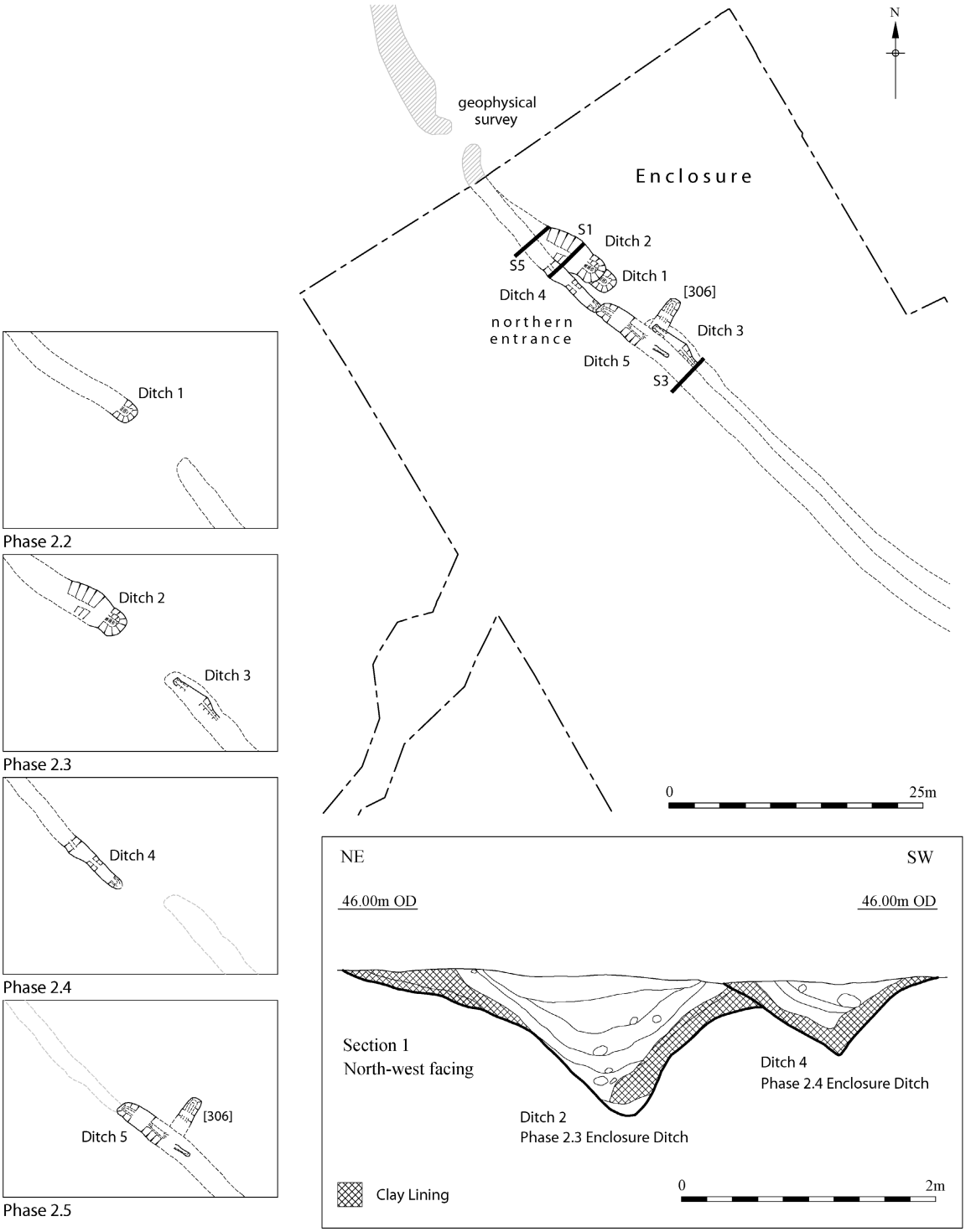


Fig. 6 Phases 2.2–2.5: the ditches around the northern entrance.

secondary fill [143] comprising firm reddish pink sandy and silty clay, up to 0.25 m thick, may have included redeposited clay lining from Phase 2.2 Ditch 1. This produced a fragment from a saddle quern or mortar (SF18). Several further fills were recorded within Ditch 2, mainly comprising material consistent with rapid accumulation and derived from weathering of the ditch sides. Fill [132], which was greyish brown sandy silt with pink clay mottling, produced six sherds of pottery, including five from the same vessel. Soil samples taken from fills [143] and [132] produced low concentrations of charred plant remains, including barley grains and chaff, and wheat grains. Fragments of birch, hazel and willow/poplar charcoal were also present. The two upper fills [127] and [128] of Ditch 2, which had a combined thickness of 0.44 m, were broadly similar, comprising charcoal-rich sandy silt deposits. Their composition is perhaps more consistent with material derived from occupation activity, either deliberately used to backfill the ditch or gradually accumulating within the ditch. A single sherd of pottery from a very large vessel was recovered from fill [128] and a fragment of a possible saddle quern or rubber, SF17 from [127].

The basal primary fill [210] recorded in the section excavated across Ditch 2 to the north-west of the terminal comprised orange-pink silty clayey sand from which a single sherd of pottery was recovered. A deposit of greyish pink clay, 80 mm thick, was recorded on the upper portion of the north-eastern edge of the ditch, overlain by a similar deposit up to 0.15 m thick. On the south-western side of the ditch was a deposit of hard brownish pink clay, 0.24 m thick, overlain by brownish pink silty clayey sand up to 90 mm thick. These deposits are interpreted as clay linings — like that identified in Ditch 1 — placed on the sides of the ditch to prevent collapse and erosion (section 1, fig. 6). A series of similar deposits, greyish brown and brownish grey silty sands, [213]–[217] formed the upper ditch fills. A small assemblage of pottery was recovered from fill [214]. Sherds of conjoining pottery were identified in different fills of Ditch 2 and between both excavated sections.

A charred wheat grain from fill [143], the secondary silting fill within the terminal, was submitted for radiocarbon dating using the Accelerator Mass Spectrometry Technique (AMS) and this produced a date of cal. 350–50 BC (SUERC–32896). Another wheat grain, from fill [132] which was located in the upper part of the terminal beneath fills [127] and [128], produced an AMS date of cal. 160 BC–60 AD (SUERC–32895). Carbonised residue adhering to the internal surface of a pottery sherd from fill [214] produced two possible dates due to the calibration curve: cal. 500–460 BC and cal. 430–380 BC (Beta–208953).

To the south-east of Ditch 2 the lower portion of a heavily truncated linear feature (Ditch 3) was recorded within a section excavated across the intersection of two later Phase 2.6 and 2.7 ditches. Ditch 3 had a squared terminal at its north-western end and was recorded for a distance of 6.85 m, continuing to the south-east beyond the excavated section (fig. 6). The maximum surviving width and depth were 1.20 m and 0.71 m, respectively. In profile, the ditch had steep sides and a concave base, representing a lower slot in the base of the truncated ditch. Ditch 3 is interpreted as the opposing terminal to that formed by Phase 2.3 Ditch 2, i.e. the south-eastern side of the northern entrance into the enclosure. The interval between the two ditches was 7 m, although originally the entrance would have been slightly narrower as the upper part of Ditch 3 had been truncated. If both ditches had originally been similar in dimensions, then the causeway can be estimated to be *c.* 6 m wide. Three fills were recorded within Ditch 3, each comprising sandy silt or silty sand, probably derived from weathering.

Phase 2.4 Ditch 4, situated immediately to the south-west of Ditches 1 and 2, was 1.20 m wide and 0.60 m deep, and survived for a length of 6.70 m. Ditch 4 represents the surviving

section of a ditch delineating the repositioned north-western side of the northern entrance into the enclosure. As with Phase 2.2, there was no trace of a corresponding ditch forming the south-eastern side of the entrance. The dimensions of this ditch are noteworthy, far narrower and shallower than the ditches assigned to the preceding and subsequent phases. Its pronounced V-shaped profile was also noticeably different (section 1, fig. 6). Three sections were excavated across Ditch 4 and a comparable sequence of deposits was recorded in each; stiff brownish pink clay lined the sides and base of the ditch and this was overlain by silty sand. A bulk soil sample taken from fill [249] produced a relatively high concentration of charred plant remains, including barley grains, 6-row barley rachis fragments, and emmer and spelt wheat glume bases. A charred barley grain produced an AMS date of cal. 160 BC–50 AD (SUERC–32899). A small stone ball, a type of object identified often as a slingshot (see Wright below) was recovered from the upper fill [251].

The south-eastern end of Ditch 4 was truncated by the north-western terminal of Phase 2.5 Ditch 5. This had a rounded terminal and was 2.10 m wide by 1.05 m deep, and survived for a length of 5.60 m. The ditch had steep sides and a steep-sided basal slot, this being the only part of the ditch surviving truncation to the south-east (fig. 6). The primary fill of the basal slot comprised lenses of sand and sandy clay, derived from weathering of the sides, overlain by laminated lenses of yellowish brown and pink silty clay and sand. This material was essentially sterile and was probably derived from a combination of material weathered from the sides of the ditch and wind-blown material. The upper fill, which was *c.* 0.45 m thick, comprised brown clayey sand with occasional charcoal flecks. A short length of ditch [306] was located approximately at right angles to Ditch 5 on its internal side. No stratigraphic relationship survived between Ditch 5 and [306] as they had both been truncated by a Phase 2.6 ditch; it has been placed with this phase of activity as it is the latest possible phase to which it may have been associated. Two sherds of pottery were recovered from this feature.

As discussed above, it was not possible to determine from the surviving evidence whether the entire circuit of the enclosure was reinstated during each of Phases 2.2–2.5. Parallels can be seen at the Fishers Road West enclosure in East Lothian where the opposing sides of an east-facing entrance survived because the latest ditch reinstatement at that enclosure was farther to the east (McCullagh and Mills 2000). Here too the entrance terminals were evidently subject to a complex sequence of re-alignments.

PHASE 2.6: THE DITCHED ENCLOSURE

Traces of Phase 2.6 Ditch 6 were observed in most of the sections excavated across the latest enclosure ditch, Phase 2.7 Ditch 7 (these sections are numbered slots 1–9 on fig. 8). The arc of Ditch 6 that was aligned north-west to south-east was *c.* 4 m wide by 1.40 m deep, and *c.* 52.50 m long (fig. 7). A full profile did not survive at any point, but the excavated sections demonstrated that Ditch 6 had a narrow basal slot (see fig. 10 and Sections 3 and 4, fig. 11). Ditch 6 had a rounded terminal in the south-east, representing the north-western side of an entrance into the enclosure; the opposing side was outside the excavated area but the minimum width of this entrance must have been *c.* 10 m. Leading up to the southern entrance terminal was a sequence of narrow irregular linear features, aligned approximately at right angles to the enclosure ditch. The most extensive of these, feature [14], was traced for a distance of 40.80 m and was 0.28 m wide and 0.21 m deep, and had irregular sides and a concave base (fig. 7). These features may represent a series of fencelines demarcating an access route

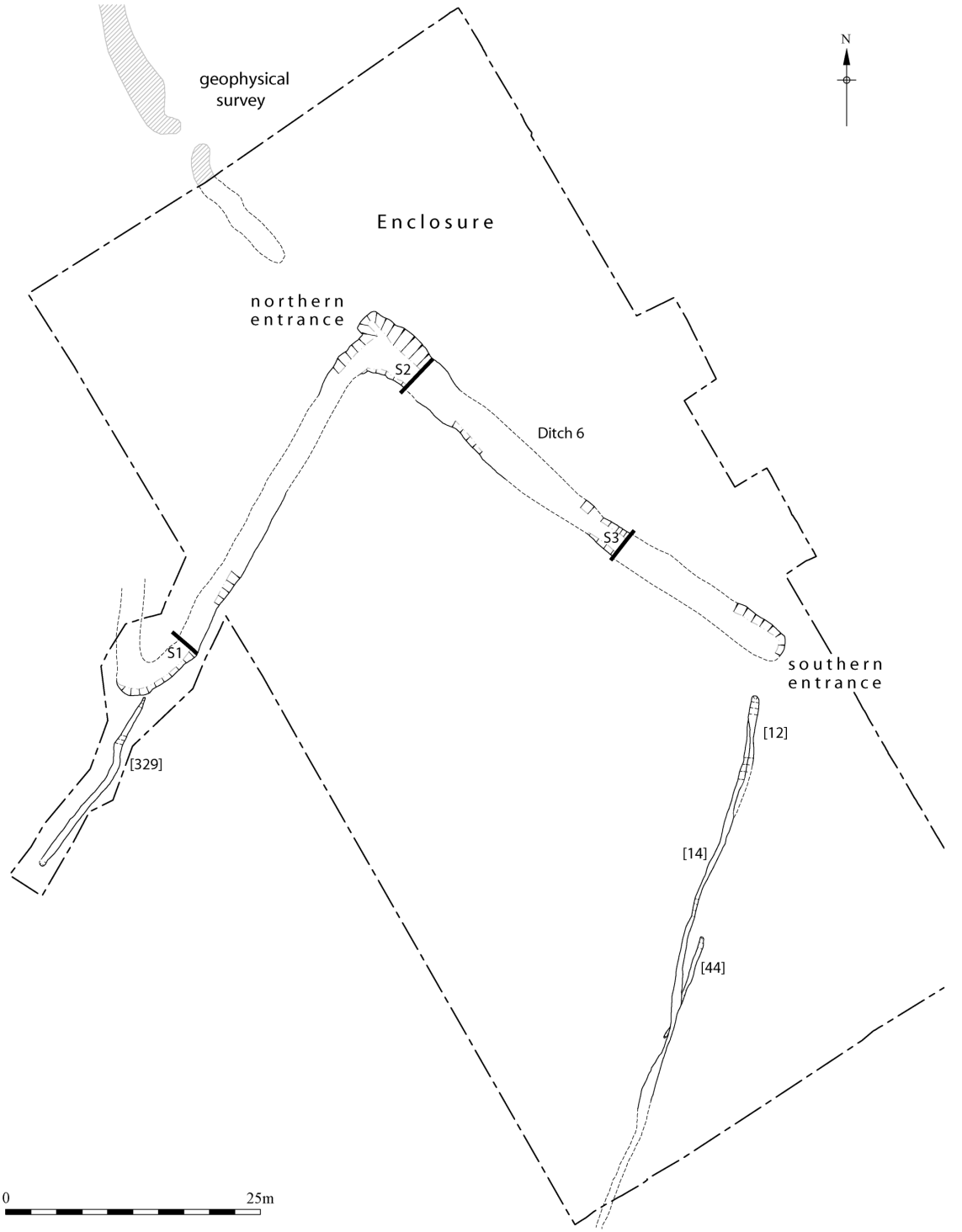


Fig. 7 Phase 2.6: the enclosure ditch and associated features.

into the southern entrance of the enclosure. A similar arrangement was recorded at the sub-rectangular enclosure at Knowes, East Lothian where a linear feature at right angles to the entrance is interpreted as having been constructed to guide movement in or out of the enclosure (Haselgrove *et al.* 2009c). The broad width of the Needles Eye southern entrance and the presence of these fencelines suggest that animals were herded through this part of the enclosure.

The north-western end of Ditch 6 had a squared terminal, representing the south-eastern side of the northern entrance into the enclosure, evidently still maintained during this phase (fig. 7). The opposing side was not identified, but the minimum width of the entrance during Phase 2.6 must have been 10 m. From the north-western terminal, another length of ditch ran at right angles for a distance of 42.50 m south-westwards, before turning sharply to the north at its south-western limit. It was not possible to determine for certain whether this segment of ditch, aligned north-east to south-west, represented a later addition to the enclosure, though the presence of the squared terminal at the northern entrance suggested that this was the case, and that the element that was aligned north-west to south-east (bounding the enclosure) had been cut first. A narrow irregular linear feature [329], similar in form and profile and running parallel to the fencelines leading up to the southern entrance, ran from the south-western corner of the ditch extension for a distance of 18 m (fig. 7). This too may represent a fenceline, perhaps constructed to control stock being herded into or out of the enclosure.

The fills of Ditch 6 largely comprised sandy silts and silty sands of varying hues with laminations indicative of deposits derived from weathering of the ditch sides and wind-blown sediments. These deposits demonstrate that Ditch 6 was not maintained but became largely infilled with redeposited natural material, along with some occupation debris. The secondary fill [261] recorded within slot 4 produced a single sherd of pottery and the tertiary fill [260] produced three sherds of pottery that conjoined with sherds from Phase 2.8 activity, although (as discussed below) the origin of this material is open to question. Occasional small and medium-sized fire-cracked stones were observed within fill [147] in slot 5 and this may represent hearth debris. A fragment of hazel charcoal from a secondary fill [188] within slot 8 produced an AMS date of cal. 356–60 BC (SUERC–37168 GU–25595). A concentration of limpet and periwinkle shells and 20 fragments of bone were recovered from this deposit with cattle, sheep and pig identified.

PHASE 2.7: THE LATEST ENCLOSURE DITCH AND INTERNAL FEATURES

Ditches 7 and 8

The complete circuit of Ditch 6 was recut by the final reinstatement of the enclosure ditch, Phase 2.7 Ditch 7 (fig. 8). The segment of Ditch 7 that was aligned from north-west to south-east, bounding the enclosure, extended for a distance of 50 m and measured between 3 m and 5 m wide and up to 1.25 m deep — a similar depth to that of the previous ditch. It had gradually sloping stepped sides and a narrow basal slot, the base of which varied from concave to flat (fig. 10; sections 3 and 4, fig. 11). This had a rounded terminal in the south-east which formed the north-western side of the southern entrance into the enclosure (fig. 8; fig 9). The opposing side was not present within the excavated area, but as with Phase 2.6, the southern entrance must have been at least 10 m wide. Two narrow linear features [10] and [25], recorded for a total distance of *c.* 38 m, led up to the enclosure entrance and feature [10] ran around the ditch terminal inside the enclosure for a distance of 4.80 m. These were very

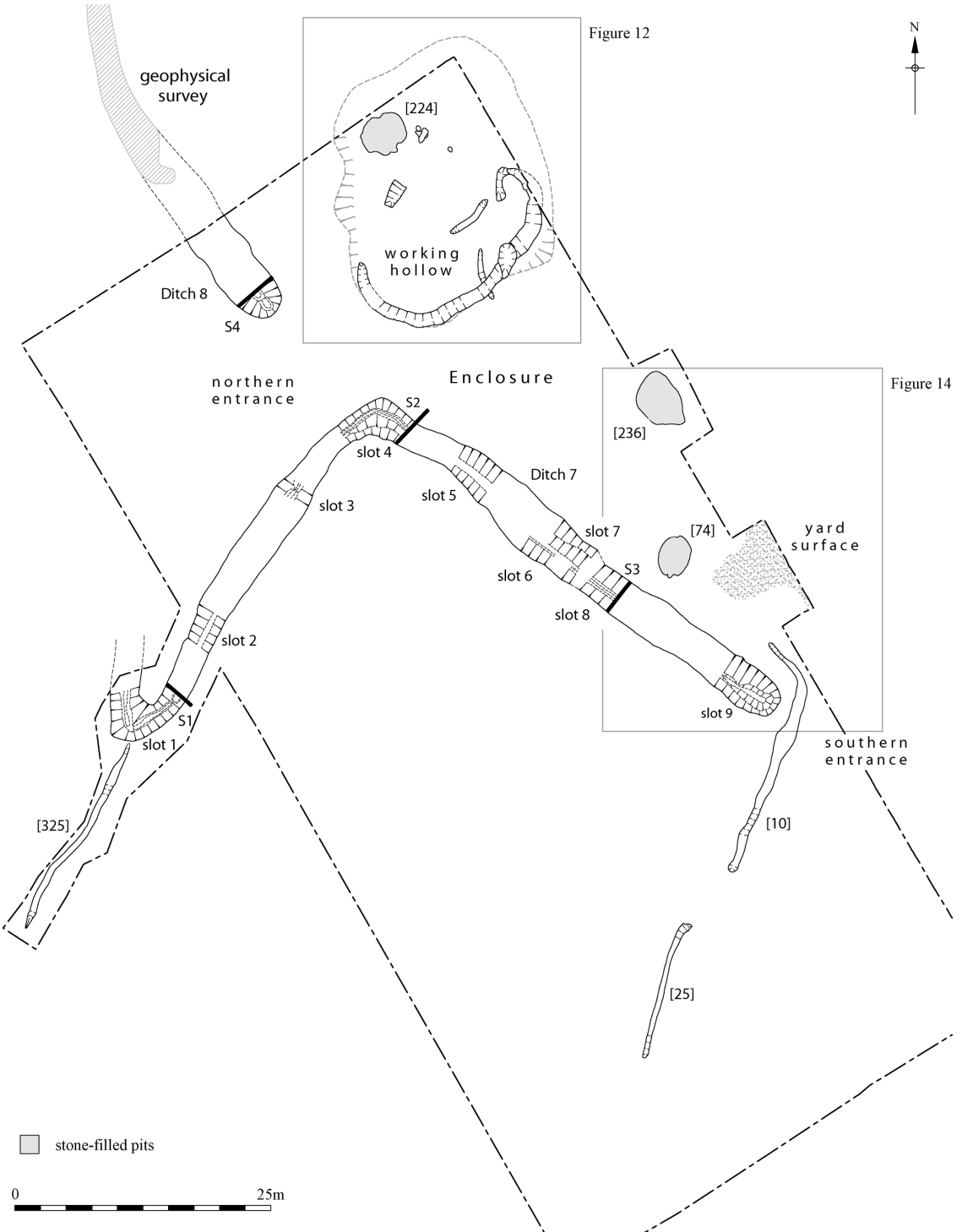


Fig. 8 Phase 2.7: the enclosure ditch and associated features.

Fig. 9 The terminal of Ditch 7 at the southern entrance, looking east.

similar to the Phase 2.7 fencelines and are likely to have performed the same function: demarcating an access route through the southern entrance. The fence was situated 2 m from the inner edge of the ditch, indicating that an internal bank may not have been present close to the entrance terminal. No traces of a bank survived *in situ* at the site, and it was not possible to determine from the ditch infills on which side of the enclosure it lay, although it is usual for enclosures in the region to have internal banks.

At the northern entrance into the enclosure, Ditch 7 turned at right-angles to run south-westwards for 42 m. Unlike Ditch 6, the two segments had been excavated as one continuous feature, before turning sharply to the north for a distance of 7 m, where it met the limit of excavation (fig. 8). Fenceline [325] ran from the south-western corner of Ditch 7 for a distance of *c.* 20 m (fig. 8). The segment of Ditch 7 that was aligned north-east to south-west measured 2 m to 3.50 m in width and was up to 1.10 m deep. It had moderate to steep sides, with some irregularity in places, and a concave base, with a steep-sided basal slot (section 2, fig. 11). This basal slot, although again reminiscent of a palisade slot, is not interpreted as such and is more likely to be the result of the ditch either having been initially dug to this profile or having had its base cleared out. There are several parallels in the region for enclosure ditches of similar size and profile, such as at Whittingehame Tower, in East Lothian, where the recut of the outer enclosure ditch and the main ditch also had pronounced slots in their bases (Haselgrove *et al.* 2009a, 29). Jobey encountered such ditches at the rectilinear enclosures at Burradon and Hartburn, both in Northumberland (Jobey 1970; 1973). At the latter site, Jobey described the slot as a distinct 'working trench' created either when the ditch was originally excavated, or in subsequent clearing out (Jobey 1973, 18).

Fig. 10 Section through Ditches 6 and Ditch 7 (slot 8), to right and left, respectively, looking north-west; scale 2 m.

Both sides of the Phase 2.7 northern entrance into the enclosure were identified; the south-eastern side was marked by the corner of Ditch 7 and the north-western side by the terminal of Ditch 8, these forming an entrance, 13 m wide. This broad width, coupled with the presence of the linear features extending away from the entrance at right angles, suggests that animals may have been herded into the enclosure. Ditch 8, aligned north-west to south-east, was recorded for a distance of 10.40 m, continuing beyond the limit of excavation (fig. 8). It was 4.40 m wide and 1.20 m deep and had a broad rounded terminal with moderately steep sides and a basal slot, although this was less pronounced within the excavated section than the slot within Ditch 7 (section 5, fig. 11). The composition of the Ditch 8 fills suggested that it had been filled with redeposited natural material and no artefactual material was recovered.

The primary fills of Ditch 7 generally comprised silty sands consistent with material derived from the weathering of the ditch sides and wind-blown material. The primary fill [302] of Ditch 7, adjacent to the limit of excavation at the north-western end of slot 1 (fig. 8), was, in contrast, a clayey waterlogged deposit up to 0.15 m thick. A bulk soil sample produced a small range of waterlogged plant remains including rush seeds, which reflect damp conditions in and beside the ditch, and other other taxa which probably derived from waste or disturbed ground near the ditch (see O'Brien, below). The composition of this assemblage, along with the insect species recorded, indicates that the ditch was not permanently waterlogged and probably dried out in the summer months. Other insect species identified are associated with dung and refuse, suggesting the presence of pastureland in the vicinity (see Davis, below). The composition of the overlying fills within slot 1 indicated that the

south-western portion of Ditch 7 probably infilled naturally with slumped and weathered material, in contrast to the segment of ditch that bounded the enclosure, the upper part of which seems to have been deliberately infilled, as described in Phase 2.8 below. A single sherd of pottery was recovered from each of the primary fills within slot 5 ([121]) and slot 4 ([154]), and eight sherds were recovered from a secondary silting fill [87] within slot 8 (see fig. 8). The latter fill also produced a smooth pebble tool (SF26) made from a beach or river pebble.

Internal features

Several features were located within the enclosure (fig. 8); in the absence of closely datable artefactual material these have been assigned to the last phase of the enclosure ditch, although it is acknowledged that some may have been in use during earlier phases of enclosure, and that others may date from the period when the latest ditches were no longer maintained. The identification of conjoining sherds of pottery recovered from the infilling of some of these features and from the upper fill of Ditch 7, discussed further below, indicates that some internal features went out of use when the latest enclosure boundary was filled in.

In the north-eastern corner of the excavation area, a substantial depression extended over an area measuring *c.* 22 m by 20 m, extending beyond the northern and eastern limits of excavation (fig. 12). The base of this depression in the south and east was between 0.30 m and 0.60 m below the level of the natural sub-stratum external to the feature. The depression may originally have been more pronounced if truncation by later ploughing affected this area, although the extent of any such truncation is not known. The base of the hollow sloped down from a highest level of 45.50 m OD in the south and west to 44.20 m OD in the north and 45.00 m OD in the east, although this was a very gradual slope as the feature extended over such a large area. This feature has been interpreted as a 'working hollow,' which would have offered some protection from the elements for whatever activity was undertaken here. It was not possible to determine whether this was a natural depression or a cut feature; it may perhaps have been a combination of the two, a natural dip in the topography that had been deliberately modified. The hollow was situated relatively close to the northern entrance and would have meant that the flow of movement could not run directly north-eastwards into the enclosure but would have had to turn to the east or north. This suggests that if deliberate landscaping had taken place, then activity within the hollow probably dated from a time when the northern entrance was no longer used for movement of animals through the enclosure. It presumably did not entirely block access as the distance from the side of the entrance to the hollow was over 7.50 m, and the entrance could still have been used for human ingress and egress. The identification of conjoining pottery sherds from the infill of the hollow and from the upper backfills of the enclosure ditch would suggest that when the hollow went out of use, the enclosure ditch was still open, though evidently it was not maintained.

In the base of the depression, close to its southern limit, was a deposit [301] of orange brown sandy silt, 0.15 m thick, with frequent cobbles and charcoal flecks, recorded over an area measuring 5.80 m by 3.40 m. This deposit was presumably derived from activity taking place within the hollow and accumulated during its earliest use. A fragment of a small mortar or socket stone (SF25) was recovered. Three short linear features of uncertain function were located in the eastern part of the hollow. One of these, feature [192], produced a single sherd of pottery. The other two had been truncated by a curvilinear feature [298], which also truncated deposit [301]. This ran along the southern and eastern edges of the hollow and had a

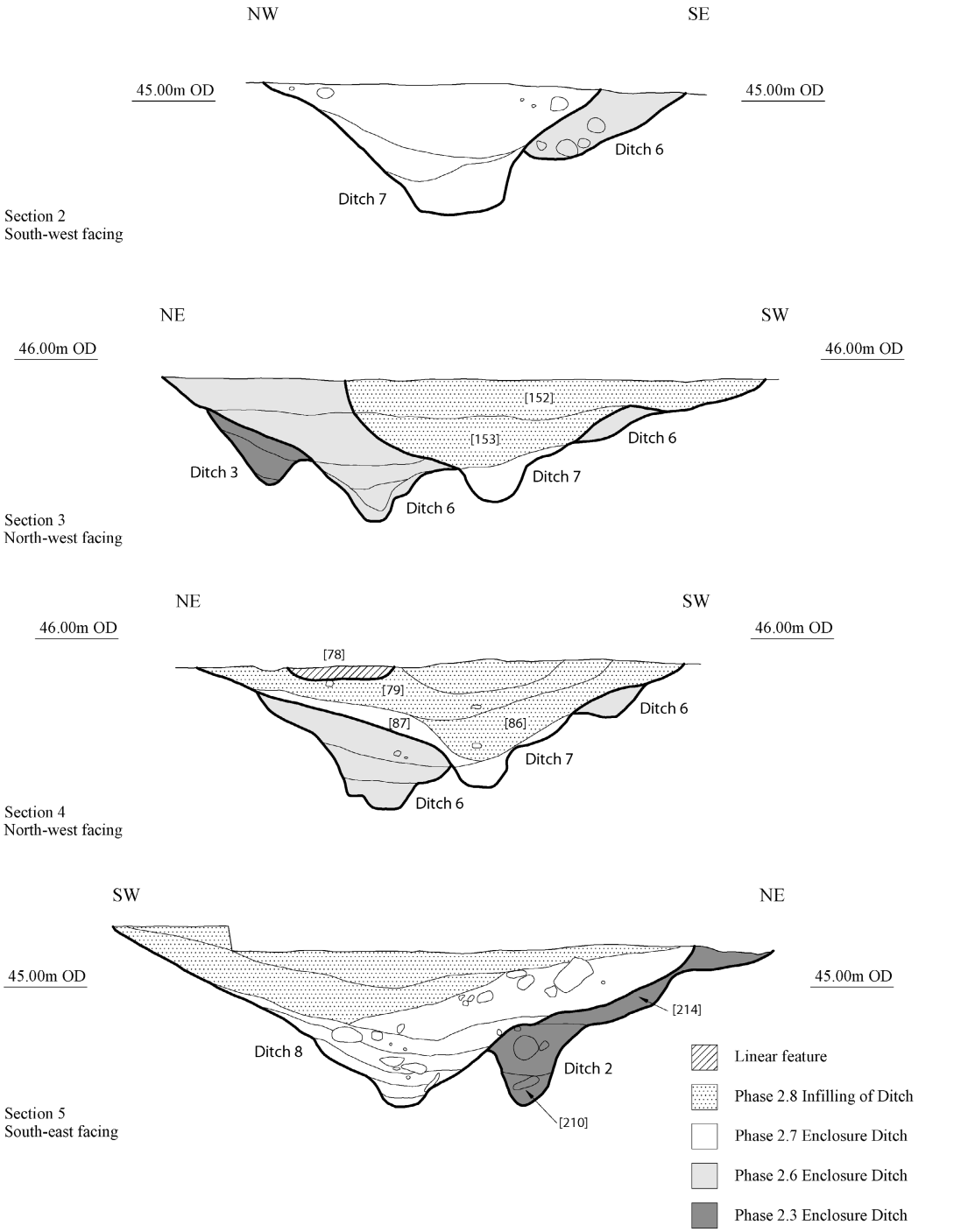


Fig. 11 Sections of ditches.

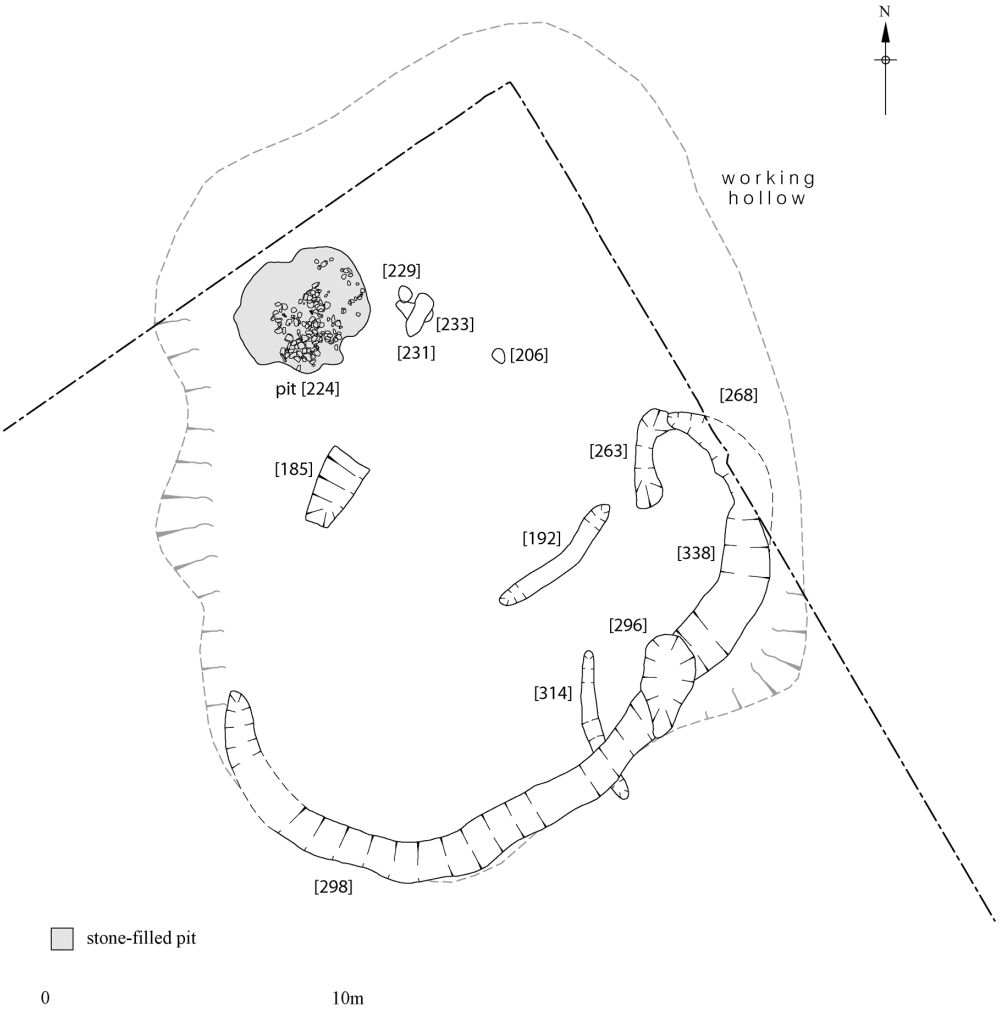


Fig. 12 Detail of Phase 2.7 working hollow.

rounded terminal in the west and was truncated in the east by pit [296] (fig. 12). It was up to 1.60 m wide by 0.40 m deep and measured *c.* 13 m east–west from the terminal to the point of truncation. In general it had moderately steep sides and a concave base, though in some areas a shallow step was present on both upper sides. Its single fill comprised mid brown sandy silt and gravel with lenses of sand; a single pottery sherd was recovered. Pit [296] truncated the western end of another curvilinear feature [338] which ran along the south-eastern edge of the hollow and was 1.72 m wide and up to 0.73 m deep. This was filled with pinkish brown silty sand, laminated in appearance. The composition of the infills of these curvilinear features suggests they had been open and may represent drainage gullies dug around the edges of the hollow after it had been in use for some time. An alternative interpretation is that these were structural features, perhaps construction trenches for a sheltering wall or fence, which had

Fig. 13 Stones at base of pit [224], looking south; 1 m scale.

been dismantled at disuse and subsequently infilled. It was not possible to determine if these were contemporary features, or indeed the same feature truncated by the pit, as the differences in composition of infill could be due to the wide variation in natural sub-stratum at the site.

A group of small intersecting pits and postholes was located in the northern part of the working hollow. To the south of this was a shallow sub-rectangular feature [185] which measured 2.60 m in length and was 1.30 m wide, narrowing to 0.75 m. It was only 7 mm deep and had a flat base; its single fill [186] comprised dark bluish grey sandy silt, indicative of a waterlain deposit, from which a single sherd of pottery was recovered. Its function remains elusive.

A substantial but shallow pit [224] was located within the working hollow adjacent to the northern limit of excavation. This was sub-oval in plan, measuring 4.45 m by 4.10 m by 0.25 m deep, and had gradually sloping sides and a concave base. A deposit of silt and charcoal, 40 mm thick, was confined to a small area in the base measuring 0.45 m by 0.25 m and a similar deposit located to the east extended across an area measuring 0.60 m by 0.74 m. Stone blocks [228], which, although irregular in shape, appeared to have been sorted for size with the majority measuring *c.* 250 mm by 220 mm by 170 mm, were clustered in the base of the pit in its central and southern portions (fig. 12; fig. 13). Amongst the stones were fragments of rotary and beehive quernstones, SF24 and SF23. Each of these primary fills was overlain by a brown sandy silt deposit [222], 0.15 m thick, which extended across the full extent of the feature. Two fragments of briquetage were recovered from this, and a soil sample produced small quantities of charred plant remains, including barley, emmer wheat chaff and charred

heather twigs. The upper fill [221], which was up to 0.12 m thick, comprised dark greyish brown silt with occasional charcoal fragments. A small assemblage of pottery was recovered, including a sherd from a very large vessel which showed evidence of being affected by exposure to salt. A second sherd, from a smaller vessel, may also have been salt affected.

Two very similar stone-filled pits [236] and [74] were located to the south of the working hollow (fig. 8). Pit [236] was sub-oval in plan, measuring 5.80 m by 4 m by 0.40 m deep, and had moderately steep sides and a flat base (fig. 14). A deposit of yellowish brown sandy silt, up to 20 mm thick, appeared to have accumulated in a series of shallow depressions in the base of the feature. A stone deposit [243] was concentrated in the base of the pit, generally in the centre with only a few lying towards its edges. The sandstone and limestone blocks were all roughly rectangular and apparently sorted for size, the majority measuring between 100 mm and 200 mm in each direction (fig. 15). Two substantially larger stones were also present, along with a fragment from a saddle quern or mortar (SF21). Overlying some of the stones was a brownish grey clay deposit up to 80 mm thick, recorded in the centre of the pit over an area measuring 1 m by 1.40 m; a deposit of yellowish brown sandy silt, probably derived from weathering, was recorded at the northern edge. This was partially overlain by a yellowish brown sandy silt deposit [240], which contained occasional flecks and small fragments of shell and charcoal. A charred barley grain from this deposit produced an AMS date of cal. 210–40 BC (SUERC–32898). Deposit [238], comprising dark brown clayey silt with frequent shell fragments and charcoal flecks, was recorded along the eastern edge of the feature. Four fragments of animal bone were recovered, along with a fish vertebra from the sieved soil sample, and a radiocarbon date of cal. 380–170 BC (Beta–208954) was obtained from charred material. A similar deposit [237] partially overlay fill [238]. Soil samples taken from the three upper fills [237], [238] and [240] yielded a relatively high concentration of charred plant remains including numerous chaff fragments representing crop-processing waste from emmer and spelt wheat. Birch, hazel, oak and willow/poplar charcoal were identified. The charred plant assemblage from fill [238] included discarded cleaned barley grain as well as waste from processed wheat, particularly from the fine-sieving stages. This assemblage could represent a deposit of waste animal feed; crop processing debris was mixed with barley grain for this purpose, or material used for other purposes such as kindling.

Pit [74], located 11 m to the south of [236], was also sub-oval in plan, though slightly smaller than the other stone-filled features at 3.56 m by 3.10 m and 0.18 m deep, with gradually sloping sides and a flat base. This pit lay 2.50 m from the edge of the ditch, suggesting that if an internal bank had been present it must have covered less than this area, or had diminished in size by the time the pit was dug. A deposit of sandstone and limestone slabs and cobbles covered an area 3.40 m by 2.20 m (fig. 14). The stones measured on average 200 mm by 150 mm by 50 mm, and for the most part appeared to have been selected for conformity of size. Three large stones, measuring up to 550 mm by 500 mm by 120 mm, were closely grouped within the feature and had been placed level, with a flat side upwards. A brown sandy silt deposit comprised the secondary fill of the pit and appeared to have accumulated around the stones. A third deposit [71] comprising greyish brown silty sand with occasional charcoal flecks, formed the tertiary fill along the northern and western edges of the feature. A fragment of a glass bangle (SF8), of first- to early second-century AD date, was found at the top of this deposit. The remarkable similarity in form between pits [74], [224] and [236] suggest that all three were contemporary and they have been interpreted as such. The glass bangle fragment may have been placed in the upper part of this pit which must still

Fig. 14 Detail of Phase 2.7 yard surface and stone-filled pits [74] and [236].

have survived as a depression in the ground during the period of activity assigned to Phase 3, see below. There was no obvious function for these stone-filled pits and, to date, no parallels are known.

A stone surface near the southern entrance to the enclosure had been constructed within an irregular cut [189] which was up to 0.26 m deep with moderately steep sides and a largely flat base. Its primary silty sandy fill may have been a bedding layer for the overlying deposit [191] which comprised stone blocks and cobbles measuring, on average, 100 mm in each direction,

Fig. 15 Stone deposit in base of pit [236], looking west; scale 2 m.

Fig. 16 Stone yard surface [64], looking west; scale 2 m.

with relatively little variation in size. Four pottery sherds were recovered amongst the stones, along with two sherds of briquetage. This layer is interpreted as a foundation deposit for the overlying stone surface [64] which covered an area measuring 7.20 m by 5 m, and which continued beyond the limits of excavation to the east. This surface was constructed with large stone blocks measuring, on average, 300 mm by 300 mm by 250 mm, each block having a flat side (fig. 14; fig. 16). The blocks were closely spaced, with the flat side up to create a level surface. A nearly complete lower rotary quernstone (SF19), which had been deliberately slighted, was used within the surface (fig. 26.4) and a saddle quern or small grinding cup or mortar (SF20: fig. 27.1) was also recovered.

Stone yard surfaces are common at settlements in the region and many stone roundhouses have paved interiors, such as at the latest settlement at Murton High Crags (Jobey 1987) and at the hillfort of Hownam Rings in Roxburghshire (Piggott 1948). A similar construction technique to the Needles Eye yard surface was observed at a rectilinear enclosure at Riding Wood, Bellingham, where flagstones had been laid over cobbles (Jobey 1960, 6). The full extent of the Needles Eye surface was not exposed within the limits of excavation and so interpretation cannot be certain, but there was no indication of any stone walling within the exposed area to indicate that this was part of a roundhouse and its most likely function was as a yard surface. At Murton High Crags, areas of external paving very similar in form to the Needles Eye yard surface were associated with some of the Roman period roundhouses (Jobey 1987, 170). The possibility that the Needles Eye yard surface was associated with the later first- to second-century AD activity and that the artefactual material recovered from foundation deposits was residual is acknowledged.

PHASE 2.8: INFILLING OF ENCLOSURE DITCH AND WORKING HOLLOW

A series of deposits, forming the upper fills of Phase 2.7 Ditch 7, has been assigned to Phase 2.8 as the material was distinct from the earlier fills that were derived from natural weathering and silting (see fig. 11). The material that was used to fill the element of Ditch 7 that was aligned north-west to south-east, bounding the enclosure, included quantities of occupation debris. The segment of ditch that ran south-westwards, away from the enclosure, contained notably less occupation debris. The working hollow was also filled in, and conjoining sherds of pottery demonstrated that the same source of material had been used for this and for the infilling of the ditch.

Within slot 1 (see fig. 8) the Phase 2.8 upper deposit was up to 0.60 m thick; it was quite mixed in appearance but largely comprised light greyish brown silty sand and sandy silt. No Phase 2.8 deposits were present in slot 2. In slot 3 the Phase 2.8 fill comprised light reddish brown sandy silt up to 0.85 m thick. Slot 4, excavated across the corner of Ditch 7, revealed a series of Phase 2.8 infilling deposits with a combined maximum thickness of 0.70 cm. The earliest [153] comprised greyish brown silty sand from which three sherds of pottery were recovered. This deposit was partially overlain by a dump of material [134], 0.20 m thick, comprising greyish brown clayey sandy silt and a large quantity of limpet shells. The upper fill of the ditch here [152] comprised brown silty sand, up to 0.28 m thick, which produced three sherds of pottery. A small quantity of iron slag was also recovered from this deposit, but this was undiagnostic and it was not possible to determine whether this was a product of smithing or smelting (Keys 2006). In slot 5 several infill deposits were also recorded with a combined thickness of 0.90 m. The earliest comprised brown silty sand [122], up to 0.18 m thick,

which contained frequent inclusions of fire-cracked stones and produced four sherds of pottery. Another slot 5 upper fill [123], mid brown silty sand up to 0.45 m thick, produced a small charred plant assemblage including barley grains, wheat grains and weed seeds. A charred barley grain from this deposit produced an AMS date of cal. 40 BC–130 AD (SUERC–32891).

Slot 6, excavated to allow investigation of an earlier Phase 2.1 feature, measured just 3.10 m by 0.80 m and 0.17 m deep (fig. 8), and contained a single deposit [252], not fully excavated, which is interpreted as a continuation of fill [79], as described below. A remarkable assemblage of 81 sherds of briquetage was recovered from this fill, representing over 70% of the entire Needles Eye briquetage assemblage, along with a single sherd of pottery.

Several fills were recorded within slots 7 and 8 with a combined maximum thickness of 1 m. Twelve sherds of pottery were recovered from fill [86] and this deposit also produced two stone spindle whorls SF9 and SF10 (fig. 28). A substantial deposit [79], comprising dark greyish brown sandy silt with inclusions of charcoal and burnt clay flecks and discrete concentrations of limpet and periwinkle shells, filled the majority of the ditch in this area increasing in thickness to 0.60 m in the north-west. A single sherd of pottery was recovered from fill [79] along with a small undiagnostic iron strip (Walton 2006). In the upper part of the fill was a complete upper rotary quernstone SF13 (fig. 17; fig. 26.3) which may have been deliberately placed as a structured deposit to mark the infilling of the enclosure, as discussed by Wright below. The latest fill, located in the central part of the ditch at the south-eastern end of slot 8, comprised brown sandy silt with occasional fragments of burnt clay, up to 0.25 m thick.

At the south-eastern terminal (slot 9) the primary fill was sealed by a deposit [131], 1.10 m thick, comprising dark greyish brown sandy silt. Occasional dumps of limpet and periwinkle

Fig. 17 The complete quernstone (SF13) in the upper fill of Ditch 7.

shell were recorded within this deposit, along with several sherds of pottery. This deposit produced the largest assemblage of animal bone from the site, though the material was poorly preserved; cattle, pig and sheep were identified. A small charred plant macrofossil assemblage comprised barley grains, wheat grains, and weed seeds, and birch, hazel and oak charcoal.

Several deposits were located within the southern half of the working hollow, representing infills that seem to have been a combination of deliberately deposited material and material accumulating through colluvial action. Deposit [204], which was up to 0.23 m thick, covered an area measuring 6 m by 4 m in the south-western corner of the hollow, also overlying gully [298]. A sherd of briquetage and a sherd of pottery, which displayed evidence of being discoloured by salt, were recovered from this. It was partially overlain by a layer [167], 0.11 m thick, which covered an area measuring 12.20 m by 9 m across the central southern area of the hollow. This produced the largest single assemblage of pottery (21 sherds) recovered from deposits at the site, along with a fragment of briquetage. Three of the pottery sherds showed evidence of discolouration through the effects of salt and the briquetage fragment appeared to have come from a stabiliser clip rather than from a vessel (see Morris below). A bulk soil sample of deposit [167] produced a small quantity of charred plant remains, predominantly made up of barley grains; wheat grains were also recorded, along with a range of weed seeds. The sample also produced a hazelnut shell and small fragments of bone, as well as the largest assemblage of oak charcoal from the site. To the north-east of layer [167] was deposit [225] which comprised dark greyish brown silty sand with occasional fractured stones and charcoal flecks. This was up to 0.30 m thick and was recorded over an area measuring 3 m by 3 m adjacent to the eastern limit of excavation. A small assemblage of pottery was recovered from this deposit, including four sherds of possible salt-discoloured pottery. In the southern and eastern parts of the working hollow, and overlying the drainage gullies and pit [296], was an extensive layer [274] up to 0.52 m thick, recorded over an area measuring 17.30 m by 4 m. This comprised mid to dark brown sandy silt, merging to light orange brown in the east. It was overlain by a similar deposit [248], up to 0.32 m thick and recorded over an area measuring 19.20 m by 5.80 m. A small assemblage of pottery was recovered from layer [248], including one sherd with evidence of salt discolouration. The latest deposit in this area [247] was up to 0.20 m thick and comprised mid to dark brown sandy silt, recorded over an area measuring 19.05 m by 5.20 m.

Several conjoining sherds of pottery were identified in the Phase 2.8 deposits. As well as examples in different deposits infilling the working hollow, there were examples of conjoining sherds recovered from the hollow infills and other features. Deposits [167] and [248] contained pottery conjoining with sherds from the upper fill of Ditch 7 (slot 4). Deposit [167] also had a conjoining sherd with the upper fill of stone-filled pit [224] located within the hollow. Deposits [204] and [248] contained sherds that conjoined examples from an upper fill of Ditch 7 (slot 9). Sherds from deposits [167] and [248] also conjoined three sherds from fill [260] of Phase 2.6 Ditch 6 within slot 4. It may be that this material actually originated from Ditch 7 in this area and suggests that the latest ditch may have been underdug in this particular area and that the pottery was therefore assigned to Ditch 6 in error. Conjoining sherds were also identified between slots 5 and 8 excavated across Ditch 7 and slots 4 and 5.

Overall, the excavated evidence suggested that the enclosure ditches had been deliberately infilled ahead of an unenclosed phase of occupation. It is possible that much of the artefactual and ecofactual material found within Phase 2.8 deposits originated from the Phase 2.7 occupation, perhaps from middens within the enclosure that were subsequently dumped within

the ditches and the working hollow. The use of midden material to backfill ditches prior to removal of the enclosure boundaries seems to be a widespread regional trait, as discussed further below. A charred barley grain recovered from the upper fill of slot 5 produced an AMS date of cal. 40 BC–130 AD (SUERC–32891). Whilst it may be that this grain came from the Phase 2.7 enclosed occupation deposit, it does provide a *terminus post quem* for the infilling.

PHASE 3: LATE FIRST- TO SECOND-CENTURY AD PITS AND FENCELINES

A cluster of circular pits was located within the internal area of the earlier enclosure (fig. 18). Artefactual material of late first- to second-century AD date was only recovered from one of the pits, but as the features were very similar in form and content, including several that were clay-lined, they have been assigned to the same phase of activity. The enclosure ditch seems to have been infilled by this period, but traces of the boundary are likely to have survived as a low earthwork and depression in the landscape, and the former enclosure seems to have remained a focus for activity.

Pit [97] measured 0.75 m in diameter by 0.33 m deep and had almost vertical sides and a flat base (fig. 18). Its primary fill [119] comprised greyish brown sandy silt, up to 0.11 m thick, which produced a notable assemblage of artefactual material: a fragment of opaque white glass bangle (SF11: fig. 25.2) of late first- to second-century AD date; a shale finger ring (SF12: fig. 29); and an abraded sherd of pottery in the Iron Age tradition. A small sherd of samian ware was also recovered; this has been identified as a body sherd from a South Gaulish vessel from La Graufesenque, deriving from the floor of a Drag. 18 platter dated to *c.* AD 40–100 (Willis 2006). The upper greyish brown sandy silt fill [96] did not produce any artefactual material but a bulk soil sample contained traces of hammerscale, and samples from both fills produced cereal assemblages dominated by barley, along with a range of wild taxa. Birch, hazel, oak and Maloideae (hawthorns, whitebeams, apple) charcoal was identified and a small quantity of animal bone was also recovered. A short distance to the east was a small pit [101], 0.50 m by 0.40 m by 0.18 m deep, which had steep sides and a flat base. To the north-east was a more substantial sub-circular pit [67], which measured 1.44 m by 1.40 m by 0.50 m deep, with moderately steep sides and a concave base. Five sherds of pottery in the Iron Age tradition were recovered from the single fill [68], along with a small quantity of animal bone.

A stone-filled Phase 2.7 pit [236] was truncated by a sub-circular pit [164], 0.24 m deep and 0.75 m in diameter, which had steep sides and a flat base. The pit was lined with a light pinkish grey clay deposit *c.* 80 mm thick. The backfill of the pit [166] comprised grey clayey silt with orange and green mottling. A number of medium-sized stones, around 0.15 m in diameter, were noted in the fill, and a bulk soil sample produced a very small quantity of charred plant remains, including barley and wheat; some charred heather twigs and traces of hammerscale were also noted. A cluster of intercutting clay-lined pits was located immediately to the west of pit [164]. The earliest [289] was sub-circular in plan, measuring 0.64 m by 0.52 m by 0.13 m deep, with moderately steep sides and a flat base. This also had a greyish pink clay lining up to 70 mm thick and a single yellowish brown clayey silt fill [291]. Bulk soil samples from these two pits produced few charred plant remains, but barley and wheat grains were present and a small quantity of animal bone was also recovered from each. Pit [289] was truncated by [286], which was similar in profile and measured 0.90 m in diameter and 0.16 m deep. The orange and brownish grey clay lining was up to 100 mm thick and the fill [288] comprised reddish brown clayey silt with frequent charcoal flecks. This pit produced a slightly larger

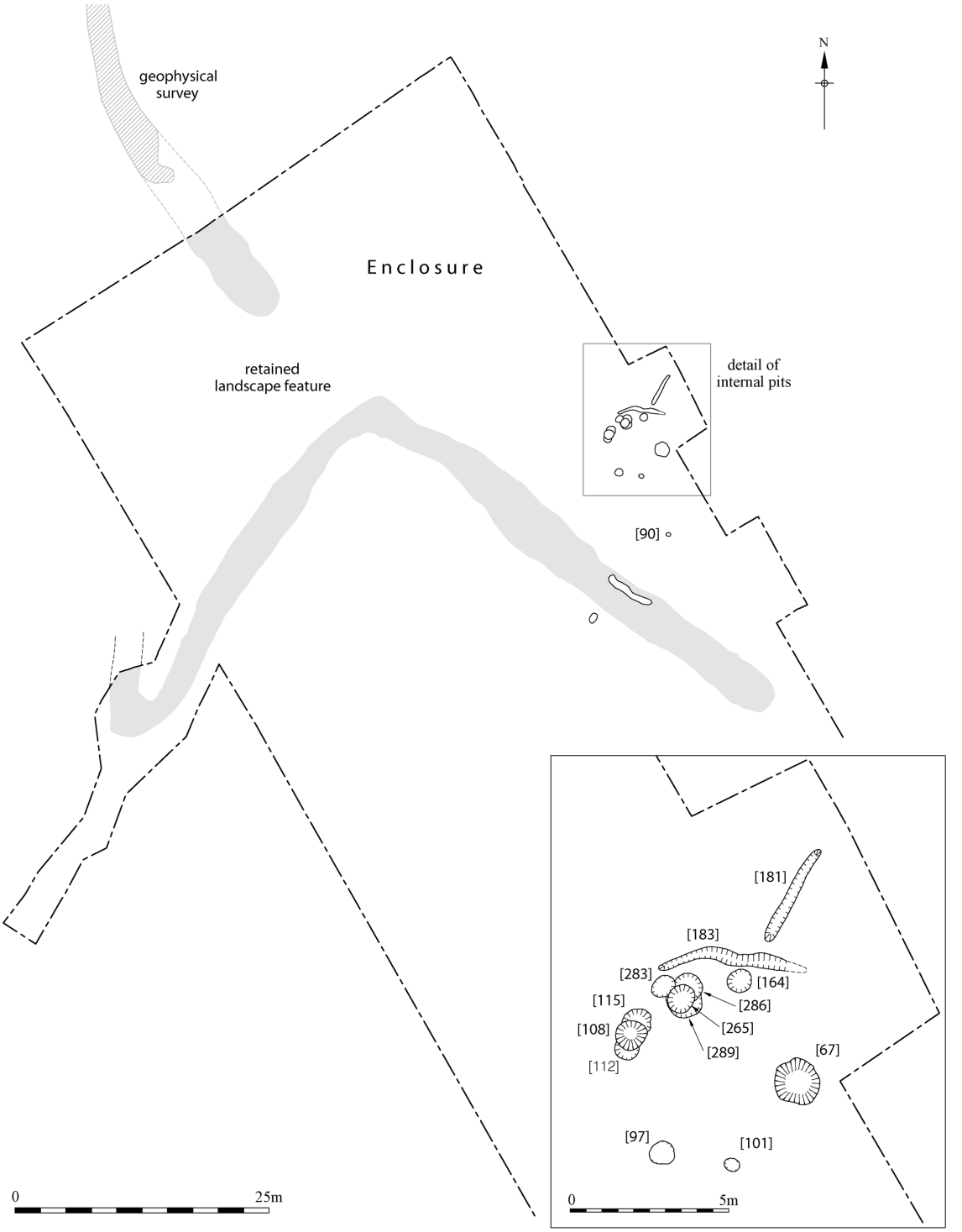


Fig. 18 First- to second-century AD features.

charred plant remains assemblage, with barley and emmer wheat identified, along with a small range of weed seeds. Pit [286] was truncated by pit [283] which measured 0.90 m in diameter by 0.16 m deep and had steep sides and a concave base. Its brownish grey clay lining was 80 mm thick and the fill [285], comprised reddish brown clayey silt with frequent charcoal flecks. A sherd of pottery in the Iron Age tradition was recovered from this pit. The latest feature in this group was a sub-circular pit [265], 0.94 m by 0.80 m by 0.20 m deep, which had steep sides and a flat base. The lining comprised yellow clay with pinkish grey patches up to 0.11 m thick, and the fill [267] comprised reddish brown clayey silt with frequent charcoal flecks.

Another group of intersecting pits was recorded immediately to the south-west. A sub-circular pit [115], measuring 0.92 m by 0.68 m and 0.40 m deep, with steep sides and a concave base, did not have a clay lining. A bulk soil sample taken from the primary fill [118], which comprised greyish brown sandy silt with yellow mottling, produced a relatively small quantity of charred cereal remains; this was, again, dominated by barley but some wheat was also present. The overlying fill did not produce any artefactual or ecofactual remains. The upper brown sandy silt fill [116] produced very few charred plant remains, but again barley and wheat were present, along with a fragment of hazelnut shell. To the south-west was sub-circular pit [112] which had the remnants of a clay lining. This measured 0.39 m in diameter and 0.25 m deep and had steep sides and a concave base. The upper fill [114] comprised greyish brown clayey silt with yellow mottling which produced a few charred plant remains. A small quantity of iron slag was recovered from this deposit and, like the material from the upper fill of Ditch 7, was undiagnostic. Both pits were truncated by pit [108] which measured 0.96 m by 0.92 m and 0.36 m deep and had almost vertical sides and a concave base. The primary greyish brown sandy silt fill [109] produced a small charred plant assemblage, mainly barley with some wheat and wild taxa, and traces of hammerscale were also noted. The two upper fills did not produce any artefactual or ecofactual material.

An irregular linear feature [183] was located adjacent to the northern limit of the two pit clusters, truncating the Phase 2.7 stone-filled pit. This was orientated approximately east-west and measured 4 m by 0.50 m and 0.12 m deep; it may represent a fenceline bounding the area of the pits. A similar feature [181], which measured 3.30 m from north-east to south-west, was located to the north. Another probable fenceline [78] was recorded cutting through the upper fill of Ditch 7, running on the same alignment as the former enclosure boundary, suggesting that traces of the earlier feature were still visible as an earthwork. This measured 5 m by 0.80 m by 0.20 m deep and had irregular edges with steep sides and flat base. Its single fill [77] comprised brown silty sand with moderate flecks of burnt clay, ash and charcoal from which three abraded sherds of pottery in the Iron Age tradition and a single sherd of briquetage were recovered.

Clay-lined pits of very similar form to the Needles Eye examples have been excavated at Broxmouth (Hill 1982, 176), Doubstead (Jobey 1982, 9) and Murton High Crags. The pits at the latter had rounded bases and measured 0.75 m to 1 m in diameter and 0.50 m in depth; most were of Late Iron Age date, but at least one contained Roman pottery of first-century AD date. Jobey suggests that the careful construction of these pits indicated that while their original purpose was for storage, they had subsequently been used for refuse disposal (Jobey 1987, 167). The Needles Eye clay-lined pits are similarly interpreted and it may be that those pits without a clay lining had had their lining removed as these were of the same size and profile as the clay-lined examples. The artefactual assemblage within pit [97] was striking and it

seems that a group of objects of special significance to the community was chosen for deposition. Such structured deposits including the deposition of glass bangles, has in recent years become widely recognised in the archaeological record across the region (Proctor 2009, 90). The fragment of a glass bangle recovered from the upper part of pit [74] (see Phase 2.7 above) may have been deliberately deposited within the pit while it was still visible on the surface and the deposit could well have marked the end of its use.

PHASE 4: MEDIEVAL ACTIVITY

A series of linear features of medieval date recorded in the south-eastern corner of the excavation area attest the use of the land for agriculture during this period. An irregular feature [57], probably a tree throw, located close to the eastern limit of excavation, produced a sherd of medieval pottery that might be a French import. This feature was truncated by a probable fenceline [39], aligned north-east to south-west, which also produced a fragment of medieval pottery (fig. 19). A further segment of fenceline [33] was located to the east and this boundary was recorded for a total distance of *c.* 15 m. The terminal of a ditch [49], aligned north-west to south-east, was located adjacent to the eastern limit of the excavation. A medieval copper alloy penannular brooch was recovered from its upper fill (Walton 2006). This ditch [49] had

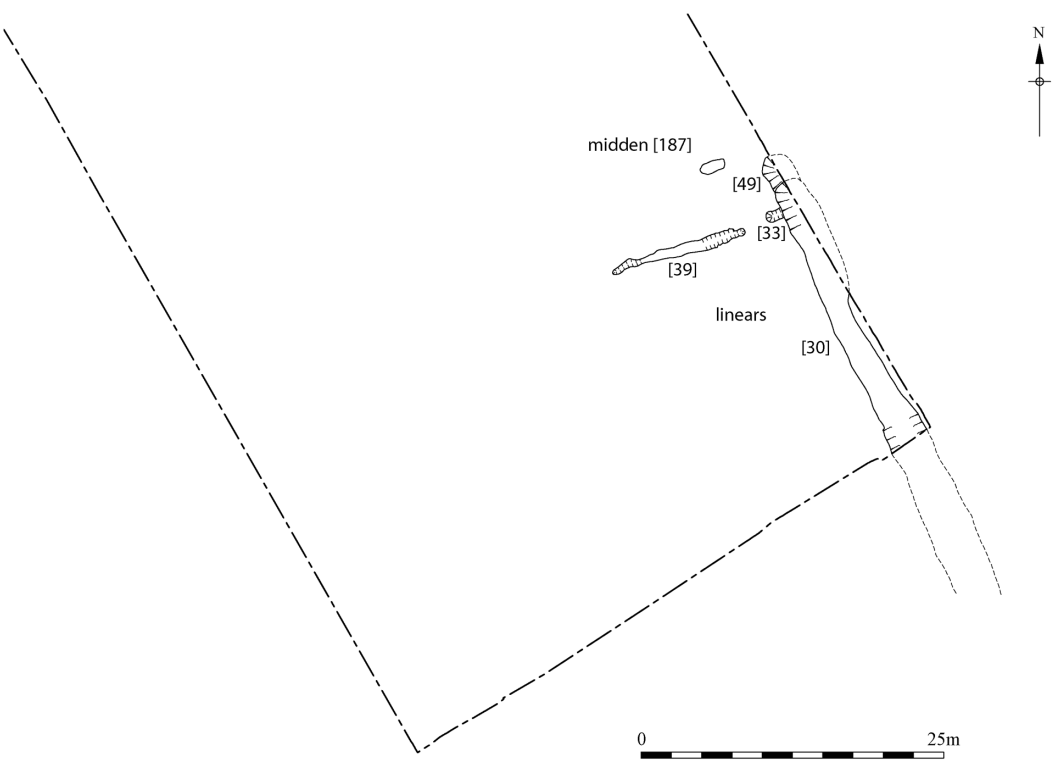


Fig. 19 Medieval features.

been truncated to the south by ditch [30], on the same alignment, which was 3.85 m wide and 1.25 m deep, and was recorded for a distance of 23.75 m, continuing beyond the limit of excavation. This was presumably a recut of the ditch represented by terminal [49] and is interpreted as a field boundary. A small assemblage of thirteenth- to fourteenth-century pottery was recovered.

A midden deposit [187], comprising limpet and periwinkle shells, was encountered a short distance to the west of ditch terminal [49] (fig. 19). This extended over an area measuring 1.74 m by 0.90 m and was 80 mm thick; it overlay a very slight depression in the underlying sub-stratum. Limpets were the most frequent species in the shell assemblage, although a large quantity of periwinkles was also present, with a few instances of oyster, flat periwinkle and dogwhelk. The bulk soil sample produced a charred plant assemblage dominated by barley grains, but oat grains were also frequent; bread wheat grains were only present in low numbers, and there was a single possible rye grain. Possible pea fragments were also noted. The medieval date suggested by this plant assemblage was confirmed by a fragment of pottery of probable thirteenth-century date and an AMS date of 1280–1400 AD (SUERC–32282) from a charred barley grain. The weed seed assemblage included vetch, heath-grass, and grasses, reflecting the environment in the vicinity during the medieval period.

SPECIALIST REPORTS

IRON AGE CERAMICS: POTTERY AND BRIQUETAGE

Elaine L. Morris

The assemblage from the Needles Eye enclosure comprises pottery of Iron Age tradition (149 sherds; 3982 g), and ceramics that were used in the evaporation of brine which are known collectively as briquetage (89 fragments; 687 g). These two ceramic categories are readily discernible due to their different fabrics, forms and firing conditions, as well as to the manufacturing techniques employed to create them. The majority of pottery fabrics are specific to that group, however there is an overlap in the utilisation of at least one clay resource shared between the two categories which suggests that at least this could have been a local one while many others may not have been. The origins of these pottery fabrics may be linked to the significance of salt production at the enclosure and demonstrate a network of exchange and interaction during the later Iron Age and early Roman period. A case is made for the recognition of a distinctive style of Iron Age tradition pottery found in north-eastern England and south-eastern Scotland and for the status of the Needles Eye enclosure as a salt production site.

Method of analysis and recording

The assemblage has been analysed and recorded according to the Prehistoric Ceramics Research Group guidelines (PCRG 1995; 1997; 2010). At least one sherd of each pottery fabric was sampled to provide detailed petrological analysis of the fabric in addition to information collated from examination in hand specimen and at x10 power binocular microscopy (Table 1). Data recorded for the briquetage follows the system developed for the study and analysis of prehistoric and Roman period material from the Fenland region and includes adoption of that form series where appropriate (Morris 2001a, figs. 112–19; Crosby 2001, fig. 32) and briquetage wall-thickness codes (Morris 2001b, 34), with fabric types distinctive to this assemblage.

Table 1 Samples selected for thin–sectioning and detailed petrological analysis.

Fabric	Sample	Form	Context	Feature
A	PRN 1002	P	US	–
A	PRN 1053	P	[167]	LAYER
A	PRN 1080	P	[225]	LAYER
B	PRN 1040	P	[131]	DITCH 7
B	PRN 1057	P	[167]	LAYER
B	PRN 1071	P	[210]	DITCH 2
B	PRN 1073	R3	[214]	DITCH 2
B	PRN 1078	R3	[225]	LAYER
C	PRN 1007	P	[4]	LAYER
C	PRN 1055	P	[167]	LAYER
C	PRN 1075	P	[221]	PIT [224]
D	PRN 1041	P	[131]	DITCH 7
E	PRN 1034	P	[122]	DITCH 7
E	PRN 1098	P	[303]	DITCH [306]
F	PRN 1012	P	[68]	PIT [67]
G	PRN 1062	P	[186]	PIT [185]
H	PRN 1027	P	[86]	DITCH 7
I	PRN 1044	P	[148]	DITCH 2
BRIQ 1	PRN 1092	P	[252]	DITCH 7
BRIQ 2	PRN 1066	P	[191]	LAYER
BRIQ 3	–	–	–	–

Condition of the assemblage

The Iron Age pottery is in moderate to good condition, with a mean sherd weight of 26.7 g which is similar to the assemblages from Burradon and Pegswood Moor in Northumberland and Fishers Road East, Port Seton in East Lothian, but contrasts significantly with Iron Age pottery assemblages from further south in the Tees Valley and Yorkshire (Table 2). This condition is a reflection of both the very large vessel-wall thickness of the sherds from these more northern assemblages compared to pottery from southern regions of Britain and the protective nature of deposition of sherds into features. A better clue to the real condition of this material lies in the infrequency of sherd joins in the assemblage and the frequency of pottery sherds which do not display full wall thickness due to the absence of at least one surface. Amongst the 149 sherds recovered, 43 (29%) are without one surface which provides an indication of the trampling of sherds and/or the degradation from weathering these sherds received prior to incorporation into features and layers.

The significant mean weight for potsherds contrasts with that of the briquetage fragments which have an overall mean weight of 7.7 g due to the much thinner walls of the briquetage containers and the friability of the fabrics employed to make them. However, amongst the 89 fragments of briquetage, only four (4.5%) were recorded as having just a single wall surface, which suggests less trampling of this material. Other aspects of wall thickness and deposition are explained and discussed in detail below.

Table 2 Mean sherd weights in grammes of selected Iron Age pottery assemblages.

Site Name	County	Count	Weight	Mean Weight
Burradon, North Shields	Tyne and Wear	170	6256	36.8
Fishers Road East, Port Seton	East Lothian	12	373	31.0
Pegswood Moor, Morpeth	Northumberland	242	6957	28.7
Needles Eye, Berwick-upon-Tweed	Northumberland	149	3982	26.7
Stanwick (Wheeler's sites; The Tofts)	North Yorkshire	n.a.	n.a.	(20.2–9.0) 15.1
Sewerby	East Yorkshire	n.a.	n.a.	14.8
Thorpe Thewles	Stockton-on-Tees	1522	n.a.	n.a.
Bonny Grove Farm	Middlesbrough	n.a.	n.a.	12.8
Scotch Corner	North Yorkshire	n.a.	n.a.	11.9
Great Ayton Moor Enclosure	North Yorkshire	215	n.a.	7.1

Fabrics

POTTERY FABRICS: DESCRIPTIONS AND SOURCES

A significant number of pottery fabrics was recognised amongst the modest number of sherds, and identifiable vessels, in the assemblage (Table 3). Three broad fabric groups were revealed: sandy fabrics which are virtually rock-free (fabrics A and E); sandy fabrics with sparse quantities of small to large rocks (fabrics B, D, G, and H); and very gritty fabrics rich with large rocks and/or disaggregated components of rocks (fabrics C, F, and I). It is uncertain whether this variation in fabric texture, based on frequency or density of rock inclusions and their size range, is representative of potters' practical choices for functional requirements of the vessels made, but this issue is discussed further below. These broad fabric groups, however, include fabric types with one (fabric C), two (fabric B), or several different rock types (fabric H), all found within sandy clay matrices.

Several fabrics can be interpreted as originating from nearby hill-wash deposits of disintegrated rock in the area of the Cheviot Hills or represent actual tempering added to clays from these outcrops. Fabric B is the most obvious candidate for a source in that area. The characteristic lava rock, present in moderate concentration and of angular shape, is a distinctive augite-andesite (pyroxene andesite; pyroxene-porphyrite) of Cheviot Hills formation located 35 km to the south-southwest (Carruthers *et al.* 1932; Taylor *et al.* 1971) of the Needles Eye enclosure, rather than, for example, the solid geological deposit of Devonian Upper Old Red Sandstone hornblende-porphyrite located only 1 km to the north of the site between Scuddylaw and New East Farm (Geological Survey Sheets 1 & 2; Fowler 1926, 2). The presence of infrequent pieces of angular to subangular rhyolite in this fabric also supports a Cheviot-derived source. Rhyolite-rich fabric C is another candidate for a source in the Cheviot Hills. The numerous pieces of this rock found in the fabric and the variety of shapes they occur in, from angular to subrounded, would favour a hill-wash source near the famous Cheviots outcrop of this distinctive, dark and dense rock formation. The clay matrices of fabrics B and C are subtly different. It appears that two different clay sources had been used to make the

Table 3 Quantification of pottery and briquetage by fabric (weight in grammes).

Fabric	Count	% by count	Weight	% by weight	Database records	Maximum vessels
A	46	30.9%	755	19.0%	23	17
B	66	44.3%	1730	43.4%	35	24
C	7	4.7%	545	13.7%	5	5
D	3	2.0%	71	1.8%	3	3
E	16	10.7%	534	13.4%	13	9
F	1	0.7%	52	1.3%	1	1
G	2	1.3%	27	0.7%	2	1
H	5	3.4%	121	3.0%	3	2
I	3	2.0%	147	3.7%	3	1
Total	*149*	*100.0%*	*3982*	*100.0%*	*88*	*63*
BRIQ 1	83	93.3%	621	90.4%	8	3
BRIQ 2	5	5.6%	43	6.3%	3	3
BRIQ 3	1	1.1%	23	3.3%	1	(1)
Total	*89*	*100.0%*	*687*	*100.0%*	*12*	*6*

pots in these fabrics; fabric B, with a modest amount of andesite and rare rhyolite naturally occurring in it, and fabric C with many pieces of rhyolite also naturally occurring in the clay rather than added as temper. Two other related fabrics probably belong to the Cheviot Hills group of sources, fabrics E and F. Fabric F has a moderate amount of distinctively large, angular pieces of granite and rhyolite as well as fragments of disaggregated felspars and mica derived from the granite. Granite is another major outcrop in the Cheviots (Carruthers *et al.* 1932, 8–90, fig. 1), and it is located in the vicinity of rhyolites. The clay matrix of this fabric and that of fabric E are very similar in character, with fine quartz and significant amounts of fine mica present. Despite the similarity of the rock types observed in each fabric, the textural differences between them in terms of frequency and size suggest that while fabric E comprises fine clay naturally-gritted with very infrequent, modest-sized pieces of granite and rhyolite, fabric F may have been tempered with these rocks or derived from a hill-wash deposit close to the main outcrop.

Two fabrics appear to derive from different sources of boulder clay, while a third is full of rocks typical of mixed glacial drift deposits. Fabric A with its sandy clay matrix and distinctive fragments of iron oxide and opaque magnetite may have originated from a boulder clay source. As the Needles Eye enclosure is located in an area of boulder clay, a relatively local source for this fabric is suspected and also for the source of fabric G which had been made from distinctively coarser clay containing larger grains of quartz and some iron oxide. Close inspection at x10 power binocular microscopy of remnant clay and sand still adhering to the broken edges and surfaces of a few potsherds in the collection reveals quartz grains and black, opaque particles of a similar nature to those in fabric A. This suggests that fabric G is not likely to be from an immediately local boulder clay source but from elsewhere in the area (Carruthers *et al.* 1932, 121–6; Fowler 1926, 32–4; Pringle 1948, 80–2; Taylor, *et al.* 1971, 83–9).

Fabric H, on the other hand, displays an array of eight different igneous and sedimentary rock types, which is extremely distinctive in character, and most likely derives from a deposit of glacial drift or possibly gravels devolved from glacial drift deposits (Pringle 1948, fig. 14). The rocks are not angular but rounded to subangular and not quite as large as those interpreted above to come from the hill wash of rock outcrops, both of which would support this interpretation. The clay matrices of fabrics A, G and H are not similar to each other and therefore these three fabrics are not likely to be from the same source.

Fabric D is different from all of the other fabrics due to the presence of rounded pieces of sedimentary, rather than igneous, rocks. The fabric has a sandy clay matrix and a sparse to moderate amount of very large pieces of siltstones and medium-fine sandstones. Sherds from only one fabric D vessel were recovered from a stratified Iron Age context. Possible sources for this fabric can be found in Coal Measure deposits which cover a wide swathe of the countryside south of the Tweed in Northumberland and in Durham (Taylor *et al.* 1971, 64–7), or the Upper Old Red Sandstone deposits which form a group of 'soft and crumbly dark red and brown arenaceous and marly beds with sandstone ribs' in the Jedburgh district (Grieg *et al.* 1971, 59). However, other possible sources to the north cannot be ruled out, especially due to the rarity of this fabric in the collection and to the absence of sedimentary rocks in Iron Age fabrics published from sites in Northumberland such as Pegswood Moor and Burradon (cf. Willis 2009a). A source not dissimilar to the source for the quernstones found at the enclosure should also be considered.

Fabric I, used to make only one vessel, may also be from much further afield because of its rarity in the assemblage, its stratigraphic relationship on site, and the type of rhyolite identified in thin section which is very different to that identified so commonly in fabric C with its likely source in the Cheviots area. Fabric I rhyolite is porphyritic in character which means it has distinctive phenocrysts which are petrographically identifiable with some frequency, even in pieces of rock measuring between 4 mm and 15 mm across. These rock fragments were most likely to have been crushed and added as temper because of the moderate degree of size sorting represented in the fabric rather than the usual range from large down to very small, which is poorly sorted. The range present is very different from that in fabric C. What is also distinctive about this fabric is the density of the fine clay matrix holding these rocks which is different from all other clay matrices in the fabrics from the enclosure, a density based on fewer, fine quartz grains compared to any other clay matrix in the pottery assemblage, and the colour of the clay matrix when oxidised. The clay is a distinctive reddish colour (Munsell 10R 6/8 light red) which contrasts with the briquetage fabric, Briq 1, of local origin, discussed below (see *Ceramic Sequence, Deposition and Re-Deposition*) and with fabric A, a possible local boulder clay which is a reddish hue (Munsell 10R 5/8 red). Fabric I sherds were found only in Phase 2.3 Ditch 2 contexts which makes this fabric, and therefore the source for this pot, extremely important as it may represent the origin of the founding community at the settlement or the origin of one of its earliest contacts. Several sherds from a single fabric B (Cheviot Hills pyroxene-andesite with rhyolite) vessel were also recovered from the same fills in this ditch (Table 4).

The emphasis on the Cheviot Hills region, which includes the Cheviot Volcanic series of Roxburghshire (Grieg *et al.* 1971, 50–1, fig. 9), as the most likely resource location for many of the pottery fabrics identified in this assemblage (rather than the Lammermuir Hills) is due to the absence of the very specific types of igneous rocks identified in so many cases. Nevertheless, further work would be needed to determine whether the siltstones and sandstones

Table 4 Quantification of ceramic assemblage by number of sherds.

Phase	Feature	Context	Fabric												Total
			A	B	C	D	E	F	G	H	I	Briq 1	Briq 2	Briq 3	Number
–	unstratified	US	16	–	–	–	–	–	–	–	–	–	–	–	16
6	layer	[4]	2	2	1	–	–	–	–	–	–	–	–	–	5
5	ditch/gully [45]	[46]	1	–	–	1	–	–	–	–	–	–	–	–	2
5	pit [84]	[85]	–	–	–	1	–	–	–	–	–	–	1	–	2
4	ditch [30]	[31]	–	1	–	–	–	–	–	–	–	–	–	–	1
3	pit [67]	[68]	–	4	–	–	–	–	–	–	–	–	–	–	4
3	gully [78]	[77]	3	–	–	–	–	–	–	–	–	1	–	–	4
3	pit [97]	[119]	–	1	–	–	–	–	–	–	–	–	–	–	1
2.8	layer	[167]	2	15	2	–	2	–	–	–	–	–	–	1	22
2.8	layer	[204]	–	–	–	–	1	–	–	–	–	–	–	–	1
2.8	layer	[225]	2	5	–	–	3	–	–	–	–	–	–	–	10
2.8	layer	[247]	–	1	–	–	–	–	–	–	–	–	–	–	1
2.8	layer	[248]	2	3	–	–	1	–	–	–	–	–	–	–	6
2.8	layer	[274]	1	–	–	–	1	–	–	–	–	–	–	–	2
2.8	ditch 7	[252]	–	–	–	–	1	–	–	–	–	82	–	–	83
2.8	ditch 7	[79]	–	–	–	–	1	–	–	–	–	–	–	–	1
2.8	ditch 7	[86]	4	5	–	–	–	–	–	3	–	–	–	–	12
2.8	ditch 7	[87]	–	8	–	–	–	–	–	–	–	–	–	–	8
2.8	ditch 7	[122]	2	–	–	–	2	–	–	–	–	–	–	–	4
2.8	ditch 7	[123]	3	–	–	–	–	–	–	–	–	–	–	–	3
2.8	ditch 7	[129]	–	–	–	–	–	–	–	1	–	–	–	–	1
2.8	ditch 7	[131]	–	2	–	1	1	–	–	–	–	–	–	–	4
2.8	ditch 7	[152]	–	3	–	–	–	–	–	–	–	–	–	–	3
2.8	ditch 7	[153]	–	1	–	–	1	–	–	1	–	–	–	–	3
	Ditch 7 sub-total		*9*	*19*	–	*1*	*6*	–	–	*5*	–	*82*	–	–	*122*
2.7	pit [283]	[285]	–	1	–	–	–	–	–	–	–	–	–	–	1
2.7	pit [296]	[297]	–	1	–	–	–	–	–	–	–	–	–	–	1
2.7	pit [229]	[230]	–	–	–	–	–	–	1	–	–	–	–	–	1
2.7	pit [185]	[186]	–	–	–	–	–	–	1	–	–	–	–	–	1
2.7	cut [189]	[191]	4	–	–	–	–	–	–	–	–	–	2	–	6
2.7	gully [192]	[193]	–	1	–	–	–	–	–	–	–	–	–	–	1
2.7	pit [224]	[221]	–	–	3	–	1	–	–	–	–	–	–	–	4
2.7	pit [224]	[222]	–	–	–	–	–	–	–	–	–	–	2	–	2
	Pit [224] sub-total		–	–	*3*	–	*1*	–	–	–	–	–	*2*	–	*6*
2.7	ditch 7	[121]	–	–	1	–	–	–	–	–	–	–	–	–	1
2.7	ditch 7	[154]	–	1	–	–	–	–	–	–	–	–	–	–	1
	Ditch 7 sub-total		–	*1*	*1*	–	–	–	–	–	–	–	–	–	*2*
2.6	ditch 6	[260]	3	–	–	–	–	–	–	–	–	–	–	–	3
2.6	ditch 6	[261]	1	–	–	–	–	–	–	–	–	–	–	–	1
	Ditch 6 sub-total		*4*	–	–	–	–	–	–	–	–	–	–	–	*4*
2.5	ditch [306]	[303]	–	–	–	–	1	–	–	–	–	–	–	–	1
2.5	ditch [306]	[304]	–	1	–	–	–	–	–	–	–	–	–	–	1
	Ditch [306] sub-total		–	*1*	–	–	*1*	–	–	–	–	–	–	–	*2*
2.3	ditch 2	[128]	–	1	–	–	–	–	–	–	–	–	–	–	1
2.3	ditch 2	[132]	–	5	–	–	–	–	–	–	–	–	–	–	5
2.3	ditch 2	[214]	–	3	–	–	–	–	–	–	1	–	–	–	4
2.3	ditch 2	[143]	–	–	–	–	–	–	–	–	1	–	–	–	1
2.3	ditch 2	[148]	–	–	–	–	–	–	–	–	1	–	–	–	1
2.3	ditch 2	[210]	–	1	–	–	–	–	–	–	–	–	–	–	1
	Ditch 2 sub-total		–	*10*	–	–	–	–	–	–	*3*	–	–	–	*13*

found in fabric D derived from Lammermuir Upper Old Red Sandstone deposits (Greig *et al.* 1971, 58–9).

Willis has suggested that the presence of significantly-sized fragments of distinctive local rocks in the fabrics of Iron Age pottery from Pegswood Moor may be symbolic (2009a, 44–7). He has suggested that these additives, whether functioning also as temper or not, would have represented well-known features in the landscape of the region. The assemblage from Pegswood Moor comprised several texturally different fabrics containing basalt/dolerite rocks, and one quartz sand fabric. The presence of basalt/dolerite in later prehistoric pottery fabrics is particularly common in the area between the Tyne and the Tweed and the basalt/dolerite derives from narrow intrusive dykes found all across the north-east of England. Willis has indicated that the assemblage from the Iron Age settlement at Burradon (Jobey 1970) is another case in point (*contra* the published fabric descriptions which states the rocks are sandstone). Further south, in the Tees valley and north-east Yorkshire, dolerite is also a common temper (Evans 1995, 48–9, fig. 5.2) but less exclusively. At Thorpe Thewles, 68.7% of the diagnostic sherds of Iron Age pottery were found to contain dolerite (Swain 1987, 63).

With this in mind, it appears that many of the potters in the Berwick area chose a different focus specific to their own landscape — the Cheviot Hills — to make their fabrics. This characteristic of landscape recognition, and its representation as temper in pots and through selection of clays near settlements, where possible, has been discussed elsewhere. The presence of modest to common quantities of crushed burnt flint from the Upper Chalk deposits which abound in Kent, for example, is recognised as one of the unifying visual indicators of Early Iron Age people of west Kent who deposited pottery at White Horse Stone unenclosed settlement; indicators equivalent to the presence of finger-tip impressed decoration or rustication (Morris 2009). The clay matrices of their pottery fabrics derive from six different sources, two relatively near to the site and four up to 15 km distant. Middle and later Iron Age pottery from the Midlands also utilised naturally-gritted clays from significant natural markers, the Malvern Hills on the western border of Worcestershire (Peacock 1968), which dominate that landscape, and the Mountsorrel outcrops above the River Soar floodplain in Leicestershire which once dominated that area (Knight *et al.* 2003, fig. 8.1). Nevertheless, practical factors such as opening up plastic clays to reduce their stickiness during vessel formation and providing thermal shock resistance during bonfiring were likely to have been part of the strategies for selection of these types of rocks or clays with disaggregated fragments of these rocks present.

The fabrics of Iron Age pottery assemblages from sites in East Lothian were also tempered or naturally gritted with distinctive rocks. Petrological analysis of the fabrics of eight Iron Age vessels recovered from excavations at the two Fishers Road enclosures (at Port Seton on the south side of the Firth of Forth) revealed that the dolerite rock that had been selected, crushed, and added as temper had such a distinctive mineralogy that the local Late Carboniferous Port Seton-Spittal Dyke which outcrops along the coast in this area was the most likely source (Gwilt 2000, 135–6; Senior 2000). The presence of rocks from the Cheviot Hills in several of the fabrics from the Needles Eye enclosure belongs to this pattern of Iron Age potters' behaviour, activity which may not have been witnessed by all the users of these vessels but which was recognised by word-of-mouth as representative of a special place in the land and a sense of belonging.

A resource procurement strategy more akin to that identified in the Needles Eye enclosure assemblage has been indicated for the pottery recovered from five site assemblages excavated as part of the Traprain Law (East Lothian) Environs Project, 45 km north of Berwick. Here,

several prehistoric pottery fabrics have been interpreted as deriving from clays and inclusions of glacial drift due to the presence of both angular and rounded rocks present, while others have moderate to frequent densities of angular rock inclusions but without identification of rock types or potential sources. For example, at Whittingehame Tower, three highly different fabrics were identified amongst the five heavily abraded sherds recovered: a fine clay fabric with 10% rock, a fine sandy clay fabric with 20–30% rock inclusions, and a sandy clay fabric with only occasional rocks present, while amongst the 84 sherds representing an estimated 46 vessels found at Knowes, two clays were used (sandy; fine sandy) and 10–30% angular rocks recorded (MacSween 2009, 117–8). There is much research potential for the petrological examination of the fabrics of later prehistoric pottery assemblages (Late Bronze Age to Late Iron Age) in East Lothian, such as these, and from Broxmouth, in order to determine which represent solid rock in this landscape of plains and intrusive outcrops (Haselgrove 2009, figs. 1.4, 2.1, 3.1, 4.2, 5.1, 6.10, and plate 1), and which derive from glacial drift. This should be a route to establish the nature of resource procurement and pottery production in this region.

Detailed petrological descriptions of the pottery fabrics are available in the digital archive, which can be accessed at www.pre-construct.com, and a summary list is presented here. The most likely source for the clay and/or inclusions identified is presented in parentheses for each fabric.

Fabric A medium-fine sandy fabric with distinctive iron oxides visible in hand specimen (boulder clay) (fig. 20)

Fabric B medium-fine, sandy fabric with sparse to moderate, angular, fine-grained, igneous rocks, primarily pyroxene-andesite with infrequent rhyolite (Cheviot Hills) (fig. 20)

Fabric C rhyolite-rich fabric (Cheviot Hills) (fig. 20)

Fabric D medium-fine, sandy fabric with rounded, sedimentary rocks including sandstone and siltstone (Coal Measures, Upper Old Red Sandstone, or glacial drift) (fig. 21)

Fabric E fine sandy fabric with disaggregated granite and rare rhyolite (Cheviot Hills) (fig. 21)

Fabric F granite and rhyolite rock fabric (Cheviot Hills) (fig. 21)

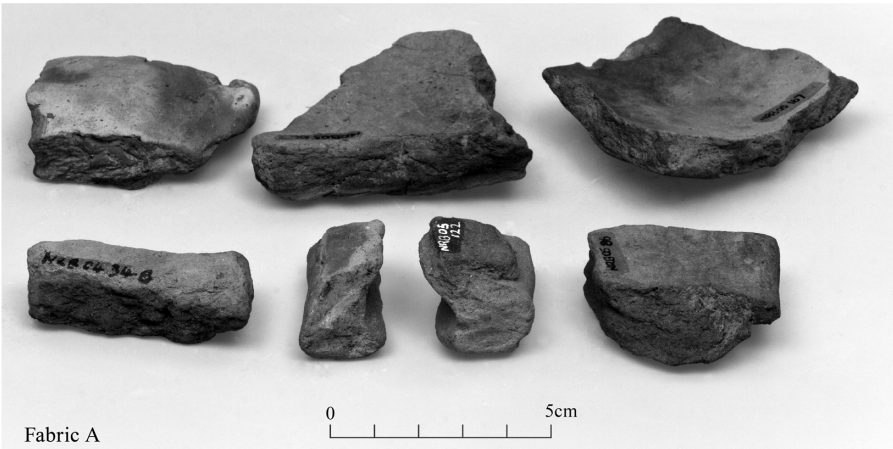
Fabric G medium-coarse, sandy fabric (boulder clay) (fig. 21)

Fabric H medium-fine, sandy fabric with various infrequent sedimentary and igneous rocks and rare patinated flint/chert (boulder clay with significant glacial drift) (fig. 21)

Fabric I fine, dense silty fabric with very large, angular rhyolite fragments (uncertain source) (fig. 21)

BRIQUETAGE FABRICS AND SOURCES

These fabrics are similar to fabrics identified in briquetage assemblages found on later Iron Age saltern sites in eastern England (Lane and Morris 2001): naturally-occurring fine sand and silty clay fabrics and those made from similar clays which had also been tempered with organic matter (fig. 22). Briq 1 is an example of the former, while Briq 3 had been made from the same clay with a sparse to moderate amount of organic matter added. Briq 2 fabric had been made from pottery fabric A into which a common to very common amount of organic matter had been added. Therefore, fabrics Briq 2 and Briq 3 are very similar technologically but slightly different sources had been selected as the original clay matrices. Briq 3 had been used solely to make the wedge-shaped support piece (type CL7), while Briq 1 and Briq 2 had



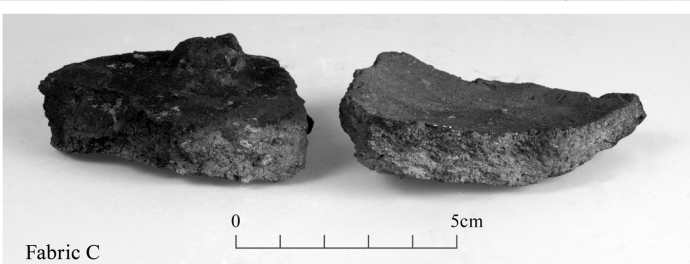
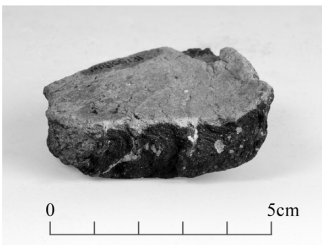
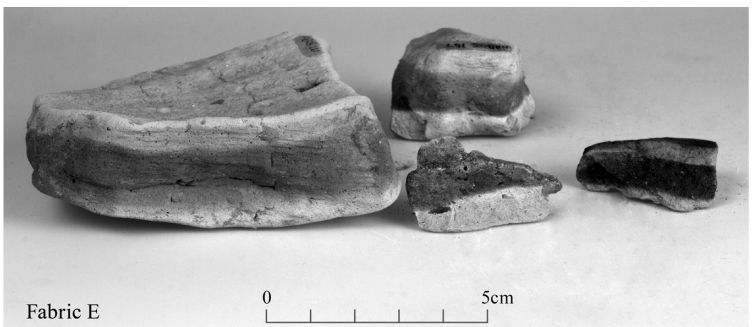


Fig. 20 Pottery Fabrics A, B and C.



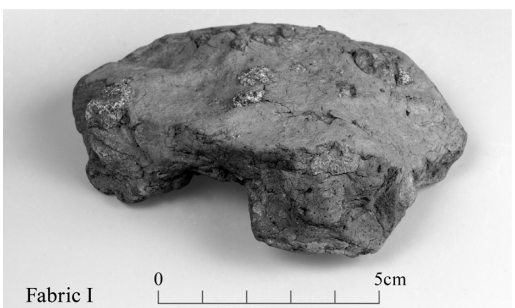
Fabric D



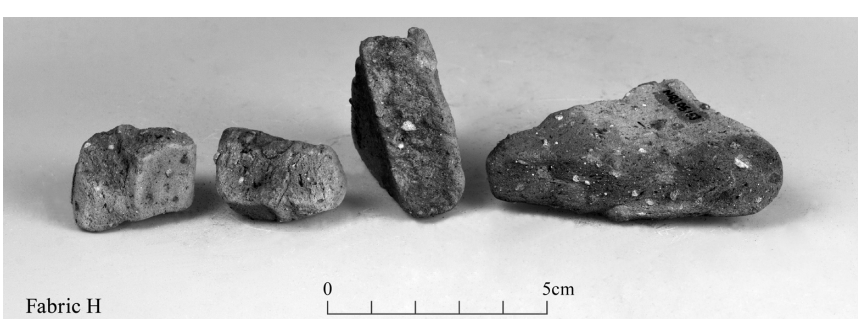
Fabric E

Fabric F

Fabric G



Fabric I



Fabric H

Fig. 21 Pottery Fabrics D to I.

been used to make evaporation containers represented by a single rim, numerous fragments from bases and many body sherds (Table 3).

Based on previous petrological analyses of British briquetage and on an understanding of the nature of salt-production ceramics as expedient objects primarily created to aid the winning of salt from brine, the source or sources of the clays used to make the Berwick briquetage fabrics are likely to be found locally on, around or very near this saltern site. If that is the case, the numerous alluvial clays at Tweedmouth and the blanket of glacial drift across the site and around its landscape to the north, west and south (Geological Survey Sheets 1 and 2, Berwick-upon-Tweed, and Norham) are the best options. There are several locations of alluvial clay deposits without rocks, including at least one used for tile-making (Fowler 1926, 35). The upper drift includes clays which are reddish, light red or light-coloured, sandy, and free of rocks, that have been observed in several sections at clay pits in the area (Fowler 1926, 32–3). It may be significant that these open pits were the locations of tile works, as at Ancroft Tile Works, Bore Hole Tile Works, and near Tweedmouth, demonstrating the suitability of the rock-free, sandy clays to make ceramics. The utilisation of added organic matter to temper the clays in two of the fabrics is a very different method of ceramic fabric manufacture than those known from the pottery fabrics at this site or any other Iron Age site in the wider region of south-east Scotland and Northumberland. Organic-tempered briquetage container sherds have been found on ten settlement sites in the wider Tees valley area (Willis 1999, 101; 2007; Vyner 2001; Johnson 2003) and from the Iron Age saltern phase at Street House, Loftus, North Yorkshire, where brine evaporation hearths have been found (Sherlock 2007; 2010; pers. comm.; see fig. 32). Teesmouth with its creek systems has been suggested as a suitable salt production landscape during the later Iron Age for this particular briquetage (Willis 1999, 101). As at Berwick, organic-tempered *pottery* fabrics have not been identified in any of the ceramic assemblages from these sites either. Dried, organic matter is a readily available secondary resource from crop processing and grass cutting for animal feed. As a temper in fabrics, it reduces shrinkage and provides added strength to pliable fabrics while building briquetage containers and other objects. It also increased porosity to aid evaporation of the final chemical water in fabrics when being fired for the first time (Rye 1981, 33–4; Morris 2007). It is interesting to note that both untempered and tempered briquetage fabrics are present in the Berwick assemblage and it is tempting to suggest that the addition of chopped organic matter to fine local clays improved their workability, strength and overall suitability and, thus, the process of salt production at this saltern site (as at other sites in coastal Britain during the later prehistoric period).

Detailed petrological descriptions of the briquetage fabrics are available in the digital archive, and a summary list is presented here.

Briq 1 fine to very fine, sandy fabric (fig. 22)
Briq 2 moderately organic-tempered, fine sandy fabric with iron oxides (fig. 22)
Briq 3 commonly organic-tempered, fine to very fine, sandy fabric (fig. 22)

Vessel forms, sizes, and manufacturing techniques

Fortunately, the shapes and manufacturing techniques of the pottery vessels are very different from the shapes and manufacturing technique of the briquetage vessels. A maximum of 63 pottery vessels was identified in the assemblage (see digital archive table 5) but, amongst these, only two general vessel shapes were revealed: a simple, convex-profile, closed jar form,

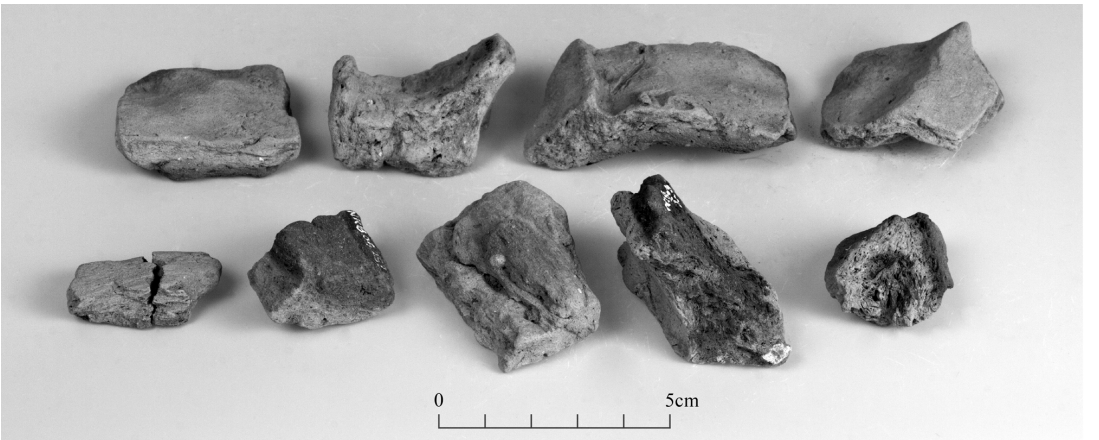


Fig. 22 Briquetage Fabrics 1–3.

and an equally simple, bucket-shaped, neutral vessel or possible bowl. Between these two general shapes, six rim types were defined. The maximum number of vessels includes single sherds for which no obvious other sherd appears to be from the same vessel. However, some must derive from the same pot and therefore this maximum is likely to be overstated.

POTTERY VESSEL FORMS, SIZES AND MANUFACTURE

Nearly all of the diagnostic vessels in the assemblage were identified as deriving from convex-profile, neckless and shoulderless, ovoid or barrel jars. Five of the six rim types defined below (R1–R5) are variations on this closed form shape while the sixth type (R6) is a more open form with a bowl-like or bucket appearance (fig. 23). Only one diagnostic type of base was identified (B1) and a single type of knob (K) attached to a vessel wall sherd was also identified. Sixteen vessels are represented by rims, including one vessel each of types R1, R2, R4, R5 and R6, with eleven examples of type R3 (Table 5). Types R1 and R5 were both made

Table 5 Frequency of form types by fabric.

Fabric	Diagnostic Form Type								
	R1	R2	R3	R4	R5	R6	B1	B99	K
A	1	–	2	–	1	–	–	1	–
B	–	1	6	1	–	–	1	2	–
C	–	–	–	–	–	1	–	–	1
D	–	–	1	–	–	–	–	–	–
E	–	–	1	–	–	–	–	–	–
F	–	–	–	–	–	–	–	–	–
G	–	–	–	–	–	–	–	–	–
H	–	–	1	–	–	–	1	–	–
I	–	–	–	–	–	–	–	–	–

from fabric A, while R2 and R4 were from fabric B. Fabric C was used to make the only example of type R6. In contrast, the type R3 vessels had been made from fabrics A (two examples), B (six), D (one), E (one) and H (one) which indicates that this rim type was not only the commonest vessel shape in the assemblage but also the preferred rim shape amongst at least five of the nine fabrics. No examples of rim sherds were recovered in fabrics F, G or I. Two vessels were represented by type B1 base sherds, one in fabric B and one from fabric H, but neither can be cross-referenced to specific rim types. In addition, sherds from the central areas of other — presumably flat — bases (B99) were identified, one in fabric A and two in fabric B, resulting in five different bases represented in the assemblage. The one pinched knob in the assemblage derives from a fabric C cooking pot but this sherd was not associated with either rims or bases from the same vessel.

The rim types and overall vessel profiles in the Needles Eye assemblage have similarities with the Iron Age pottery assemblages from Burradon, Doubstead, and Pegswood Moor in north-east England and Broxmouth, Dryburn Bridge, and Port Seton in south-east Scotland.

Burradon has several illustrated examples of convex-profile, barrel jars and neutral vessels (Jobey 1970) which would easily lose themselves in the Needles Eye assemblage. In particular, the coil-built, medium-sized vessel Burradon 4 is very similar to more than one vessel form from the enclosure, type R3 (fig. 23, nos. 1, 5–6, 9, 13–16, 18–20), while Burradon 10 is a thick-walled version of neutral vessel or bowl type R6 (fig. 23, no. 7). The bevelled edge of type R4 (fig. 23, no. 11) is identical in appearance to Burradon 5. The presence of two vessels decorated with finger-tip impressions, one along the bevelled rim and the other below the shoulder curve, in the Burradon assemblage indicates that the Burradon assemblage is likely to include activity dating to the final decades of the Early Iron Age period and prior to the construction of Ditch 2 (Phase 2.3) at the Needles Eye enclosure. No decorated sherds or sherds from shouldered jars were identified in the assemblage. Carbonised residue on a sherd from one vessel found in Ditch 2 (fig. 23, no. 1) was radiocarbon dated to cal. 500–380 BC (Beta–208953; 2350+40 BP), while AMS dates from four carbonised barley and wheat grains from ditches and pits later in the stratigraphical sequence range from the second century cal BC through the mid-first century AD, ie. the later Iron Age period (this volume, Tables 12 and 13). A fifth date from a stratigraphically later context may derive from as late as the second half of the first century AD (cal. 40 BC–AD 130; SUERC–32891 GU–23127).

Comparable vessels from Doubstead include several examples similar to type R3 and one bevelled example like type R4 (Jobey 1982, fig. 5, 1, 2 and 4–5), while the illustrated vessels from Pegswood Moor (Willis 2009a, figs. 30, 31) include two that are identical to R3 vessels and two that could easily be classified as examples of nearly hooked rim versions of this barrel shape (type R2). Another two of the Pegswood barrel-shaped jars have strong internally-bevelled rims (Willis 2009a, 8, 10). One of these appears to have finger-tip decoration along the bevel surface but close inspection suggests that it was more likely to be the result of rim construction through finger pinching rather than deliberate decoration (Willis 2009a, fig. 30, 8). AMS dates of carbonised residues derived from five unspecified sherds selected from that assemblage resulted in dates ranging from the fourth to first century cal BC (Proctor 2009, table 3) which places the occupation there entirely within the middle and late pre-Roman Iron Age and contemporary with the middle and late pre-Roman Iron Age phases at the Needles Eye enclosure.

The Needles Eye assemblage is a combination of the characteristics outlined for the later prehistoric pottery assemblage from Broxmouth (East Lothian) which is located on the coast

35 km north of Berwick. Cool (1982) has identified two broad groups of pottery which were stratigraphically separate on that site. Type I pottery is characterised by very thick walls, often measuring 20 mm or more, with rim diameters from 250 to 350 mm. The coil-built construction is easily visible on the surfaces of the vessels which are slightly flared upwards from the base but are generally bucket-shaped with upright or inturned rims. The fabrics are always very coarsely tempered with stone fragments often up to 10 mm or more. The firing was highly variable. In contrast, Type II pottery at Broxmouth is thinner walled at 10–20 mm thick, often smaller in diameter with a range from 180 to 250 mm, has well-finished surfaces, and is a simple bucket-shape (rims not detailed in text). The fabrics are much finer with grits usually measuring less than 3 mm and the firing is thought to have been under much greater control — as evidenced by the more consistent colouring, both on the surfaces and in the core. The Needles Eye assemblage exhibits characteristics of both of these groups, which appear to have been stratigraphically distinct at Broxmouth. The former, referred to as the Middle Assemblage, was associated with dates centring on the fourth century uncal bc (370 + 60 uncal bc; 345 + 50 uncal bc; and 300 + 55 uncal bc) while the latter, referred to as the Late Assemblage, was associated with dates of at least the second century BC (205 + 55 uncal bc; 145 + 95 uncal bc) and (based on association with metalwork) continued in use into the first century AD (Cool 1982, 99). The full publication of this significant assemblage is anticipated.

The small assemblage from Dryburn Bridge (East Lothian) has two particularly useful comparators: a barrel jar with rounded rim and a bucket with flat rim (Cool 2007, illus 58, nos. 9 and 70a–b). However, the remaining examples, including a fragment of decorated rim with finger-tip impressions from one vessel and the necked rims from two others, suggest that this site might be more contemporary with Burradon. The Port Seton assemblages have few rims, but the one illustrated from site West is from a barrel-shaped jar with a nearly hooked rim (Cowie 2000, fig. 25, 3) while one from site East is typical of a barrel jar with an inturned rim (Gwilt 2000, fig. 76, 2). Two good examples of hooked rim barrel jars were found at settlements excavated at St Germains, just to the south of Port Seton, at Tranent (Alexander and Watkins 1998, illus. 13, 8 and 15, 26). Interestingly, none of the assemblages discussed thus far is able to provide a parallel for rim type R1, the small, beaded rim barrel jar (fig. 23, no. 21), which suggests that this form is likely to be quite late in the Iron Age to early Roman sequence of activity at the site as it is similar to examples from several sites in Cleveland and Yorkshire (Evans 1995, fig. 5.6: type Hi). This sherd was recovered from the topsoil. Two of the sites excavated as part of the Traprain Law Environs Project produced modest assemblages of later prehistoric pottery, but most of these originated from bucket-shaped vessels (similar to the Broxmouth Type I group) rather than barrel-shaped jars. Two vessels from the site at Knowes would fit comfortably within the range of forms from the Needles Eye enclosure (MacSween 2009, fig. 7.2, 81 and 145) but the majority of illustrated examples are classic bucket shapes, with the addition of one flared bowl bearing a distinctive necked profile. In contrast, there is a considerable variety of vessel form shapes and rim types amongst the so-called handmade pottery of native tradition from Thorpe Thewles (Cleveland) in the Tees Lowlands. At this site, the range of shapes include necked jars, shouldered jars, hemispherical bowls with flanged rims, flared bowls with flat, expanded rims, and everted rim jars (Swain 1987, figs. 44–7). Neckless, barrel and bucket-shaped vessels are present but in a very small minority of cases. Therefore, there is little similarity between the vessel forms from the enclosure and those from Thorpe Thewles.

The diameters of nine of the sixteen vessels from the enclosure could be determined. Three vessels can be described as relatively small (100–<200 mm), five as medium-sized (200–<300 mm), and one is large (300–<400 mm). Although there are very few measurable examples in the assemblage, it is interesting that the majority are in the medium-sized range which contrasts with later Iron Age assemblages from the Midlands, the Trent to Tyne region, and southern England, which (when data about vessel sizes are published) are always dominated by small-sized vessels (e.g. Brown 1991, fig. 151; Woodward 1997, fig. 4.1; Woodward and Blinkhorn 1997, tables 1–3, figs. 1–2; Hancocks 2003, figs. 7.17a and b; Morris and Crosby 2007, table 5;) or can be obtained from illustrated vessels (e.g. Challis and Harding 1975). Calculation of the measurable rim diameters from the two principal phases of activity at Thorpe Thewles has revealed that the majority of diameters fall into the small category as well (Swain 1987). MacSween (2009, 118, fig. 7.2) has emphasized that the seven vessels measurable from the modest assemblage recovered from Knowes during the Traprain Law Environs Project fieldwork range from 120 to 420 mm (where the diameter could be established).

Based on measurable wall thickness of 55 identifiable vessels in the Needles Eye assemblage, most of the vessels (80%) have walls measuring between 13 and 21 mm thick. These facts need to be elaborated to provide suitable impact and the simplest way to emphasize the significance of this statistic is to realise that most of the pottery from Iron Age assemblages published from sites in southern England have walls measuring between 5 and 14 mm, virtually three times thinner. This is one of the most striking characteristics of the pottery from north of the Tyne — the preponderance of very thick-walled vessels. But even this is an understatement because of the presence of extremely thick-walled examples from the enclosure. Three examples have walls measuring between 25 and 28 mm, a thickness which never occurs in southern England. Cool (1982) has indicated that the considerable wall thicknesses she encountered on the Type I vessels at Broxmouth could be an indicator of continuity in stylistic tradition from the Bronze Age, an idea which is supported by the illustrated late Bronze Age vessels from Myrehead (Falkirk District) which measure 18 to 22 mm thick (Barclay 1983, figs. 15–16).

Thick-walled Iron Age vessels are most common north of the Tyne but rare to the south. The wall thicknesses of the Iron Age pottery from Pegswood Moor range from 7 to 19 mm with the majority of 31 measurable vessels being between 11 and 18 mm thick (74.1%) (tabulated data available in the digital archive), while that from the small assemblages at Broxmouth (Cool 1982), Fishers Road West (Cowie 2000), and Fishers Road East (Gwilt 2000), are described as distinctively thick and appear to be comparable to the Needles Eye enclosure assemblage in general. Most of the body sherds in the small Iron Age assemblage from Knowes in East Lothian are 10–20 mm thick (MacSween 2009, 118). Examination of the illustrated pottery from Thorpe Thewles (Swain 1987, figs. 44–47), however, reveals that the wall thickness range of that assemblage is thinner overall and much more 'southern' in nature. Of the catalogued vessels from Thorpe Thewles, 45% measure less than 9 mm while only 3.6% of the Needles Eye assemblage measures less than this. In contrast, 65.3% of the Needles Eye vessels measure 15–28 mm or more but only 6.4% of the Thorpe Thewles vessels are this thick. Therefore, the pottery from the enclosure has little in common with that from the Tees valley, other than the presence of rock grits in most of its fabrics.

Finer fabrics in the Needles Eye assemblage, such as fabric A, were used to make both the thinnest vessels (7–12 mm) and some of the thickest vessels (21–22 mm) as well as the more common ones (13–20 mm). Fabric E, another fine fabric, had been used to make the widest

range of wall thickness including two of the thickest vessels (23–26 mm and 25–28 mm) and single examples of 7–8 mm, 11–12 mm, 17–18 mm and 19–20 mm. Amongst the ten rims with measurable diameters, coarse fabric B was used to make one small, four medium, and one large-sized vessels. Therefore, it does not seem that there is any functional correlation between the size of vessel opening, the size of wall thickness or the selection of fabric texture but it must be remembered that this is a small assemblage. If such a trend proves to be the case generally north of the Tyne, then the likelihood is that each potter created a specific fabric which became an all-purpose one for making simple-profile pots of different sizes.

One of the most striking aspects of this assemblage, other than the massive wall thickness of many sherds, was the discovery that 16% of the 63 vessels displayed clear evidence of an unusual method of manufacture. All of the prehistoric pots were handmade and many show that the method employed to make them had been coil-building which is recognisable where the broken edges are angled at 45° across the section of the vessel. This method is common amongst later prehistoric pottery assemblages in central and southern England. However in this assemblage, some of the pots had been made by the unusual and distinctive tongue-and-groove (T&G) technique which can be recognised by the presence of two tongues of clay overhanging a rounded ridge of clay ring or collar as a result of the sequence of collars being pressed down equally on both the exterior and interior surface during manufacture. It is easy to see these tongues of clay being smeared on either side of the rounded, collar ridges nestling within the grooves created by the tongues in the broken sections of sherds (fig. 23, nos. 3, 6, 10, 14, 16, 21–2). Although this is a term and technique applied to woodworking, the effect is similar as such joints allow two pieces to be bonded strongly together to make flat surfaces on the interior and exterior of a vessel, and it is possible to see that this results in the creation of more surface contact and potentially a stronger bond. Both oblique angled and T&G techniques had been used on at least two of the vessels (fig. 23, nos. 14 and 16). The T&G technique can be identified in other later prehistoric assemblages from south-east Scotland. One of the illustrated late Bronze Age vessels from Myrehead was entirely made by this technique (Barclay 1983, fig. 16) while another was created through a combination of both T&G and coil or ring construction (Barclay 1983, fig. 15, SF9). Cool's (1982, 94) drawings of both Broxmouth Type I and Type II examples emphasize this method of manufacture. Cowie (2000, 31, fig. 25, 3–4) declares that the majority of sherds recovered at Fishers Road West derive from vessels which had been made by ring construction with three different types of joints: T&G, obliquely bevelled or angled (Cowie 2000, fig. 25, 2), and flat breaks. Tongue-and-groove is the commonest method of construction in that assemblage. Gwilt (2000, fig. 76, 2) struggled to determine details about the methods of construction of the pottery from Fishers Road East but the cross-sections of the illustrated vessels suggest that one was likely to have been T&G. He further emphasizes his surprise at not finding construction evidence, despite close examination, as this 'differs from those found at many other later prehistoric settlements in southern Scotland which show ample presence of joining technique' (2000, 135). Both T&G and obliquely bevelled ring joins were visible on a number of sherds from St Germains (Alexander and Watkins 1998). In contrast to these East Lothian assemblages and to the Needles Eye assemblage, the pottery vessels from Burradon (Jobey 1970) and Pegswood Moor (Willis 2009a) had been made solely by coil-building as only oblique-angled or flat breaks have been drawn. Therefore, T&G technique on its own or in association with coil-building was a manufacturing technique used specifically by potters from the Tweed to the Forth.

Pottery forms type series

R1 beaded, rounded rim on an ovoid or convex-profile jar (fig. 23, no. 21)

R2 internally extended, nearly hooked, rounded rim on an ovoid or convex-profile jar (fig. 23, no. 22)

R3 incurved rounded rim, which may be slightly flattened on the top, on an ovoid or convex-profile jar (fig. 23, nos. 1, 5–6, 9, 13–16, 18–20)

R4 internally bevelled, flattened rim on ovoid or convex-profile jar (fig. 23, no. 11)

R5 thin, pointed rim on an ovoid or convex-profile jar (fig. 23, no. 17)

R6 upright and flattened rim on hemispherical or bucket-profile, neutral vessel which may be an open bowl (fig. 23, no. 7)

B1 flat base with base angle present (fig. 23, no. 12)

B99 central zone of flat base no longer attached to vessel wall (central part of flat base) (not illustrated)

K attached, pinched knob of clay on exterior surface wall; may function as a securing device to assist in the lifting or balancing of the vessel during use (fig. 23, no. 4)

P plain body sherd (fig. 23, nos. 3, 8 & 10)

BRIQUETAGE FORM TYPES AND MANUFACTURE

Two classes of briquetage (Morris 2001a) are present in the assemblage: containers and a support. No identifiable ceramic fragments which could be interpreted as deriving from one or more man-made hearths, normally classified as briquetage structural material, were recovered.

Amongst the container fragments, only one rim sherd could be identified (R10: see the forms type series, below). It is a slightly flared, flattened rim from a very thin-walled vessel that was remarkably straight-walled in plan (fig. 24, no. 1). However, one body sherd with diagonal finger grooves (created during manufacture) derives from very close to the rim edge of a different container, one which is also straight-walled in both profile and plan, but moderately thick-walled and narrowing significantly up to the rim zone (fig. 24, no. 2). The presence of a slight internal overhang to the lower wall fracture suggests that this container may have been made by slab construction. Three variations of base sherds were identified including the most frequent type which is a very flat base with attached flared wall rising straight from the base which had been joined to the base plate by thumb-pressing (B2). Highly fragmented pieces of this type come from uncertain vessel forms (fig. 24, nos. 3 and 8) but two examples in the assemblage derive from a form of small, flared-wall 'auget' (fig. 24, no. 4), a term utilised to describe similar brine drying containers from later Iron Age saltern sites excavated in northern France which usually have sharply squared ends creating a distinctive rectangular vessel or 'auget évasé' (Daire 1994; 2003, 43–4). The second form (B3) is another flat base with flared wall but curved in plan (fig. 24, no. 5), which implies that there may have been curved ends to one container for which there are later Iron Age and early Roman parallels from the Fenland region (Crosby 2001, fig. 32, 3–4). The third base form (B9) is slightly different. The wall of the flat based container is convex in profile and attached to the flat base plate apparently without thumbing but the method produces an excess of clay in the form of a spur or lip due to pressing the wall to the base plate (fig. 24, 6). All three types of base (B2, B3 and B9) and the rim R10 were made from fabric Briq 1, the most common fabric type in the

Ditch 7 briquetage deposit and in the briquetage assemblage as a whole. In addition, one example of B2 base had been made from fabric Briq 2.

There may be four, or five, different brine evaporation containers in the assemblage. One vessel is in fabric Briq 1 and may include the form R10 rim (which is oxidised throughout), and a few of the thinner, similar body sherds found in Ditch 7. The second vessel, also in fabric Briq 1, may be represented by the finger-grooved body sherd from near the rim of a vessel with straight side bases (B2), curved base end (B3), and the majority of body sherds from Ditch 7 (fig. 24, nos. 2, 3 and 5) with an oxidised exterior but unoxidised interior surface that had been abraded from use. A most unusual third vessel had closely parallel and very straight walls in plan which had been made from fabric Briq 1, oxidised or nearly oxidised throughout, and was also abraded on the interior from use. A fourth one, which was probably similar in shape to the principal container in Ditch 7 (fig. 24, no. 8) but had been made from fabric Briq 2 and was recovered from a stratigraphically later context (see Table 4). A fifth container might be represented by the B9 base in fabric Briq 1 (fig. 24, no. 6) but its difference could simply be a manufacturing variation along part of the principal container. No examples of narrow, rectangular briquetage containers have been published from coastal or inland saltern assemblages in Britain, making this augit type of container form unique in the UK. The range of base variation and, consequently, the many interpretations of vessel shapes in such a small assemblage are not unexpected within later prehistoric and early Roman seaboard assemblages in eastern England (Lane and Morris 2001) and coastal France (Daire 1994; 2003).

The single example of a support class object is a type of stabiliser, used to secure containers to other containers and/or supports to make sure they remain in a firmly balanced complex while in use. Stabilisers can be soft clay clipped over the rims of two containers, for example, which are then fired when the briquetage complex is heated or they can be pieces of soft clay wedged between hearths and containers or pedestals and containers. This example is a wedge-like piece which has one flat surface derived from the floor of the hearth and concave impressions of the walls of two containers (CL7; fig. 24, no. 7). Similar pieces are frequently found amongst many different stabilisers in the Fenland region (Morris 2001a, fig. 113; Crosby 2001, fig. 33) and also in France where they are less common (Daire 2003, fig. 61).

Briquetage forms type series

R10	simple, flared rim (fig. 24, no. 1)
BS1/2	body sherd which may be curved or straight (fig. 24, no. 2)
B2	flat base with flared container wall profile that is straight in plan (fig. 24, nos. 3 & 8); at Needles Eye, examples derive from 'augits' (fig. 24, no. 4)
B3	flared/splayed base in profile and curved in plan (fig. 24, no. 5)
B9	spurred flat base with convex-sided container wall profile (fig. 24, no. 6)
CL7	wedge-shaped stabiliser pressed between flat surface and walls of containers (fig. 24, no. 7)

Surface treatments

Amongst the pottery, only two types of surface treatment were noticed: burnishing and finger-wiping. Two different fabric A vessels were identified as having burnished exterior surfaces. One is a small thinner-walled vessel (fig. 23, no. 17) while the other is much thicker

(fig. 23, no. 3). Burnishing has two distinct characteristics, one aesthetic and the other practical. Burnishing reduces the migration of moisture from within a liquid storage container through its walls and thus helps to retain the contents as well as reducing the seepage of moisture into a dry storage vessel from outside, keeping the contents dry. This treatment also gives a shiny, light-reflective appearance to a pot which can be readily appreciated. Finger-wiping was observed on only one pottery vessel in the assemblage (fig. 23, no. 11) but was extremely frequent on both body and base sherds of briquetage (fig. 24, nos. 2–4), making it a distinctive manufacturing characteristic of salt-production ceramics at the Needles Eye enclosure. In addition, the only briquetage rim was wiped with a cloth or the fingers on both the interior and exterior surfaces (fig. 24, no. 1).

Evidence of vessel use and modification

Three types of use-wear were observed on potsherds and two types on briquetage (see digital archive table 9). The commonest evidence visible to the naked eye on pots was associated with cooking in the form of soot on the exterior and burnt/carbonised residue on the interior. At least 18 of the 63 vessels displayed evidence of having been used as cooking pots and these had been made from six different fabrics (A–E, H). Cooking pots are common amongst later prehistoric and native pottery assemblages from the region (Jobey 1982), as exemplified by the Pegswood Moor assemblage where 13 out of 36 identifiable vessels had been used for this domestic activity (Willis 2009a, table 2). In addition, the unusual appearance of pink tinges to the otherwise orange-firing fabrics of at least seven vessels indicates that these pots had been in contact with brine and heat at some. It is not possible to determine by normal visual examination alone whether brine had been used to make those vessels, or whether the vessels had been used to transport brine up to the site from the seashore for the purpose of salt production, or as ladles to add brine to the briquetage containers in the saltern hearth during the heating process. However, these seven vessels had been made from four very different and, in two cases popular, fabrics. Because relatively few of the commonest fabric vessels have this pink discolouration, it may be assumed with some confidence that brine was not likely to have been used in their own manufacture. At most, only 19% of fabric A and 12% of fabric B vessels were visibly brine-affected.

Curiously, none of the briquetage displayed this pink colouring. Instead, the types of use-wear observed on briquetage consisted of abrasion on the interior and salt-bleaching on the exterior, with one vessel each displaying these types. The best examples of abrasion, in this case caused by the scraping out of the salt crystals from a container, are visible on the base sherds of the principal vessel from the upper fill [252] of Ditch 7 (fig. 24, no. 2). Salt-bleaching has been observed frequently on briquetage from the Fenland region and is recognised as a white to off-white 'skin' on the surfaces of containers and supports (Morris 2007), akin in appearance to a slip on the surface. If a container has been used over a long period of time or frequently and repeatedly, the white appearance begins to include the core of a container's wall until it is no longer orange-coloured. This 'skin' is actually the beginning of salt-bleaching whereby the naturally-occurring iron in orange/red-firing clays becomes leached out, which results in the 'skin' representing iron-free clay. Only two small fabric Briq 2 container sherds from pit [224] displayed this type of evidence which strongly suggests that the remaining briquetage in the assemblage was not used for any length of time or repeatedly. Briq 1 fabric in this assemblage is quite pale orange in appearance (Munsell 5YR 7/6, reddish

yellow) but the majority of sherds indicate that the main container had been fired for a short period of time as the core and interior surfaces of these sherds were unoxidised (Munsell 5YR 5/1 grey). If the container had been used for an extended period, the open firing condition of the brine evaporation process on a hearth would have completed the full oxidisation of this vessel fabric through the walls. One body sherd was selected to test this concept by determining the natural colour when fully oxidised through refiring the sherd from 500 to 700°C for two hours in an electric kiln. The sherd became oxidised throughout and the colour clarified (Munsell 5YR 6/6 reddish yellow).

Vessel 34 (fig. 23, 14) had been modified after it had been made. A post-firing perforation was drilled from both sides (hour-glass perforation profile) to create a small hole, 5 mm in diameter, about 30 mm below the rim of the vessel. The small diameter of the perforation suggests that it is likely to be a repair hole, and one of a pair, for the insertion of a string or thin strip of leather to bind across a vertical crack in the wall. The use of string or a leather thong would not be unsuitable in this case as it appears, in the absence of any soot or carbonised residue, that the pot was not used as a cooking vessel. This post-firing perforation is unique amongst the published later prehistoric pottery assemblages in the region.

Ceramic sequence, deposition and re-deposition

One of the most striking results from the analysis of this assemblage, discovered during the detailed research phase rather than the assessment phase, was the recognition that sherds from the same pottery vessel were frequently recovered from stratigraphically *distant* contexts; i.e. disturbance and redeposition had been a regular occurrence during the site's history. A detailed discussion of the stratified ceramic sequence of both specific pottery vessels/sherds and briquetage container sherds is available in the digital archive.

Tyne-Forth Iron Age pottery style zone

In 1970, George Jobey referred to a 'Tyne-Forth province' (1970, 51) in his site report about excavation at Burradon, just north of Newcastle. Hilary Cool also used this term in her extensive discussion of the material culture from Broxmouth (1982, 92). In both cases a regional concept had been invoked to frame the activities of people living in a defined area during the later prehistoric period. Interestingly, there is a great deal of information from the pottery found in the area to support such a concept, evidence which could be referred to as a 'style zone'. However, Cunliffe who first established this classification scheme in the 1970s and continually updated it (2005) has not yet recognised a pottery style zone for this region, despite presenting generalised locations of the major tribes of northern Britain with the Votadini in the areas of East Lothian and Northumberland (Cunliffe 2005, fig. 9.6). Is it possible to define a style zone for this region? The evidence from Burradon, Pegswood Moor, Doubstead, Needles Eye, Broxmouth, Knowes, Fishers Road East and West, and St Germains indicates that there is a strong case.

Most specialists have written about the pottery from this area in a negative manner because of its infrequency, simplicity and plain appearance, its coarseness in terms of fabric, and its rough construction. These, however, are exactly the characteristics that make the definition of a new style zone, the Tyne-Forth style, possible. The vessels are neckless in profile, nearly always bucket and barrel-shaped, and have simple rims with either rounded or bevelled lips.

The pots were built with relatively thick to very thick walls, measuring primarily between 13 and 20 mm, in a sizable assemblage and are primarily in the medium to large rim-diameter size range (200 to 380 mm). They display obvious handmade manufacturing methods, with strong evidence of joints frequently visible, revealing several techniques including 'tongue-and-groove', coil-building and ring construction. Vessels were very rarely burnished and equally infrequently decorated. This is an array of strong characteristics, ones which set the Needles Eye assemblage apart from any assemblage of Yorkshire, Midlands, East Anglian, or southern British origin. They make the Tyne-Forth assemblages very distinctive and worthy of style zone recognition, one quite separate from the assemblages of the Tees valley and Yorkshire (see Evans 1995).

Salt production at the Needles Eye enclosure

The assemblage of later Iron Age briquetage from Needles Eye is relatively small compared to later prehistoric assemblages from salterns in the Fenland region (Morris 2001b, table 4; 2001c, table 55; 2001d, table 61; Morris and Percival 2001, tables 84–5), but the presence of fragments from at least three containers and a stabiliser-clip show how close the briquetage-bearing features were to the main saltern activity zone. The excavated part of the enclosure is now located 150 m from the eroding cliff-edge, at 42 to 64 m OD, while the eastern side of the enclosure identified as a cropmark on aerial photographs is 50 m from the present cliff edge (see Geology and Topography, above). Seawater, which is 3% salt to water, could either have been heated to remove a significant proportion of the water at sea level before being carried to the top of the cliff for further processing, or the water could have been completely evaporated at saltern hearths by the shoreline during the warmest, and calmest, time of the year to produce the salt crystals (Bradley 1975, fig. 10; Gurney 1986). Bradley has suggested that two stages of brine evaporation process may be the explanation for variation in the ceramic material from Early Roman sites on Chichester Harbour in West Sussex, where one site, closer to the source of brine, had thick-walled containers, and another, further inland, had thin-walled containers (Bradley 1992). A quantity of briquetage containers found at the Late Roman settlement of Carngoon Bank, located on top of the sea cliff at Trebarveth in Cornwall (Morris 1980), has been interpreted as evidence of salt production at that site. Several sherds of amphorae, one modified by deliberate removal of the narrow rim (not illustrated in Smith 1980, figs. 16–17), were likely to have been employed as brine transport containers to bring the water up to the settlement for processing (cf. E. Morris, Central Excavation Unit Archive Report, Site 32, The Briquetage).

As only a small area of the Needles Eye enclosure was available for investigation and because the North Sea has eroded the cliff over the past two millennia (see Geology and Topography, above), until further fieldwork is possible we must assume that salt production did take place by the sea below the site, on the site, or at both locations during the later Iron Age. The presence of a stabilising clip adds weight to support the Needles Eye enclosure as the home of the earliest evidence for salt production in Northumberland. If salt production at the saltern complex was at all similar to that in the Fenland or at coastal sites on the Continent, then the main components missing from the classes of briquetage that would be expected to be found are pedestal supports to raise the containers above the hearth floor and fragments of fired clay from a hearth representing the structural material (Daire 1994; 2003; Lane and Morris 2001). The stabiliser-clip found its way into layer [167] in the working

hollow and may have arrived there having been attached to a container brought up from the shore.

The best evidence for accepting the Needles Eye enclosure as part of a saltern complex is the sheer quantity of briquetage in this ceramic assemblage, considering that so little of the site was available to investigate, and comparison of this quantity to amounts from non-coastal contemporary sites in this region and further south. Willis (1999; and forthcoming) has recognised small quantities of sherds from briquetage containers from several Late Iron Age sites in and around the Tees valley including Catcote, Easingwold, Melsonby (Fitts *et al*. 1996), Rawcliffe Moor, Rock Castle (Willis 1994), Scotch Corner (Willis 1995), Stanwick (Willis, forthcoming) and Thorpe Thewles, and from Burradon and Pegswood Moor in Northumberland (Willis 2009a; 2009b) (see fig. 32). If a ratio of briquetage to pottery by weight is obtained for each of these collections, it would be possible to compare the relative amounts of briquetage between Needles Eye, a proposed salt-making site, and all the others to demonstrate that these were salt-using sites. The data is available for Pegswood Moor, a ratio of 0.004 briquetage to pottery, while this assemblage from the Needles Eye has a ratio of 0.173. Therefore, the enclosure has 43 times more briquetage in its ceramic assemblage and can be interpreted as a location of salt production.

The fabric of the sherds of briquetage containers from Pegswood Moor is not similar to that from Needles Eye. It was made from sandy clay and tempered with significant quantities of chopped organic matter. Willis (2009b) believes that it is most likely that the production site for this material will be found at the mouth of the River Tees, or the fabric might match the briquetage found in the Iron Age salt production phases at Street House, Loftus, North Yorkshire (Sherlock 2007; 2010). At present, no fragments of briquetage containers have been confirmed from sites in East Lothian.

The amount of briquetage recovered and the array of salt-production equipment in the Needles Eye ceramic assemblage is limited, but it is possible to suggest that at least a low level of production did take place. The containers had not been used in the evaporation process for an extended period of time or repeatedly. Incomplete oxidisation of sherds from the main vessel, rare evidence of pink discolouration due to contact with brine, and lack of salt-bleaching of the fabrics all point towards this interpretation.

Willis has hypothesized that the deposition of briquetage into final phases of settlement activity on later Iron Age sites might be interpreted as ritual events of closure at the end of occupation (2009b). The principal deposit of briquetage at the Needles Eye enclosure derives from the infilling of the final reinstatement of the enclosure boundaries (Table 4).

Conclusions

The area excavated at the Needles Eye enclosure was much smaller than that at Pegswood Moor (Proctor 2009), and therefore the amount of pottery of Iron Age tradition recovered was relatively much larger both in terms of number and weight of sherds. The Pegswood Moor assemblage 'comprises relatively well-preserved sherds, many of which conjoin to form part profiles of the original vessels' (Willis 2009a, 40) which is in complete contrast to that from the present assemblage where the frequency of redeposition of sherds from the same vessel in more than one phase of site activity has revealed that this site was intensively occupied despite its smaller size. Pegswood Moor and this enclosure were very different sites, and this is reinforced by the extraordinary range of different fabrics and likely sources of origin for the

much larger number of vessels represented, respectively. The most likely scenario is that the production of salt provided a focus for trade between the local producers and people from elsewhere in the area, even from as far as the Cheviot Hills, at least during the later phases of Iron Age activity. Fieldwork has shown that the Cheviots in particular was a richly-occupied, defended, agricultural landscape during the Middle to Late Iron Age period and the River Breamish on the south-east side of these hills is part of the principal regional drainage system which leads downstream to the River Tweed and eastwards to the North Sea (Topping 2008, plate 1; Grieg *et al.* 1971, 3). The intensification of arable agriculture in that region during the Late Iron Age may have been a stimulus for the production of salt to maintain the level of this essential mineral in the diet as a result of possible reduced meat consumption. The Needles Eye enclosure may have been a gathering place for summer celebrations with people bringing their own pots and food to this special place while the magic of saltmaking was conducted by those with the expertise. In exchange for their own manufactured goods or food products, they took away salt for preserving their surplus meat and milk (as cheese, for example) during the autumn and winter months and in order to stay healthy.

Otherwise, the pottery assemblage from the site was typical of that from sites in the Tyne-Forth region. It has a small typological range comparable to the sites at Pegswood Moor, Burradon, or Port Seton, and those in the Traprain Law environs, including Broxmouth. The fabrics are distinctive and include sandy fabrics likely to derive from boulder clay deposits as well as more common examples of rock-tempered wares. Direct dating of carbonised residues on the interiors of the vessels, and of wheat and barley grains from the same and additional contemporary contexts, indicates that the occupation or different occupations (which included salt production during at least one phase), spanned a number of centuries from the Middle Iron Age until the Early Roman period. This site is the most northern location known of salt production during the later Iron Age of Britain.

Catalogue of illustrated pottery (fig. 23)

PHASE 2.3

1. Rim type R3; fabric B; coil-built manufacturing technique; 14% of 320 mm diameter; sooted on exterior, burnt residue on interior; fills [128], [132] and [214], Ditch 2; Pottery Record Numbers (PRN) 1036/1042 (join) and 1073 (thin-sectioned; AMS radiocarbon-dated), vessel 1.
2. Body sherd; fabric I; coil-built, fingering impressions from manufacture on exterior; fill [214], Ditch 2; PRN 1072, vessel 2.

PHASE 2.6

3. Body sherd; fabric A; T&G manufacture; burnished on exterior; fill [261], Ditch 6; PRN 1094, vessel 7.

PHASE 2.7

4. Body sherd with attached, pinched knob; fabric C; coil-built; sooted on exterior, burnt residue on interior; primary fill [121], Ditch 7 slot 5; PRN 1033, vessel 9.
5. Rim type R3; fabric B; coil-built; less than 5% present; sooted on exterior; fill [131], Ditch 7 slot 8; PRN 1039, vessel 20.
6. Rim type R3; fabric D; T&G manufacture, finger-wiped on exterior; less than 5% present; fill [131], Ditch 7 slot 8; PRN 1041 (thin-sectioned), vessel 22.

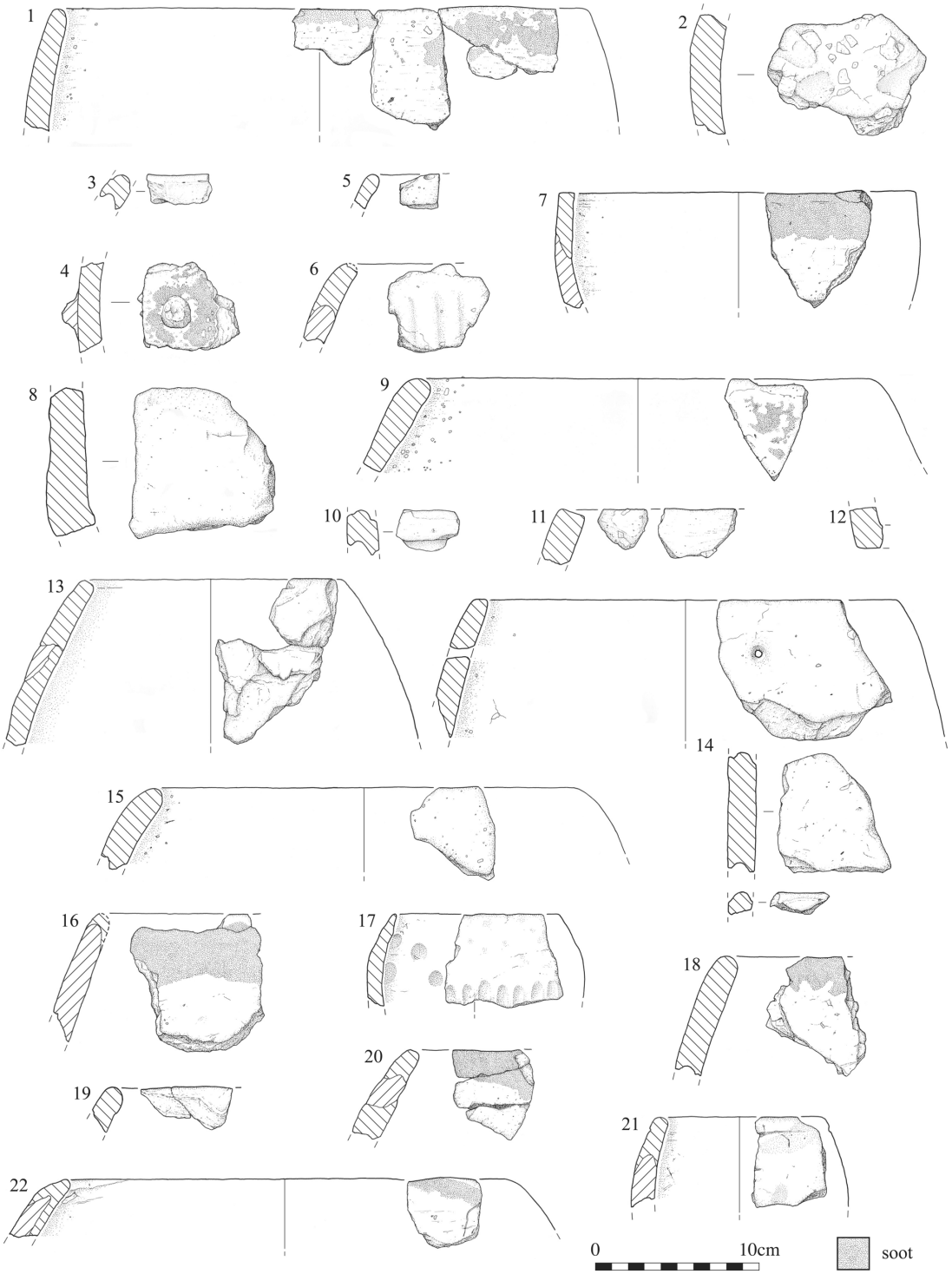


Fig. 23 Pottery.

7. Rim type R6; fabric C; coil-built; 8% of 220 mm diameter; sooted on exterior; upper fill [221], stone-lined pit [224]; PRN 1076, vessel 30.
8. Thick-walled body sherd; fabric E; 23–26 mm and 25–28 mm; salt-affected; layer [167] in working hollow and upper fill [221] of stone-lined pit [224]; PRNs 1053 (thin-sectioned) and 1074, vessel 31.

PHASE 2.8

9. Rim type R3; fabric H; handmade; 5% of 280 mm diameter; sooted on exterior; fill [153], Ditch 7 slot 4; PRN 1048, vessel 12.
10. Body sherds; fabric A; T&G manufacture; fill [122], Ditch 7 slot 5; PRN 1035, vessel 13.
11. Rim type R4; fabric B; handmade; less than 5% present; fill [87], Ditch 7 slot 7; PRNs 1028/1029, vessel 14.
12. Base type B1; fabric H; handmade; less than 5% present; fills [129] and [86], Ditch 7 slot 5 and slot 7; PRNs 1037 and 1027, vessel 16.
13. Rim type R3; fabric A; coil-built; 5% of 160 mm diameter; sooted on exterior; fill [86], Ditch 7 slot 7; PRN 1025, vessel 18.
14. Rim type R3 and body sherds; fabric B; T&G and coil-built manufacture; 9% of 260 mm diameter; post-firing, drilled perforation; salt-affected; layer [225] in working hollow; PRN 1078 (thin-sectioned), vessel 34.
15. Rim type R3; fabric B; coil-built; 5% of 260 mm diameter; salt-affected; layer [248] in working hollow; PRN 1083, vessel 37.
16. Rim type R3; fabric B; coil-built, finished with T&G at top of rim; less than 5% present; sooted on exterior; layer [247] in working hollow; PRN 1082, vessel 38.
17. Rim type R5; fabric A; coil-built with finger-dimpling on interior; 15% of 100 mm diameter; burnished on exterior; sooted on exterior; layer [167] in working hollow; PRN 1056, vessel 45.
18. Rim type R3; fabric B; handmade; less than 5% present; salt-affected; layer [167] in working hollow; PRNs 1057/1059, vessel 46.
19. Rim type R3; fabric E; coil-built; less than 5% present; sooted on exterior; layer [167] in working hollow; PRN 1060, vessel 47.
20. Rim type R3; fabric A; handmade; less than 5% present; sooted on exterior; layer [248] in working hollow; PRN 1023, vessel 55.

PHASE 6

21. Rim type R1; fabric A; T&G manufacture; 5% of 100 mm diameter; topsoil [4]; PRN 1004, vessel 59.
22. Rim type R2; fabric B; T&G manufacture; 5% of 260 mm; sooted on exterior; topsoil [4]; PRN 1019, vessel 63.

Catalogue of illustrated briquetage (fig. 24)

PHASE 2.8

1. Rim type R10; fabric Briq 1; wiped on both exterior and interior of rim top surfaces; fill [252], Ditch 7 slot 6; Pottery Record Number 1088.
2. Body sherd type BS1/2 (near rim); fabric Briq 1; finger-wiped with finger impressions on exterior; abraded on interior; fill [252], Ditch 7 slot 6; PRN 1103.
3. Base type B2; fabric Briq 1; finger-wiped and finger impressions on exterior; abraded on interior; fill [252], Ditch 7 slot 6; part of PRN 1092.
4. Base type B2 — two complete profiles; fabric Briq 1; abraded on interior; fill [252], Ditch 7 slot 6; PRN 1090.

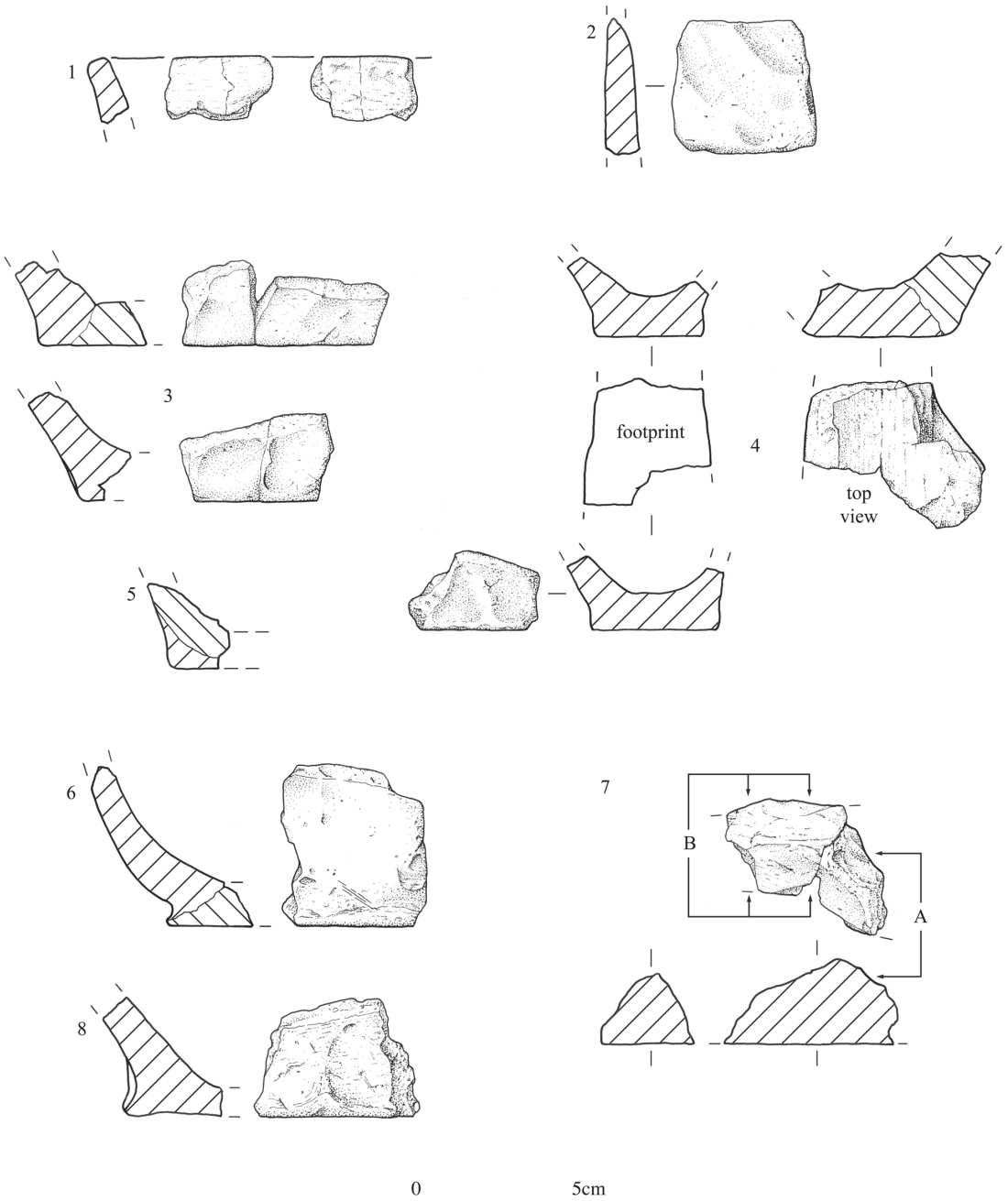


Fig. 24 Briquetage.

5. Base type B3; fabric Briq 1; abraded on interior; fill [252], Ditch 7 slot 6; PRN 1102.
6. Base type B9; fabric Briq 1; fill [252], Ditch 7 slot 6; PRN 1100.
7. Wedge-shaped stabiliser, CL7; fabric Briq 3; layer [167] working hollow; PRN 1061.

PHASE 5

8. Base type B2; fabric Briq 2; finger-wiped on exterior; fill [85], pit [84]; PRN 1018.

GEOCHEMICAL ANALYSIS OF CERAMICS

Louise Jones

Geochemical analysis of ceramic samples was undertaken by Quaternary Scientific (QUEST), University of Reading, in order to ascertain, through non-destructive techniques, whether there was any geochemical evidence to confirm if any of the ceramics were associated with salt-production. Due to the high solubility of sodium chloride (seawater is dominated by chloride and sodium — Wilson 1975; Chester 2000), rain and groundwater may easily remove any salt precipitated on the surface of artefacts (Horiuchi *et al.* 2011). In addition, the cleaning (washing) of soil from pottery when first discovered is also likely to remove any salts (Horiuchi *et al.* 2011), with the result that generally the only evidence of seawater on the surface of an artefact is the result of any impurities which still remain, for example calcium, magnesium, and potassium (Flad *et al.* 2005). In order to achieve the aim of the geochemical analysis, various fragments of pottery described visually as either: salt affected (nine samples), not salt affected (four samples), or with a different fabric and not salt affected (two samples), were analysed via X-Ray Fluorescence (XRF) (all fifteen sample) and X-Ray Diffraction (XRD) (four samples).

The results of the analysis did not indicate any clear geochemical differences (using XRF and XRD) between the visibly, and non-visibly salt affected samples. Equally there were no clear geochemical differences between the internal and external faces of the pottery fragments described as visibly salt affected. (The same is also true for the non-visibly salt affected samples.) Full details of the analysis and results are available in the digital archive.

GLASS BANGLES

James Bruhn

Two small fragments of glass bangle were recovered from two pits. The Type 2 bangle fragment (SF8) found in stone-filled pit [74] came from its top most fill [71] and may relate to both the end of this feature and the transition from Phase 2 to Phase 3. Type 2 bangles date traditionally to the first and early second century AD and have a widespread distribution in southern Scotland and northern England (Kilbride-Jones 1938; Stevenson 1956; 1974; Price 1988; 1995). The other larger fragment of bangle, a Type 3A, was found in the primary fill [119] of Phase 3 pit [97]. This pit also contained a fragment of samian pottery, an abraded sherd of Iron Age pottery, a fragment of reused pottery and a shale finger ring. The nature of the finds point to the bangle fragment being part of a structured deposit. Type 3 bangles are more difficult to date precisely but probably began in the late first century AD and continued in production on through the second century AD.

Catalogue

SF8 FROM UPPER FILL [71] OF PHASE 2.7 STONE FILLED PIT [74] (FIG. 25.1)

A small fragment of translucent light green blue glass bangle, with a central applied cord of dark blue and white opaque glass twisted. The twisted white line is very thin and spaced far apart and is most likely the product of anticlockwise turning. The central applied cord is slightly raised. The bangle is a Kilbride-Jones Type 2 and most likely a Price subtype Ai. The fragment is very small having been fractured lengthwise at some point with only the top portion surviving. This makes it difficult to estimate the bangle's overall size. The surviving fragment (11.8 mm wide) indicates either that the original bangle was very wide at its base or that its overall section was that of a squashed D. It should also be noted that this break through the core of the bangle is rare; the breaks that are most common are through the cross section.

D-shaped section W 11.8 mm × H 4.96 mm; L 15.87 mm; int D ?mm; ?% of the circumference.

SF11 PRIMARY FILL [119] OF PHASE 3 PIT [97] (FIG. 25.2)

A fragment of opaque white glass. The bangle is a Kilbride-Jones Type 3A which are common in southern Scotland and north-east England; the largest concentration of them has been found at Traprain Law. Type 3A are the most common subtype of the Type 3 bangles, though it should be acknowledged that there is often slight variability in the colour hue of Type 3A bangles, with some having a grey or greenish hue. This may be a by-product of the opacifier or the process used to create the opaque white colour. After spectrographic qualitative analyses was carried out on a small number of fragments of white glass bangles during the 1950s, Stevenson (1956) argued that, due to the lack of an identified specific element in the white bangle fragments and the high number of bubbles in the glass, the opaque white effect was achieved through aeration or 'whipping' of the glass during production. The use of bone ash as an opacifier is another possibility that should be considered. This fragment is white in colour with little discernible hue.

D-shaped section W 15 mm × H 9.5 mm; L 34.04 mm; int D 60 mm; 15% of the circumference.

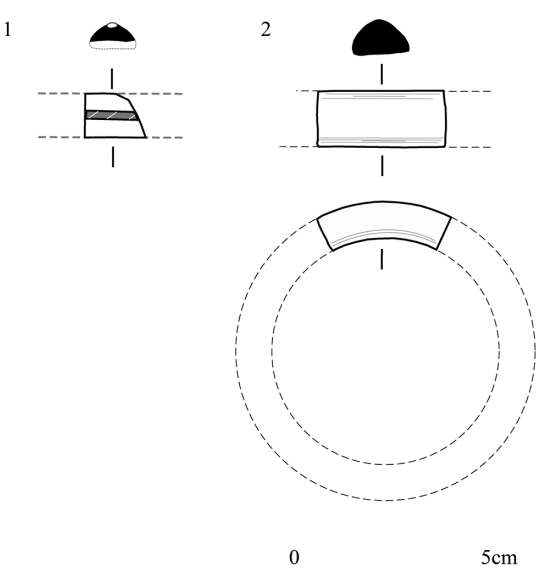


Fig. 25 Glass bangles.

QUERNSTONES

Elizabeth Wright

A number of fragments of mortars or saddle querns, rotary querns and other stone tools and utilised stones were recovered from the excavations. The raw materials from which they were fashioned were extremely varied, ranging from sedimentary rocks (e.g. fine feldspathic sandstone, ferruginous sandstone, medium sandstone and grey siltstone) to a number of very different lithologies of probable igneous origin, possibly including a rhyolite and basalt or gabbro. The range of materials represented and finished forms of the manufactured artefacts suggest that most of the raw materials were erratic pebbles or boulders obtained from areas of glacial drift probably at no great distance from the site and were manufactured locally with varying levels of skill from rocks which were durable and sometimes difficult to shape.

Rotary querns

Six pieces were identified as from rotary querns. SF1, an almost complete lower rotary quernstone, came from a post-medieval sump, where it was almost certainly residual. SF2, an upper stone of which about half survived, was of similar igneous lithology to SF1 and was recovered from topsoil. The original date of use of these artefacts is therefore unknown. A complete upper stone, SF13, came from the Phase 2.8 upper fill [79] of Ditch 7. SF 19, again a fairly complete quern in an igneous lithology, had been heavily slighted around the edges and had a large facet removed from the base. This was excavated from Phase 2.7 stone surface [64]. That this stone had already been discarded before incorporation in this surface suggests that its primary period of use belonged to an earlier site phase and as there was very little to distinguish it from SF1 and SF2 in terms of material, general proportions and method of manufacture, it is very likely that these three examples should be regarded as broadly contemporaneous.

Little remained of SF23, which was a surface fragment from the upper stone of a beehive quern of different shape from the other examples from the site. It is unfortunate so little of this example survived, but sufficient was present to recognise that it derived from a better shaped, taller and more hemispherical quern of smaller diameter than the other examples, which were of larger diameters and squatter proportions. It is far more characteristic of the types of Iron Age querns most frequently excavated in Northumberland and Durham by George Jobey, many of which are reported in issues of *Archaeologia Aeliana* (e.g. Jobey 1963, fig 7, nos. 1, 2, 30–1). The medium sandstone from which this quern was manufactured may have come from an outcrop to the south along the Northumberland coast in the region of Amble to Alnmouth (Taylor *et al.* 1971, 58; fig. 22, 65). Whilst this same guide indicates in Plate XIII that millstone grit deposits occur close to the coast between Berwick and Holy Island, it is unclear whether there are accessible outcrops in this area.

As with SF13, this particular secondary context for SF23 suggests that the period of use of the quern was earlier. SF24 came from the same context as SF23 and though of a very different cream-coloured micaceous sandstone, was similar in design to the other larger, flatter rotary quernstones from the settlement.

There was some difficulty in assigning the rotary querns from the site to either the Iron Age or Romano-British period on the basis of their shape and proportions alone. Whilst five of them had many features of Iron Age querns, their slightly larger diameters and lower profiles

were more suggestive of material of native type from the Roman period. However none of them had the inclined grinding faces, signs of metal or stone rynds or variations in handle sockets that might have been seen in these later querns. The remaining quern SF3 conformed more nearly to the style of Iron Age quern more usually encountered in northern England.

The available dating information for the rotary querns falls unequivocally into the Late Iron Age when the use of the querns on site fits well with the presence of carbonised grain and Iron Age pottery and other indications of domestic settlement.

A reason needed to be sought for the apparently anomalous forms of these querns. The first and strongest possibility is that their form depends much on the dimensions and shapes of the erratic boulders from which they had been manufactured. Some of these appeared to be hard rocks, not easy to shape and areas of their surfaces had been only lightly rounded and trimmed, perhaps best seen in the sub-square shape of SF1 and its somewhat irregular profile. A second factor lies in the skill of the artisans who shaped the querns, and all the indications from these examples are that they were probably made locally and in small numbers.

Saddle querns and mortars

The saddle querns or mortars from the Needles Eye enclosure appeared also to be of relatively unsophisticated manufacture and showing irregular shapes, little altered from the original form of the raw material. Six stones (SFs 17, 18, 20, 21, 25, 27) were identified as probable saddle querns or mortars, of which only SF20 was largely complete. As with the rotary querns, the secondary contexts for the mortars stratified in Phase 2.7 suggest their original date of use in site Phase 2.6 or earlier. All were very damaged and fragmentary but appeared to be of a small and perhaps intentionally portable size. As most of the worn or chipped hollows in their surfaces were rough, they are more likely to have been mortars or grinders than saddle querns used to produce a fine ground product. Their small size would also preclude the processing of large quantities of product. It is possible that SF25 might have been used as a socket stone for a small post for a gate. However, the rough interior to the circular hollow showed very slight traces of smoothing from use so this function is considered unlikely. In contrast to the rough nature of the hollows in these artefacts, where original outer surfaces had survived slighting or modification for re-use, there was a tendency for these surfaces to show marked smooth wear. These features of the artefacts are problematical and idiosyncratic, perhaps indicating that the polish came from handling the artefacts to steady them during use because of their small size. Alternatively, it is possible that the artefacts had been habitually carried in leather or cloth pouches to account for the polish on their surfaces. This might be consistent with some seasonal transhumant movement in the site's economy and might also account for their unusually small size and nature.

Artefacts such as SF18 and SF20, with their irregular polyhedral shapes and different lithologies, were almost certainly made from erratic pebbles from deposits of glacial drift with a minimum amount of shaping. The discovery of remains of hazelnut shells in bulk soil samples might suggest that the mortars could have been used for cracking hazelnuts or for processing them.

Because of the relatively small proportion of the settlement that was excavated it is impossible to draw firm conclusions about the apparent absence of evidence for larger sized saddle querns with smoothed grinding hollows used to produce larger quantities of finely ground products (most probably cereals). However, the absence of even one such saddle quern could

be significant. On Iron Age sites with an extended period or periods of occupation it is quite normal to find both saddle querns and rotary querns in use during a period which saw the replacement of the one type by the other. At the time that the rotary querns were in use at the Needles Eye enclosure, considerable quantities of cereals were being processed by the site's inhabitants; a number of querns were discovered in just a small proportion of the site and these, though sometimes manufactured from hard and durable rocks, were heavily worn.

Deposition of quernstones

With the exception of SF13, which was essentially complete, the other querns, both rotary and non-rotary, had all been broken and slighted prior to deposition or re-use. The position of the complete quernstone SF13 in an upper backfill of Ditch 7, the final incarnation of the enclosure, may suggest that this deposit had some special significance, perhaps marking the event of the filling of the ditch and a new phase in the life of the settlement. Heslop (2008, 75) refers to the deposition of parts of querns and suggests that with the introduction of beehive querns there is a greater emphasis on deposition in or near boundary features and causeways across enclosure ditches. He has also pointed out that querns found in small hoards, which may constitute votive deposits, are frequently complete or nearly so (Heslop 2008, 73–80). The completeness of SF13 may underline the significance of this deposit.

Because of their durable nature and strength, the breaking of the other querns must be seen as a deliberate act marking the end of their period of use. A number of the pieces had been either deliberately trimmed to size or selected on the grounds of their size for incorporation in features [236] and [224]. The presence of the broken querns here may have been purely utilitarian or may have had some cultural significance as a 'foundation deposit' marking a new enterprise.

Quernstone catalogue

SF1 FILL [6] OF PHASE 5 PIT [8] (POST MEDIEVAL) FIG. 26.1

About seven-eighths of a complete lower stone of a rotary quern in a fine to medium igneous stone. Minerals of quartz, iron, some large feldspars and a little white mica were identified in the rock. The quern has been fashioned from a largely unmodified sub-rectanguloid boulder measuring 350 mm by 380 mm and up to 115 mm thick. A smooth conical central spindle socket, 45 mm by 40 mm in diameter and 50 mm deep, has been drilled at the centre of the grinding face. Although the smooth, worn grinding surface does not extend to the corners of the stone, the outer edges of the quern still show significant smoothing. It is possible that this rotary quernstone could have been adapted from a saddle quern. The quern exhibits a concavo-convex grinding surface somewhat raised around the central spindle socket. The rough, dimpled texture of the dorsal surface shows little modification from the original igneous boulder from which it was formed, though it is obvious that attempts had been made to neaten and round the surface in this hard rock which must have been difficult to work.

SF2 UNSTRATIFIED (FIG. 26.2)

Originally in two fragments, but now in three, this represents about half of the upper stone of a rotary quern. White mica and feldspar can be identified within a finer matrix in this rock, which is probably of igneous origin. Like SF1, the dorsal surface is heavily pitted and pock-marked, being

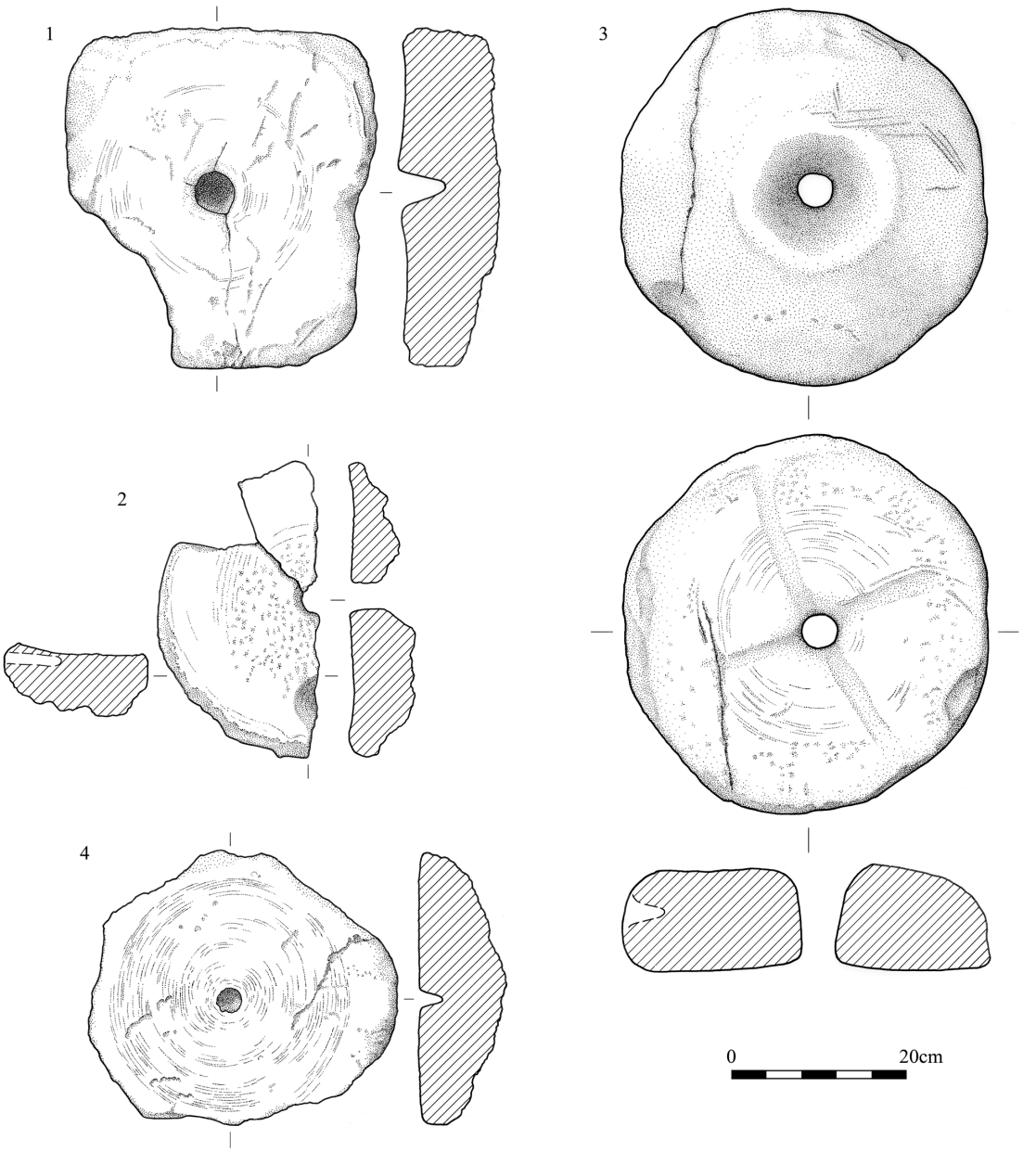


Fig. 26 Quernstones.

apparently in its original form or little modified. The grinding surface has been heavily worn leaving upstanding larger phenocrysts which give the quern an excellent sharp grinding surface — a probable reason for the choice of this hard and rather intractable rock. Although the upper surface of the quern has seen relatively little modification, a small hopper and central eye has been formed. The flat grinding surface measures 340 mm in diameter and the maximum height of the quern is 70 mm with an edge height of 60 mm. The hopper measures 85 mm in diameter and 35 mm deep, whilst the feed pipe is 35 mm to 40 mm in diameter. A radial handle socket 40 mm wide and with about 25 mm of height remaining, being 57 mm deep, has been drilled into the quern, narrowing to about 10 mm at its base, and it is possible that an iron handle was used. The quern has seen very heavy use as the handle socket has worn through onto the grinding face. In little used querns, it is unusual for the handle socket to be positioned lower than half the quern height and sometimes two-thirds or more of the quern height lies below the handle socket. This quern is more heavily worn on the side with the handle socket, a common observation, as this was probably where most pressure could be applied in use. From the wear observed, it is likely that a secondary handle was inserted in the missing part of the quern which had enabled it to remain in use.

SF13 PHASE 2.8 FILL [79] OF DITCH 7 (FIG. 26.3)

The complete upper stone of a rotary quern with a single radial handle socket and central hopper and feed pipe. The quern is of a flattened, bun-like shape, of a medium sandstone and sub-polyhedral in outline, perhaps retaining signs of original rough shaping of the boulder from which it was fashioned. The dorsal surface is rounded and smoothed, showing no signs of peck dressing or chiselling to shape. The minimally concave grinding surface (concave by about 15 mm) is worn smooth and measures 410 mm by 390 mm in diameter. There are four pecked grooves, at right angles, radiating from the central feed pipe to the edge of the quern. The feed pipe measures 43 mm by 40 mm and is about 60 mm long, widening to a hopper 55 mm by 58 mm in diameter at the top. The quern varies between about 117 mm and 130 mm in height. Parts of the exterior are worn very smooth around the edge. A single radial handle socket, measuring 36 mm in diameter, 58 mm deep and narrowing to 15 mm by 10 mm internally, may have been used with an iron handle.

SF19 PHASE 2.7 STONE YARD SURFACE [64] (FIG. 26.4)

The lower stone of an igneous quern in an iron-rich rock, possibly a basalt or gabbro. There is sparse white mica. The grinding surface measures 360 mm by 310 mm in diameter and there is a drilled spindle-socket, 22 mm by 20 mm in diameter and 32 mm deep, narrowing to 10 mm at the base. It is apparent that this was used with an upper stone of slightly smaller diameter. The edges of the quernstone have been slighted; the edge was originally dressed or finished in some way, but very little of this has survived slighting. The very outer edges of the grinding surface exhibit very smooth wear whilst more central parts retain a rough finish. The grinding surface is very flat and the quern was probably very heavily worn when discarded. The dorsal surface had originally been carefully shaped and rounded, following the lines of the original boulder: given that this was a hard rock which would have been difficult to work. A large facet had been removed from the dorsal surface probably when the edges were slighted. A maximum height of 100 mm survives.

SF20 PHASE 2.7 STONE YARD SURFACE [64] (FIG. 27.1)

A saddle quern or small grinding cup or mortar in a very fine sandstone. The piece has a somewhat rhomboidal shape, measuring approximately 140 mm by 100 mm and 70 mm deep. One side is roughly broken but the others are mainly smoothed and polished by handling and use, including the base facet. An oval hollow in the upper surface, 105 mm by 70 mm and 22 mm deep, has a mainly rough interior. It is probable that this is a small, portable saddle quern. Use as a mortar or chipping hollow may have been secondary, though it is unclear if the rough, chipped finish to the hollow is a result of percussive use or shows deliberate roughening for use as a mortar.

SF21 FILL [243] OF PHASE 2.7 STONE-FILLED PIT [236] (NOT ILLUSTRATED)

Fragment of a mortar or saddle quern of portable size, perhaps about one-third of the original artefact. The lower surface and sides have been slighted in part. The piece had a rounded shape and remaining length is 100 mm by 130 mm wide and 65 mm deep. The shallow hollow in the upper surface, up to 5 mm deep, measures 90 mm wide by 56 mm long. Though the depression edges are themselves smooth, the surface in the hollow is rough (as in SF20) and may have been intentionally chipped. The outer and upper surfaces are all smoothed and worn except where damaged.

SF23 FILL [228] OF PHASE 2.7 STONE-FILLED PIT [224] (NOT ILLUSTRATED)

A surface fragment from the upper stone of a hemispherical beehive quern in a pinkish grey igneous rock with a well worked and shaped dorsal surface. A small area of the edge of the grinding surface survives and the remaining height is 180 mm. Part of the handle socket survives, centred about 100 mm above the grinding surface, measuring 27 mm by 28 mm in diameter and at least 50 mm deep. The smooth inner surface of the handle socket appears slightly sub-square. The original diameter of the quern is difficult to assess, though is estimated at about 280 mm.

SF24 FILL [228] OF PHASE 2.7 STONE-FILLED PIT [224] (NOT ILLUSTRATED)

Part of the upper stone of a rotary quern in a fine pale cream sandstone with a little white mica and some iron content. About one-quarter to one-third of the stone survives and the maximum height is 75 mm. Part of the central eye and traces of a radial handle socket survive. The dorsal face is curved. The very flat grinding surface has a diameter estimated at about 360 mm and its rough finish may suggest it was chipped or pecked to produce a rough surface. Some iron deposit adheres to the grinding surface which may represent translocated iron from ground water which accumulated in its depositional context. The large diameter feed-pipe has a rough interior, suggesting that it was fashioned by chiselling or picking rather than drilling. There are indications of widening at the top of the feed pipe, perhaps to make a slight hopper. The drilled handle socket is broken, only 5 mm of its depth has survived, and it measures 17 mm internally; its external measurement is estimated at about 22 mm.

MISCELLANEOUS STONE FINDS

Elizabeth Wright and Jennifer Proctor

A very well shaped slingshot (SF14), neatly chipped to shape and 38 mm in diameter, was recovered from the upper fill [251] of Phase 2.4 Ditch 4. This might well accord with an element of animal husbandry in the site's economy, or a need for personal protection. A beautifully smooth pebble tool (SF26), probably made from a beach or river pebble, was recovered from Phase 2.8 fill [87] of Ditch 7 (fig. 27.2). It measures 95 mm by 67 mm and could have been used as a handstone for a small saddle quern, but may have had another industrial or domestic use. Some dark stains on the surface may result from slight heat or fire damage.

Two stone spindle whorls (SF9 and 10), made from fine-grained red sandstone, were recovered from the Phase 2.8 upper fill [86] of Ditch 7. SF9 weighs 50 g and measures 37 mm in diameter with a central hole 5 mm in diameter (fig. 28.1). SF10 weighs 40 g and has a maximum diameter of 37 mm, and a central hole 4 mm in diameter (fig. 28.2). These items can date from the Late Iron Age to the early post-medieval period (Walton 2006) but, given their context, are presumably of Late Iron Age to early Roman date. A shale finger ring (SF12: fig. 29) was found within the primary fill [119] of Phase 3 pit [97]. This pit produced several finds that seem to have been of some special significance and this is interpreted as a structured

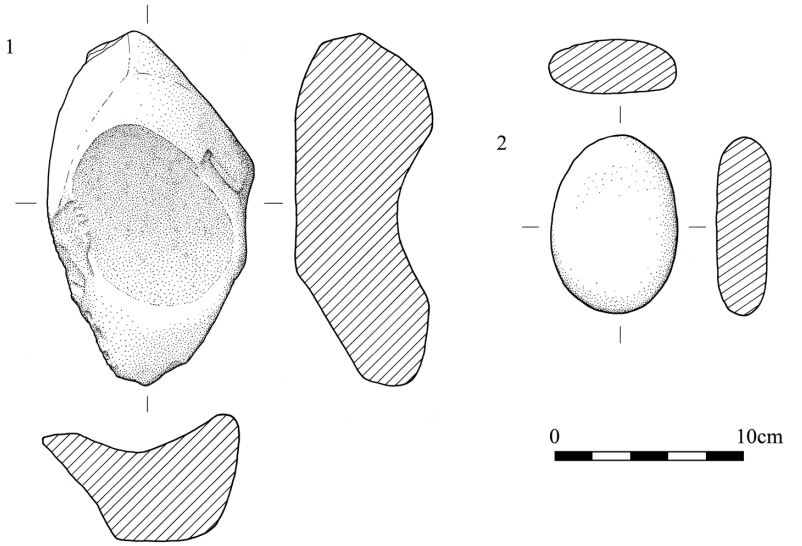


Fig. 27 Stone tools.

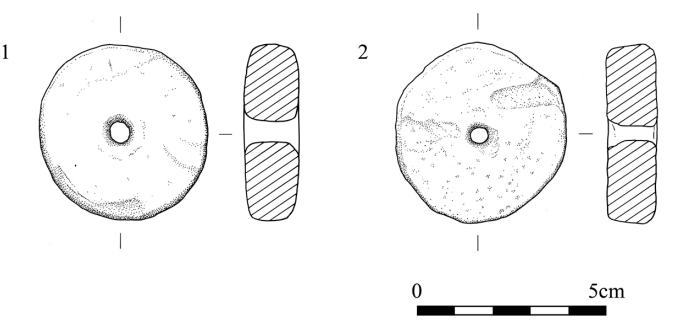


Fig. 28 Spindle whorls.

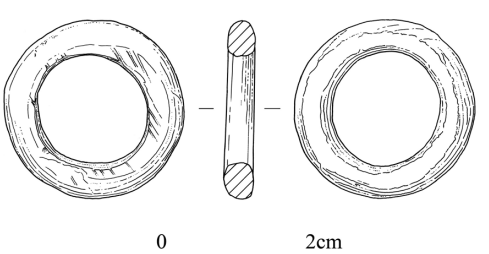


Fig. 29 Shale ring.

deposit. The outer diameter of the ring is 24 mm and inner diameter is 15 mm. A similar shale ring was found within one of the Late Iron Age timber roundhouses at Murton High Crags. Such objects are not closely datable and are commonly found on later prehistoric and later settlements (Jobey 1987, 188)

MEDIEVAL AND POST-MEDIEVAL POTTERY

Jenny Vaughan

Fifty sherds of medieval and post-medieval pottery were recovered from the investigations. Full details of the range and variety of the material are included in the assessment report (Vaughan 2006). Apart from three fragments, there is no reason to suppose that the medieval pottery is other than of local or regional manufacture. There were examples of both iron-rich (grey or red firing) and light firing (buff, pink or white) types but no particular or dominant group was identifiable. Five fragments were various medieval reduced green-glazed types and included an unstratified ribbed rod handle and a piece of moulded decoration in quite a fine fabric. There was a strap handle in a coarse pinkish buff fabric and another in a mainly oxidised sandy fabric, probably related to the reduced greenwares. Apart from a very small gritty buff rim sherd and an abraded base, there were no other form sherds present.

A single sherd of pottery was recovered from the Phase 4 shell midden deposit [187]. The fabric is hard and brown with a grey core and sparse very fine quartz inclusions. There are also occasional larger ill-sorted ferrous grits. The sherd is slightly sooted, has a ribbed profile and is probably from a cooking vessel. This is broadly thirteenth century in date, but it is not possible to identify it precisely (i.e. with a known type) or to date closely.

Of the three sherds of non-local medieval pottery, most interesting was part of a rim with the beginning of the spout of a Saintonge polychrome jug recovered from pit [47]. This French import dates to the latter half of the thirteenth or beginning of the fourteenth century. French wares are uncommon but by no means unknown in the North East. This particular type is very distinctive with, in this case, manganese brown and green decoration so even small fragments are easily identifiable. Less easily identifiable was a fragment of fine whiteware with applied strip decoration recovered from feature [57]. This sherd was rather abraded but appeared to have also had a layer of red slip. It might also be a French import. A tiny fragment recovered from ditch [39] was tentatively identified as Scarborough type ware.

ANIMAL BONE

Kevin Rielly

The animal bone evidence was largely limited to Phase 2.5–2.8 ditches, although some bones also came from Phase 2.7 features internal to the enclosure and the Phase 3 Romano-British pits as well as a few medieval deposits. The total number of bones in the site assemblage includes 89 from hand recovery and 112 by sieving and sorting sample residues.

Methodology

The assemblage in each context was sorted by species, attempting to refit as many bones as possible. Following refitting, each bone was recorded onto a database using Microsoft Access which forms part of the archive. The tooth eruption/wear uses the method devised by Grant

(1982), whilst the measurements are essentially taken from Driesch (1976). The approximate ages for the tooth eruption and epiphyses fusion sequences are taken from Schmid (1972, 75, 77).

Condition of the bones

The animal bones throughout these deposits (with, perhaps, the exception of the medieval sieved collection from midden deposit [187], which provided fish and the only small rodent remains) were highly fragmented and had generally suffered some degree of surface damage. The quantities from each phase are too small to warrant any analysis of temporal variation. There appears to be a lesser proportion of damage amongst the sieved collections, however, this is probably related more to the size of the fragments, which made it difficult to ascertain the level of such damage, as well as the greater degree of burnt material from the samples. The great majority of the burnt bone was either calcined or semi-calcined (black and white), perhaps denoting varying degrees of heat. The greater proportion of such bones in the samples could relate to the brittle quality of bones following burning. Their greater susceptibility to fragmentation would perhaps severely limit the retrieval of such bones by hand.

The surface damage will have affected the identification of dog gnawing (no cases) and butchery marks (one case), whilst the advanced level of fragmentation has clearly limited the available age and size data and will undoubtedly have biased the assemblage towards bones belonging to the larger animals, as cattle and equid. Such bones tend to be more robust and even when fragmented, are more likely to be retrieved compared to similarly fragmented sheep or pig bones.

Period and phase distribution

PHASES 2.5–2.8

Animal bones were recovered from deposits derived from the enclosure ditches and associated features. These were limited to the later sub-phases; Phases 2.5 and 2.6, derived from ditch [306] and Ditch 6, respectively, and Phases 2.7 and 2.8, taken from a variety of features, principally: Phase 2.8 infilling of Ditch 7 (68 hand collected and 17 sieved bones); pit [236] (1 hand collected and 23 sieved bones); and from Phase 2.8 layer [167] within the 'working hollow' (0 hand collected and 20 sieved bones). A large proportion of the bones in each sub-phase were unidentifiable, although most could be categorized as either cattle or sheep-sized fragments. Those that could be identified amongst the hand collected bones include a small collection of cattle, equid, pig, and red deer, with the larger assemblage, from Phase 2.8, providing approximately twice the number of cattle/equid as against sheep/pig bones. The under representation of the latter appears to be well demonstrated by the notably high proportion of sheep-sized fragments in the sieved collection. It is clearly difficult to ascertain, given the conditions as well as the rather small datasets, the actual contributions made by these key species; however, the evidence from the sieved collections, as well as the relatively high proportion of the smaller domesticates, would perhaps suggest a greater parity between these and the larger domesticates than is indicated by the bone counts in Table 6. The bones represented by each of these species are all less than 25% complete and also feature a high count of tooth fragments (e.g. in Phase 2.8 accounting for 4 out of the 8 hand collected cattle bones and all 3 of the sieved pig bones); this, again, underlines the level of fragmentation.

Table 6 The species represented, by phase.

Phase:	2.5	2.6	2.7 and 2.8	3	4
Species/collection					
Hand collected					
Cattle	–	4	8	–	–
Equid	–	–	6	–	–
Cattle-size	–	1	43	–	–
Red deer	–	–	1	–	–
Sheep/Goat	–	1	4	–	–
Pig	–	–	2	–	–
Sheep-size	–	1	9	1	–
Indeterminate	5	–	–	–	3
Sieved					
Cattle-size	–	3	8	1	–
Pig	–	1	3	–	–
Sheep-size	–	17	48	23	–
Small rodent	–	–	–	–	1
Uniden. Fish	–	–	1	–	6
Grand Total	5	28	133	25	10

phase 3 (first- to second-century AD pits)

Small quantities of bones were provided by five pits [67], [97], [115], [164] and [289], the first with a single hand collected fragment and the following with 3, 19, 1 and 1 fragment respectively, all from sieved collections. None of these bones were identifiable to species, but notably the single hand collected bone was cattle-size, while all of the others were sheep-size.

phase 4 (medieval)

There were two medieval collections, comprising a hand collected assemblage (3 bones) from field boundary ditch [30] and a few bones (7 fragments) provided by a sample taken from the shell midden [187]. The former bones were unidentifiable, while those from the midden included a small rodent mandible, probably a mouse, and six fish vertebrae, possibly smelt.

Age data, modifications and size

The quantity of bones as well as their general state all act to limit the available data concerning the age structure, the methods employed to divide the carcass, and the size or type of the animals represented. Butchery marks were found in just one bone, a cattle-size cervical vertebra from a Phase 2.8 fill of Ditch 7. This shows a heavy grazing chop on the left side of the dorsal surface, which could be interpreted as an attempt to split the entire or a section of the carcass, aiming to one side of the vertebrae. The major domesticates all appear to be rather

small, with measurements restricted to a cattle and pig proximal radius, with proximal breadth dimensions of 68.3 mm (Phase 2.8) and 23.2 mm (Phase 2.6) respectively.

The age data, based on toothwear and epiphysis fusion, is shown in Table 7. There would appear to be a wide range of ages amongst the cattle represented, with juveniles (1st year), subadult (2nd year), adult (3rd year and older) and old adults (beyond 7 to 9 years), assuming that the cervical vertebra can be identified as cattle. The red deer is certainly adult, which may also be true for all the equid and sheep/goat, whilst the pigs could all be subadults.

Conclusions

The assemblage is small and less than well preserved, factors which clearly diminish the value of any interpretation. However, various general points can be made about the Iron Age collections. The species range suggests the exploitation of the typical major domesticates as well as some wild game. All, perhaps including equid, could have been used for their meat. There is a relatively wide distribution of skeletal parts amongst the domesticate collections and from this it can be assumed that these animals were culled and butchered in the vicinity of this site. The condition of the bones clearly argues for a retrieval bias towards the larger animals as well as towards adults rather than younger individuals. It is difficult to estimate the extent of this bias but it would seem likely that sheep/goat and especially pigs (as they are both small and young) are grossly under represented relative to cattle and equid. The age structure suggests that a portion (or perhaps the majority) of the cattle and sheep supplied one or more secondary product prior to being culled for their meat, although the younger age of at least two cattle suggests the exploitation of quality beef. Alternative explanations concerning the juvenile individual include the cull of an animal deemed too expensive to overwinter or the cull of a surplus calf, perhaps related to milk production.

Table 7 Age data.

Species	Bone	Phase	Feature	Age
Cattle	dpm4 (worn)	2.6	Ditch 6	Subadult
	dpm4 (just worn)	2.8	Ditch 7	Juvenile
	Mandible (full dentition)	2.6	Ditch 6	Adult
	2 adult molars (w)	2.8	Ditch 7	Adult
Equid	Maxilla (full dentition)	2.8	Ditch 7	Adult
	Adult molar (w)	2.8	Ditch 7	Adult
Cattle-size	Cervical vertebra (fused)	2.8	Ditch 7	Old adult
Sheep/Goat	Mandible (full dentition)	2.8	Ditch 7	Adult
	Adult molar (w)	2.8	Ditch 7	Adult
Pig	Mandible with dpm4(w)	2.8	Ditch 7	Subadult
	dpm4 (w)	2.8	Ditch 7	Subadult
Red deer	Tibia proximal (fused)	2.8	Ditch 7	Adult

PLANT MACROFOSSIL ANALYSIS

Charlotte O'Brien

Methods

In total, 105 bulk sediment samples were collected during the excavation and, following assessment of a representative selection of these, 17 were recommended for plant macrofossil analysis. Identification of the plant macrofossils was undertaken by comparison with modern reference material held in the Environmental Laboratory at Archaeological Services Durham University. Plant taxonomic nomenclature follows Stace (1997). Habitat classifications follow Preston *et al.* (2002). Charcoal fragments >4 mm were identified.

Results

Full details of the plant macrofossil and charcoal data are available in the project archive. Preservation of plant materials on the site was largely through charring, although the waterlogged conditions in Ditch 7 deposit [302] allowed the preservation of uncharred seeds and vegetative material. Many of the samples produced evidence for domestic waste, with

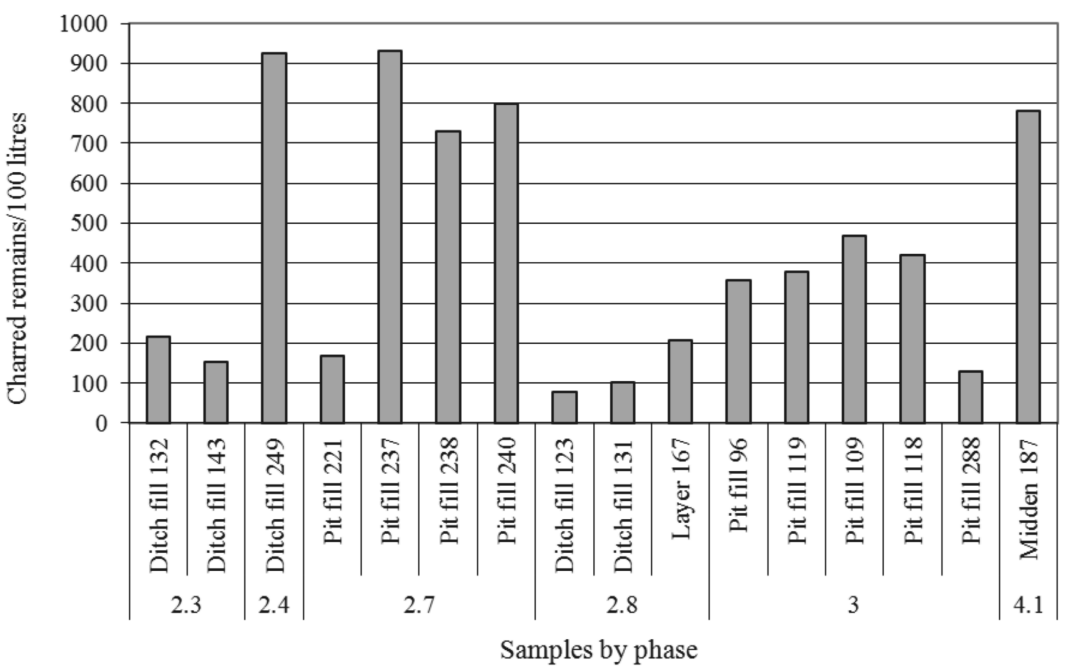


Fig. 30 Concentrations of charred remains in the samples (standardised to charred remains/100 litres).

small assemblages of charred food plant remains, charcoal and fragments of animal bone/tooth present. This may include waste from hearths, ovens or grain-dryers, or crop processing waste which was burnt as a result of being used for kindling or to reduce its volume. Some of the charcoal may also derive from fuel waste relating to the salt-making activities. Traces of hammerscale were noted in some of the residues, which may derive from small-scale metal working at the site.

Charred heather (Ericaceae undiff.) twigs and rhizome/tubers were frequently noted in the flots. Most of the analysis samples are from Phase 2 (Iron Age Enclosure), but five Phase 3 (first to second century AD) pit fills and the Phase 4 (medieval) midden were also analysed. Fig. 30 shows that the concentrations of charred plant remains were generally higher in the fills of pits compared with those of the ditches, although charred remains were well-represented in fill [249] of Ditch 4 and the medieval midden deposit. As with many Iron Age sites from north-east England and the Scottish Lowlands, the concentrations of plant remains are relatively low, with an average of 2.5 seeds per litre across the samples.

Phase 2 — Late Iron Age Enclosure

PHASE 2.3 — REDEFINITION OF NORTHERN ENCLOSURE ENTRANCE

Fills [143] and [132] of Ditch 2 comprised low concentrations of charred plant remains, which included barley (*Hordeum* sp) and wheat (*Triticum* sp) grains, and weed seeds of heath-grass (*Danthonia decumbens*), sheep's sorrel (*Rumex acetosella*), redshank (*Persicaria maculosa*), ribwort plantain (*Plantago lanceolata*), fat-hen (*Chenopodium album*), sedges (*Carex* sp), cinquefoils (*Potentilla* sp), and members of the grass and pink families (Poaceae and Caryophyllaceae undiff.). Chaff included barley rachis fragments, most of which could not be identified to species, although a few 6-row barley (*Hordeum vulgare*) fragments were present. Emmer wheat (*Triticum dicoccum*) and spelt wheat (*Triticum spelta*) glume bases were identified in [132]. Fragments of birch (*Betula* sp), hazel (*Corylus avellana*) and willow/poplar (*Salix/Populus* sp) charcoal were present.

PHASE 2.4 — REPOSITIONING OF NORTHERN ENTRANCE DITCH

The small bulk sample of fill [249] of Ditch 4 comprised a relatively high concentration of charred plant remains (fig. 30). These included barley grains, 6-row barley rachis fragments and emmer and spelt wheat glume bases. The weed seeds were predominantly of heath-grass, with crowberry (*Empetrum nigrum*), sedges, redshank and grasses also represented. A few charred leafy branches of heather (*Calluna vulgaris*) and two fragments of hazel charcoal were identified.

PHASE 2.7 — LATEST ENCLOSURE DITCH AND INTERNAL FEATURES

The highest concentration of charred plant remains was in three upper fills [237], [238] and [240] of the large stone-filled pit [236]. Numerous fragments of chaff were recorded, with most being glume bases and spikelet forks from emmer and spelt wheat. Barley rachis fragments were also present, with the identifiable fragments being from 6-row barley. Barley and wheat grains were recorded, although a number of the cereal grains could not be identified due to their poor condition. A few cereal culm nodes were present and a single oat (*Avena* sp) grain was noted in [238]. Charred weed seeds comprised fat-hen, black-bindweed (*Fallopia convolvulus*), heath-grass, hemp-nettles (*Galeopsis* sp), redshank, ribwort plantain, sedges, pale persicaria (*Persicaria lapathifolia*), and members of the pink, grass and goosefoot (Chenopodiaceae undiff.) families. Birch, hazel, oak (*Quercus* sp) and willow/poplar charcoal was identified.

The small assemblage of charred plant remains from upper fill [221] of stone-filled pit [224] predominantly comprised weed seeds, many of which derived from wetland taxa, including

bogbean (*Menyanthes trifoliata*), lesser spearwort (*Ranunculus flammula*) and at least two species of sedge. The cereal remains were from barley (grains and chaff), with a single oat grain also recorded.

PHASE 2.8 — UPPER FILLS OF ENCLOSURE DITCH AND INFILLING OF WORKING HOLLOW

The assemblage from layer [167], the upper deposit within the 'working hollow', comprised a small quantity of charred plant remains, predominantly made up of barley grains. A few barley rachis fragments were also present, with wheat grains and a single indeterminate wheat glume base also recorded. A hazelnut shell was recorded, and the weed seeds comprised heath-grass, crowberry, ribwort plantain, grasses and dock (*Rumex* sp). Whilst a few charred rhizome/tubers were noted in several of the samples, it was generally not possible to identify these further. However, one of the charred tubers in [167] had the bulbous shape often seen in false oat-grass (*Arrhenatherum elatius* ssp *bulbosum*), although the characteristic ribbed surface pattern was not obvious. Apart from a single birch fragment, all of the identified charcoal was oak.

Two upper fills [123] (slot 5) and [131] (slot 8) of Ditch 7 were analysed. Their small charred plant macrofossil assemblages were similar, comprising barley grains, wheat grains and weed seeds recorded elsewhere on the site. A few glume bases and a spikelet fork, which were from either emmer or spelt wheat, were also present in [131]. Birch, hazel and oak charcoal was noted.

WATERLOGGED REMAINS FROM PHASE 2.7 DITCH 7

The primary fill [302] of Ditch 7 in slot 1 comprised a clayey waterlogged fill. Charred plant remains were absent, but a small range of waterlogged remains was preserved. These were generally present in low numbers, although small rush (*Juncus* sp) seeds were abundant. The other taxa recorded were redshank, greater plantain (*Plantago major*), common nettle (*Urtica dioica*), pale persicaria, and members of the cabbage (Brassicaceae undiff.), grass and goosefoot families.

Phase 3 Early Romano-British activity

FIRST TO SECOND-CENTURY AD PITS

Fills [96] and [119] from pit [97], primary fill [109] from pit [108], primary fill [118] from pit [115], and upper fill [288] from clay-lined pit [286] were analysed. The charred plant macrofossil assemblages were relatively similar, although pit [286] comprised a lower concentration of remains than the other pits. Barley grains were the most frequently recorded macrofossils, with barley rachis fragments (indeterminate and 6-row) also noted. Wheat grains and chaff fragments were relatively low in number. Emmer or cf. emmer wheat chaff was present in four of the pit fills, and glume bases which could not be differentiated between emmer or spelt wheat were present in two fills. The pit fills contained the range of weed seeds recorded elsewhere on the site, in addition to wild radish (*Raphanus raphanistrum*), bearberry (*Arctostaphylos* sp), cleavers (*Galium aparine*) and wood-rushes (*Luzula* sp). Charcoal from the pits comprised birch, hazel, ash (*Fraxinus excelsior*), oak and Maloideae (Hawthorns — *Crataegus* sp, whitebeams — *Sorbus* sp, apple — *Malus sylvestris*, etc).

Phase 4 Medieval activity

SHELL MIDDEN

A sample from deposit [187], a medieval shell midden, was analysed. The charred plant macrofossil assemblage was dominated by barley grains, with oat grains frequently recorded. Wheat grains were present in low numbers, and a single possible rye (*Secale cereale*) grain was also noted. Weed seeds were from vetch (*Vicia* sp), heath-grass, and undifferentiated grasses. Six possible pea (*Pisum sativum*) fragments were also recorded. Chaff was absent from this context. Three fragments of oak charcoal were identified.

Discussion

ECONOMIC PLANTS

The charred plant macrofossil assemblages were dominated by cereal grains and chaff, the proportions of which are presented in Tables 8 and 9. In all three phases, barley was the most frequently recorded cereal grain, with wheat grains forming approximately 15–16% of the grain assemblage in Phases 2 and 3, and 2.5% of the assemblage in the Phase 4 sample. Between 15–20% of the grains could not be identified due to their poor condition. Wheat chaff was present in significantly higher proportions than barley chaff in the Phase 2 samples, while they were recorded in relatively equal proportions in the small chaff assemblage in Phase 3.

The poor condition of many of the remains meant that most of the barley grains and rachis fragments could only be recorded as undifferentiated barley. However, the identifiable barley rachis fragments in Phases 2 and 3 were all 6-row barley, and some of the grains in a number of the samples exhibited twisting which is a characteristic of a proportion of the grains in 6-row barley. As 6-row barley is the most commonly recovered barley in the region until the medieval period, it is likely that all of the barley remains from the Iron Age and Romano-British fills were from 6-row barley. Rachis fragments were absent from the Phase 4 medieval midden sample, which prevented determination of the barley species used in this phase. Although a few twisted barley grains were recorded in this sample, their small number (7 out of 214 barley grains), suggests that distortion may have resulted through charring. A number of the better preserved barley grains from all of the phases were noted to be hulled, while naked grains were not observed on the site.

Wheat species are difficult to separate on the basis of grain morphology, and therefore the majority of the wheat grains could not be reliably identified to species. However, chaff is more

Table 8 Proportions of cereal grain.

	Phase 2		Phase 3		Phase 4	
	% of total grain	No. of occurrences	% of total grain	No. of occurrences	% of total grain	No. of occurrences
Hordeum sp. (Undiff. Barley)	44.44	11	31.08	5	65.61	1
Cerealia undiff.	20.28	8	18.24	5	15.44	1
Triticum sp. (Undiff. Wheat)	16.11	8	15.55	4	0.35	1
Hordeum sp. (Hulled Barley)	12.78	6	13.51	3	0.70	1
Hordeum sp. (Twisted Barley)	5.83	8	21.62	3	2.46	1
Avena sp (Oats)	0.56	2	–	–	12.63	1
Triticum cf. *aestivum* (cf. Bread Wheat)	–	–	–	–	2.46	1
cf. *Secale cereale* (cf. Rye)	–	–	–	–	0.35	1

diagnostic, and emmer and spelt wheat were positively identified from glume bases and spikelet forks. These were particularly numerous in the fills of Phase 2 pit [236]. As is shown in Table 9, emmer chaff fragments outnumbered those of spelt in the Phase 2 samples, and only emmer was specifically identified in the Phase 3 samples, which comprised smaller wheat chaff assemblages. Whilst this suggests that emmer was the more significant of the two wheat crops during the Iron Age and Romano-British use of the site, a large proportion of the wheat chaff was too fragmented to allow differentiation between emmer and spelt, and therefore it is unclear what the precise proportions of the different wheat crops used in the Iron Age were, and whether spelt was cultivated at all during the Romano-British period.

Wheat chaff was absent in the Phase 4 medieval midden sample [187]; however, the wheat grains had the characteristic compact shape associated with bread wheat (*Triticum aestivo-compactum*), which was not noted in any of the other samples. The cereal assemblage in [187] also differed from the Phase 2 and 3 samples in having a significant proportion (13%) of oat grains. The only other occurrence of oats on the site was a single oat grain in each of the Phase 2 pit fills, the upper fill [221] of stone-lined pit [224] and an upper fill [238] of stone-lined pit [236], and these may represent weeds rather than an Iron Age oat crop. A possible rye grain was also present in the midden sample.

Remains of gathered wild foods were low in number. A few charred fragments of hazelnut shell were noted, and charred fruitstones of crowberry and bearberry may indicate that these berries were gathered for food. Bearberry may also have been collected for medicinal purposes, as the dried leaves have astringent properties (Lang 1987). However, the remains of these moorland shrubs could also have arrived at the site in turves, as discussed below.

Six fruits from the pea family were present in the medieval midden [187], although their poor condition meant that it was uncertain whether the remains were from cultivated peas or other members of the pea family. Peas were a common crop in Britain during the medieval period (Greig 1991), cultivated both for human consumption and as a fodder crop. They are thought often to be under-represented in charred plant macrofossil assemblages, as their preparation does not involve exposure to fire. Other members of the pea family that are frequently recorded on archaeological sites include hairy tare (*Vicia hirsuta*), which was once

Table 9 Proportions of cereal chaff.

	Phase 2		Phase 3	
	% of total chaff	No. of occurrences	% of total chaff	No. of occurrences
Triticum sp. (Undiff. Wheat) glume base	37.36	8	22.93	3
Triticum dicoccum (Emmer) glume base	27.47	5	2.08	1
Hordeum sp. (Undiff. Barley) rachis fragment	12.82	8	45.83	5
Triticum spelta (Spelt) glume base	9.16	5	–	–
Triticum dicoccum (Emmer) spikelet fork	5.13	3	2.08	1
Hordeum vulgare (6–row Barley) rachis fragment	4.40	6	18.75	2
Triticum sp. (Undiff. Wheat) spikelet fork	2.56	3	6.25	2
Cerealia undiff. culm node	1.10	3	2.08	1

a troublesome arable weed (Garrard and Streeter 1983), and common vetch (*Vicia sativa*), which was grown as a fodder crop (Applebaum 1975; Preston *et al.* 2002).

CROP HUSBANDRY

Following harvesting, cereal crops go through stages of threshing, winnowing and sieving, to release the grains from the ears, with characteristic by-products (Hillman 1981; Jones, G. 1984). Analysis of the by-products of these stages of cereal processing can provide information about crop husbandry practices in the vicinity of the site. In general, the samples contained low numbers of charred plant remains, and only two contexts had sufficient remains to provide a reasonable dataset for analysis (>100 wheat or barley grain and chaff fragments). These were the upper fill [237] of Phase 2 stone-lined pit [236] and the medieval midden [187].

As mentioned above, it is assumed that all of the barley from the Phase 2 and 3 samples was from 6-row barley, which would have produced three grains to one rachis internode, or a ratio of 0.3, if whole ears were represented in the samples. If there are far more rachis fragments than grain, giving a ratio of much larger than 0.3, it is likely that processing waste is represented. Conversely, much more grain than rachis fragments, giving a ratio of much less than 0.3, probably represents cleaned grain.

The only wheat chaff recorded from the Phase 2 and 3 samples was from glume wheats, and therefore it is assumed that all of the wheat cultivated during the Iron Age and Romano-British use of the site is either spelt or emmer, rather than the free-threshing bread wheat which appears to have been used at the site during the medieval period. For the glume wheats, each spikelet produces two glumes and two grains, thus a ratio of 1 would be expected if whole spikelets were present. A ratio of much higher than 1 would result if there are many more glume bases than grains, and would suggest crop processing waste, whilst a much lower ratio, produced when there is a much higher number of grains than glume bases, indicates fully processed grain.

In the upper fill [237] of Phase 2 stone-lined pit [236] the ratio for barley is 0.14, reflecting the significantly higher number of barley grains than chaff fragments. By contrast, the ratio for wheat is 3.82, as wheat chaff fragments were far more numerous than wheat grains. Therefore this sample appears to have a variable composition, containing discarded cleaned barley grain, in addition to waste from processed wheat, particularly from the fine-sieving stages. Some of the charred weed seeds in this sample may also derive from processing waste. This charred macrofossil assemblage could represent a deposit of waste animal feed, as it has been suggested that crop processing debris was mixed with barley grain for this purpose (Jones, M. 1984). Fine-sieving waste also had other uses, such as kindling or chicken feed (Huntley, in prep.). The low amounts of barley chaff may also reflect variations in processing for different crops. According to Hillman (1981), barley (as with free-threshing wheat and rye) had most of its straw, rachis fragments and coarse weeds removed at an early stage. This was likely to be near the point of harvest prior to transporting to the settlement. In addition, this resulting crop waste would be useful for fodder, thatching and flooring and less likely to be burnt as fuel. The number of glume bases and spikelet forks in [237] suggests that whilst some initial processing of the glume wheats may have been undertaken, the later stages to release the grain from the spikelets was taking place at the site. This on-site processing suggests that the crops were locally produced.

Chaff was absent from the Phase 4 midden [187] sample, and weed seeds were also relatively few in number. This context appears to represent the disposal of a quantity of cleaned grain. The grain may have been burnt during food preparation or as a result of over-parching during grain-drying.

PALAEOENVIRONMENT

Charred remains of non-cereal taxa were recorded in all of the samples in varying quantities and these weeds and shrubs can provide information about the local palaeoenvironment. The remains have been categorised according to broad ecological groups based on their most typical, present-day distribution (fig. 31). A number of the charred weed seeds probably derive from plants which grew with the arable crops, such as fat-hen, black-bindweed and wild radish. The ruderal species, hemp-nettles, redshank, ribwort plantain, common nettle and cleavers, may also have grown in the fields or on areas of waste or disturbed ground at the site. Weeds such as fat-hen, redshank and common nettle favour nutrient-enriched soils (Preston *et al.* 2002), and may indicate that the fields were relatively well-manured.

Pasture and grassland communities are represented by the presence of ribwort plantain, a possible false oat-grass tuber, and grass caryopses. Sheep's sorrel and some cinquefoils are also common components of open grassland, and although the wood-rush seed could not be identified to species, it may be from field wood-rush (*Luzula campestris*) or heath wood-rush (*Luzula multiflora*), which are both low-growing, tufted herbs of short grassland (Preston *et al.* 2002). While some of these seeds may derive from hay or dung, it is likely that many of the grassland remains, in addition to the undifferentiated rhizome/tubers, reflect burnt turves. Turves were an important resource in the prehistoric period, providing a source of construction material, bedding and fuel (Hall 2003). Turves were also used in clamp kilns, to undertake processes such as firing pottery (cf. Grant and Jones 2009).

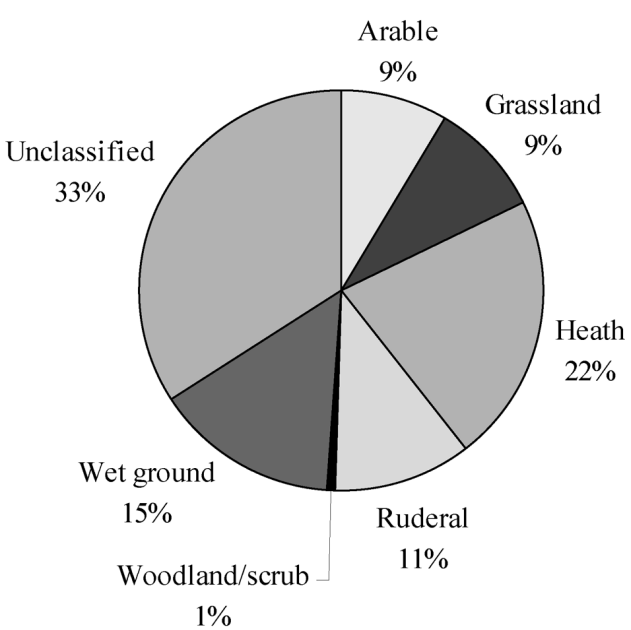


Fig. 31 Proportions of charred remains, by ecological category.

A number of the charred plant remains reflect plant communities of acid heath and moorland. These include heather, heath-grass and sheep's sorrel, and the low-growing shrubs, bearberry and crowberry. Bearberry is an alpine plant, found on upland heaths and moorlands, often over rocky ground and ravine sides (Lang 1987; Preston *et al.* 2002). Although common in areas of the Scottish Highlands, it is rare in England, and in Northumberland it is confined to two isolated locations in the south of the county (Swan 1993). In recent decades, it has suffered local declines, possibly due to moor-burning (Preston *et al.* 2002), and it may have been more widespread in the county in the prehistoric period. Crowberry favours areas of acidic soils, on moorlands, mountains and blanket mire (Preston *et al.* 2002), and it grows in upland heath vegetation with bearberry and heather. As mentioned previously, crowberries and bearberries may have been gathered for food or medicinal uses, and fresh heather may have been collected for fuel, bedding, thatch or winter fodder which were all traditional uses (Gale and Cutler 2000; Fenton 1978). However, these remains may also reflect the exploitation of upland moors for heathland turves. The nearest areas of such moorland habitats are in the Cheviots and Northumberland Sandstone Hills (Natural England 1997a and b) and upland areas of Southern Scotland. The occupants of the Needles Eye enclosure therefore either travelled some distance to gather these important resources, or these were brought to the site by groups arriving there from a wide area. There is evidence that peat turves may also have been collected and brought to the site for fuel, as charred remains of wetland plants such as sedges, bogbean, pale persicaria and lesser spearwort were recorded. Peat would have been cut from wet flushes and mires which also form part of the landscapes of the Cheviots, the Northumberland Sandstone Hills and other moorland areas (Natural England 1997 a and b).

Although the quantities of charcoal in the samples were generally very small, their presence suggests a woodland resource near the site. The assemblage included small trees and shrubs, such as hazel and Maloideae, which may have grown as opportunistic shrubs at the site or in nearby scrub woodland. Larger trees, like oak and ash, were also identified; many of the fragments had weak ring curvature, indicating that stemwood was used. These mature trees were probably felled from established woodland, for use as fuel or structural timbers. Willow/poplar (which are very similar anatomically) and birch were also present. Hazel was the most frequently recorded charcoal species, and this was often noted to have strong ring curvature suggesting the use of small twigs and branches. Hazel has traditionally been used for wattling (Orme and Coles 1985) and was also an important source of kindling and fuel.

The clayey nature of the primary fill [302] within the south-westernmost portion of enclosure Ditch 7, allowed the preservation of a small assemblage of waterlogged plant remains. This included numerous small seeds of rushes, which reflect damp conditions in and beside the ditch. The other taxa recorded were redshank, greater plantain, common nettle, pale persicaria, and members of the cabbage, grass and goosefoot families. These probably largely derive from waste or disturbed ground near the ditch, which may also have been subject to trampling. The single seed of greater plantain resembled those of subspecies *intermedia*. This subspecies favours somewhat saline soils (Preston *et al.* 2002), which may have resulted from sea spray or possibly also the saltworking activities on the site. Although the preservation of the waterlogged remains indicates that damp conditions were present in the ditch, the low number and diversity of remains, and the absence of aquatic taxa, suggests that the ditch was not permanently filled with water, and probably dried out during summer months.

Regional context

The cereal remains indicate that hulled 6-row barley, emmer wheat and spelt wheat were the main crops cultivated during the Iron Age occupation of the site. The identified emmer wheat remains outnumbered those of spelt, suggesting that this was the main wheat crop. However, it was not possible to establish the relative proportions of the crops with certainty, as a number of the glume bases could not be differentiated. The cultivation of emmer and barley continued into the Romano-British period, although it is unclear from the few poorly preserved chaff fragments, whether spelt was also used at the site at this time.

A synthesis of studies of plant remains from Iron Age sites in northern England concluded that there were two significantly different methods of arable farming being practised simultaneously in the region (Van der Veen 1992). A system of small-scale, subsistence farming appears to have been undertaken in the north of the region (termed Group A sites), while in the southern part, a larger-scale, extensive cultivation was prevalent (Group B sites). The Group A sites are characterised by the cultivation of emmer wheat and barley, with a weed flora dominated by annuals indicative of good, well-manured soil conditions. Fat-hen, pale persicaria, redshank, oraches (*Atriplex* sp), common chickweed (*Stellaria media*) and small grasses are weeds strongly associated with this group. Group B sites are characterised by spelt wheat and barley, with perennial weeds indicative of poorer soil conditions. Weeds that commonly occur in this group are heath-grass, brome (*Bromus* sp), blinks (*Montia fontana*), false oat-grass, cleavers, scentless mayweed (*Tripleurospermum inodorum*) and selfheal (*Prunella vulgaris*).

The assemblage from the Needles Eye enclosure clearly is more characteristic of the Group A category, with a significant number of emmer wheat remains and weeds indicative of well-manured soils. Other sites where emmer retained its importance are also located in the north of the region, including at Murton High Crags (Van der Veen 1985), Dod Law (Van der Veen 1992), Chester House (Holbrook 1988) and Fawdon Dean, in the Breamish valley (Archaeological Services 2004), and this pattern is also noted in lowland Scotland, for example at Port Seton (Huntley 2000) and in the environs of Traprain Law (Huntley and O'Brien 2009). As at Berwick, spelt remains were also identified at most of these sites, particularly in the later phases, but spelt was not cultivated to the same extent as sites further south in the region, where spelt had largely replaced emmer by the Late Iron Age and Romano-British period. The latter farming regime is observed at sites such as Street House Farm, Cleveland (Archaeological Services 2007a), Thorpe Thewles, Cleveland (Heslop 1987), Faverdale, Darlington (O'Brien 2012), East and West Brunton Farm, Newcastle (Archaeological Services 2008a), Shotton, Northumberland (Archaeological Services 2010a), and extending north to Pegswood Moor, Morpeth, Northumberland (Proctor 2009). The reasons for the differences in farming practice in the region are unclear, but appear to have more to do with cultural or social differences, rather than environmental or edaphic factors (Huntley and Stallibrass 1995; Van der Veen 1992).

The charred assemblage in the Phase 4 midden deposit, comprising barley, cf. bread wheat, oats, cf. pea and cf. rye, is typical of medieval sites throughout the region (Hall and Huntley 2007). Bread wheat, oats, barley and rye were the main crops recorded at medieval sites such as Walkergate, Berwick (Archaeological Services 2007b), Embleton, Northumberland (Archaeological Services 2006), Shotton, Northumberland (Archaeological Services 2010b), Tuthill Stairs, Newcastle (Archaeological Services 2007c) and Old Rectory, Ponteland

(Archaeological Services 2009). Further south, bread wheat, oats, hulled barley, legumes and rye were also the main crops identified in 12th–16th century occupation deposits at Headland Town Square, Hartlepool (Archaeological Services 2008b).

MARINE SHELL ANALYSIS

Ruby Ceron-Carrasco

Methods

The marine shell remains derived from four contexts and were retrieved from sieved bulk samples: fill [131] of Ditch 7 (slot 8); fill [188] of Ditch 6 (slot 8); fill [28.6] from the evaluation phase, which equates to the upper fill [79] of Ditch 7; and the medieval midden deposit [187]. Apical fragments of shell were identified to species using standard guides (Campbell 1989; Moreno-Nuño 1994a). Frequency was estimated by counting shell apices for gastropods and valve umbos for bivalve species (Moreno-Nuño 1994b). Broken fragments identified to species were quantified in terms of their relative frequency within each context and given as a percentage within the sample.

Results

The results of the identification and recording of the marine shell per context are given in Table 10. The medieval midden deposit [187] produced the greatest amount of marine shell and most diverse species representation. Overall, the gastropods: periwinkle (*Littorina littorea*) and limpet (*Patella vulgata*), were the most abundant marine molluscs recovered. The

Table 10 Data from marine shell analysis.

Context	Sample	Feature	Species	Adult	Juvenile	Broken shell
[131]	25	Ditch 7 (slot 8)	Periwinkle	32	–	–
			Limpet	22	26	25% of sample
[131]	41	Ditch 7 (slot 8)	Periwinkle	45	3	–
			Limpet	504	156	25% of sample
			Topshell	–	1	–
[187]	53	Medieval midden	Periwinkle	277	138	**
			Limpet	177	578	50% of sample
			Mussel	–	–	**
			Oyster	1	–	**
			Flat periwinkle	1	–	–
			Dogwhelk	1	–	–
[188]	54	Ditch 6 (slot 8)	Periwinkle	54	12	–
			Limpet	69	132	25% of sample
[28.6]	–	Ditch 7	Periwinkle	120	–	**
			Limpet	58	20	25% of sample

[**: presence only]

limpets recovered were mainly whole but at least 50% had lost the lower layer of their shell, it was therefore difficult to determine whether most of the specimens recorded as 'juveniles' had actually suffered this taphonomic loss. Other species present include bivalves: oyster (*Ostrea edulis*) and mussel (*Mytilus edulis*), which were mostly fragmented, and other gastropods: dog whelk (*Nucella lapillus*), flat periwinkle (*Littorina littoralis*) and top shell (*Gibbula cineraria*).

Discussion

The east coast has been an important source of a wide range of marine and coastal habitats and species. These are highly productive habitats with high densities of invertebrates, and their sheltered waters have also provided spawning grounds for a number of species of fish and crustaceans that have supplied a rich resource to humans since prehistory, and on which many coastal communities have depended upon for centuries (Coull 1996).

From early historical accounts it seems obvious that shellfish of various types were used as food in Britain and there is considerable regional variation in its uses as such (Ellis 1995). Furthermore, shellfish have also traditionally been used as fishing bait, and fishing techniques have depended greatly not only on the availability of fish species and equipment but also largely on the seasonal variation in the type of bait (Fenton 1984). The two main species present at the Needles Eye enclosure were periwinkles and limpets along with mussel.

Periwinkles are found on rocks, stones and seaweed on the middle and lower shores. Their shells, in modern populations, may measure up to 25 mm high (Branch 1985; Campbell 1989). Most of the periwinkles recovered were whole specimens measuring from 20 to 30 mm in height. This species has been used for human consumption in Britain from prehistory to the present; its other important use has also been that of fishing bait. Edible periwinkles, which are found along the shoreline, are still gathered by hand; they have always been plentiful and are usually eaten boiled.

The limpet is found throughout the coast on all rocky shores. This is a species of major importance in quantitative terms on most littoral shores and in shallow waters (Branch 1985). It is present from the most sheltered rocky shores dominated by the algae *Ascophyllum nosodum* L. to the most exposed mussel- and barnacle-dominated types. Limpets are edible and have also been used traditionally as fishing bait. They are gathered by sharply knocking them from their toeholds on rocks, a technique which requires swiftness, accuracy and practice. Most of the 'adult' specimens of limpets in the assemblage were up to 45 mm in length, and were mainly smooth and rather flat indicating calm wave action and probably favourable weather conditions.

Both oyster and mussel, which were only present in the medieval midden assemblage, are widely found all around the coastal areas in dense beds in a variety of substrates by the shore, and have been widely exploited as a harvested marine resource. The common oyster is found mainly in shallow water. Its shell may grow up to 100 mm in length. The oyster shell recovered from Needles Eye was very fragmentary. Due to its lamellar structure, like that of mussel, the shell tends to fragment and disintegrate more rapidly than other more robust species. Oysters would have been gathered at low tide, mainly from September to April, and from shallow bays and firths. Mussels have also been an abundant and productive resource, with the best quality mussel gathered during their spawning in autumn and winter (Lockhart 1997).

The non-edible species of dog whelk may have been accidentally gathered with the species mentioned above, whilst flat periwinkle and the top shell may have been attached to seaweed, particularly *Fucus vesiculosus* and *Ascophyllum nodosum*.

Conclusions

The variety of marine shell recovered from the Needles Eye enclosure indicates a wide-ranging use of the shoreline, which was readily accessible, and the species present in this assemblage would have been easily collected. Most of the large robust gastropods (e.g. periwinkles and limpets) were well preserved. These usually survive well in archaeological deposits because of their strong sturdy shell. Most of the other shell remains, particularly those of bivalves such as the oysters and mussels, only survived as broken fragments. Their under-representation may therefore be just the result of taphonomical loss, rather than a preference to eating mainly periwinkle and limpet. The molluscan remains from this site are an interesting contribution to our understanding of the uses of the various marine resources by prehistoric and medieval communities. These molluscs were not only used as a source of nourishment (e.g. oyster, mussel, periwinkle, limpet) but also as a means for fishing as bait (e.g. mussel, periwinkle, limpet), and at least two species, flat periwinkle and top shell, may be indicative of the gathering of seaweed which could have been used as fertiliser.

INSECT REMAINS ANALYSIS

Stephen Davis

Methods

A 20-litre subsample of the waterlogged primary fill of Ditch 7, recorded as [302] adjacent to the limit of excavation at the north-western end of slot 1, was wet-sieved over a 300 µm sieve and examined for insect remains. Additional insect remains recovered during plant macrofossil analysis of the sample were also examined. Following initial sorting, insects were identified using standard texts and comparison to appropriate reference materials. Taxonomy follows that adopted by the computer package BugsCEP (Buckland and Buckland 2006), which is based upon Lucht (1987), revised by Böhme (2005), and Gustafsson (2005). BugsCEP also provided invaluable assistance in providing ecological information.

Results and discussion

The results are listed in Table 11. The sample yielded a small and highly degraded assemblage of insect remains, all of which were heavily pitted and difficult to identify. As such, with the exception of the small hydrophilid *Megasternum obscurum*, no taxon could be assigned to species level with a high degree of confidence. Fragments of at least five caddis (Trichoptera) larval cases were recovered. The majority of caddis develop in water, where they build their larval cases from a variety of materials (in this case sand). Fast-flowing water in particular can be responsible for the type of mechanical damage evident in these remains, although no aquatic taxa were recovered.

The assemblage was dominated by members of the Curculionidae, the weevils, specifically taxa which are likely to represent grassland environments. These included two members of the genus *Sitona* ('clover weevils') and three specimens of *Otiorhynchus* spp. These included

Table 11 Data from insect analysis.

Taxon from primary fill [302] of Ditch 7	MNI
Trichoptera (caddis) larval cases	5
Hydrophilidae	
Megasternum obscurum	1
Scarabaeidae	
Aphodius sp.	1
Aphodius ? *fimetarius*	1
Curculionidae	
Otiorhynchus ? *rugostriatus*	2
Otiorhynchus ? *sulcatus*	1
Sitona sp. A	1
Sitona sp. B	1
Ceutorhynchus sp.	1

[MNI: minimum number of individuals]

O. ? *rugostriatus*, most frequently found on dry ground on sandy or calcareous soil (Duff 1993) and *O.* ? *sulcatus*, a widespread pest on cultivated plants (Frieser 1981). Both *O. rugostriatus* and *O. sulcatus* are among the most synanthropic taxa within the genus and can be serious pests of cultivated plants (Moorehouse *et al.* 1992). Other weevils recovered were of limited value and included a member of the Ceutorhynchinae and a fragment of ?*Phyllobius* sp.

Three fragments of *Aphodius* dung beetle were also recovered, including a small fragment of elytron which was not identifiable beyond genus level and an elytral apex of *A.* ? *fimetarius*. This latter species, in addition to being found in dung of various sorts, is also found in decomposing vegetable matter (Jessop 1986). This habitat is shared by *Megasternum obscurum* which is extremely eurytopic and found in almost all kinds of decaying organic matter (Hansen 1987).

Given such a small and poorly preserved assemblage, its interpretive value is clearly limited. Despite the absence of true aquatic taxa, the presence of a number of caddis larval cases suggests that the deposit is waterlain. A small dung and refuse element suggests pasture. This is further suggested by the presence of 'pastoral' weevil taxa (e.g. *Sitona* spp.). Whilst no definitive evidence of human presence is evident, the presence of *O.* ? *rugostriatus* and *O.* ? *sulcatus* hints at infield type environments.

RADIOCARBON DATES

Two samples were submitted during the initial post-excavation phase of work for radiocarbon dating at Beta Analytic Radiocarbon Dating Laboratory, Florida (BETA) (Table 12). The samples were dated used the Accelerator Mass Spectrometry Technique (AMS). AMS Sample 1 was taken from a carbonised residue adhering to a pottery sherd recovered from fill [214] of Phase 2.3 Ditch 2. AMS Sample 2 was obtained from charred plant material recovered from a bulk sample taken from fill [238] of Phase 2.7 stone-filled pit [236].

Table 12 BETA AMS dates.

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age (*)
AMS sample 1 Beta-208953 Sample: NRB05214POT Analysis: AMS-Standard delivery Material/Pretreatment: (food residue): acid washes	2370+/- 40BP	–26.0 ‰	2350+/- 40BP
2 Sigma Calibration: cal. BC 500–460 (cal. BP 2450–2410) AND cal. BC 430–380 (cal. BP 2380–2330)			
AMS sample 2 Beta-208954 Ample: NRB05C238S68 Analysis: AMS-Standard delivery Material/Pretreatment: (charred material):acid/alkali/acid	2160 +/- 40BP	-22.0 ‰	2210+/- 40BP
2 Sigma Calibration: cal. BC 380–170 (cal. BP 2330–2120)			

Seven samples were submitted to the Scottish Universities Environmental Research Centre (SUERC) for radiocarbon dating during the subsequent phase of analysis. The details are provided in Table 13.

DISCUSSION

The earliest settlement at Needles Eye may have been a palisaded enclosure, subsequently replaced by an enclosure bounded by a series of ditches that silted up and were recut on a number of occasions and which, by the Late Iron Age, were of substantial size. The latest enclosure ditch was evidently backfilled after a period of natural infilling, and during the early Roman period further activity at the site seems to have been associated with an open settlement phase. The Hownam sequence, which served for many years as the model for Iron Age settlement in the Tyne-Forth region, saw a progression from simple palisaded to univallate and multivallate enclosures, followed by open settlements in the Roman period — enclosures being no longer necessary because of the stability brought about by the *pax Romana* (Piggott 1948). This model has been subject to much debate over the years and its limitations are now widely accepted; at some sites there is evidence for a more complex sequence of activity with periods of unenclosed settlement between (as well as after) phases of enclosure. At other sites, palisades post-date the earthwork defences (Harding 2004, 54–5). Nevertheless, the excavated evidence indicates that at Needles Eye a palisaded enclosure was succeeded by a ditched enclosure, with a subsequent period of open settlement. It is now generally accepted that palisades cannot be seen as chronologically or culturally diagnostic (Harding 2004, 56), but palisaded settlements were most common in the Tyne-Forth region in the first half of the first millennium BC (Gates and Deegan 2009, 142). Palisaded settlements were

Table 13 SUERC AMS dates.

LAB CODE	CONTEXT	FEATURE	MATERIAL	WEIGHT	RADIOCARBON AGE	δ13C RELATIVE TO VPDB	95.4% (2σ) CAL AGE RANGE
SUERC-32282 (GU-22833)	[187]	Shell midden	Charred barley grain	14 mg	650 ± 30 BP	-24.4 ‰	1280 AD (43.6%) 1330 AD 1340 AD (51.8%) 1400 AD
SUERC-32891 (GU-23127)	[123]	Ditch 7	Charred barley grain	5 mg	1955 ± 30 BP	-25.5 ‰	40 BC (95.4%) 130 AD
SUERC-32895 (GU-23128)	[132]	Ditch 2	Charred wheat grain	7 mg	2030 ± 30 BP	-21.9 ‰	160 BC (3.0%) 130 BC 120 BC (92.4%) 60 AD
SUERC–32896 (GU-23129)	[143]	Ditch 2	Charred wheat grain	8 mg	2130 ± 30 BP	-22.8 ‰	350 BC (10.9%) 300 BC 210 BC (84.5%) 50 BC
SUERC-32897 (GU-23130)	[221]	Pit [224]	Charred barley grain	20 mg	2025 ± 30 BP	–24.2 ‰	160 BC (1.5%) 130 BC 120 BC (93.9%) 60 AD
SUERC-32898 (GU-23131)	[240]	Pit [236]	Charred barley grain	7 mg	2110 ± 30 BP	-24.0 ‰	210 BC (95.4%) 40 BC
SUERC-32899 (GU-23132)	[249]	Ditch 4	Charred barley grain	17 mg	2035 ± 30 BP	-21.9 ‰	160 BC (5.1%) 130 BC 120 BC (90.3%) 50 AD
SUERC-37168 (GU-25595)	[188]	Ditch 6	Hazel charcoal	135 mg	2150 ± 30 BP	-27.7 ‰	356 BC (30.4%) 286 BC 253 BC (0.2%) 250 BC 234 BC (63.6%) 91 BC 72 BC (1.2%) 60 BC

often the first phase of enclosure not just at hillforts but also at enclosed settlements; the construction of a palisade would have required less labour than a bank and ditch and thus may have been the most suitable form of boundary when a settlement was first established (Harding 2004, 55, 67). The absence of datable artefactual or ecofactual material from the earliest phase of activity means that the date of origin of the Needles Eye enclosure is unknown. There was no evidence for this slight feature on the aerial photographs of the site, nor was it identified by geophysical survey, so it is not possible to say if the circuit of this palisade was the same as the subsequent ditched enclosure. However, by analogy with other excavated sites in the wider region, it is considered likely that this was the case and, given the shape of the subsequent ditched enclosure, the Needles Eye palisaded enclosure was probably oval in plan and of considerable size.

The enclosure was subsequently bounded by ditches, which in Phases 2.2 to 2.5 were only recorded in the vicinity of an entrance into the enclosure. These ditches were relatively slight in comparison to those bounding the latest phases of enclosure. It was not possible to determine whether the entire circuit of the enclosure was reinstated during each of these phases, but it is possible that Phase 2.3 comprised a localised realignment to the entrance, as suggested by the similarity in size, profile and location of Phase 2.2 Ditch 1 and Phase 2.3

Ditch 2. A similar group of features was recorded at the eastern entrance to the Fishers Road West enclosure, in East Lothian, and it is suggested that these represent numerous realignments of the ditch terminals rather than comprehensive recuts of the entire circuit (McCullagh and Mills 2000, 14). Ditches 1 and 2 at the Needles Eye enclosure had steep-sided slots in the base which may have been created when the features were first excavated or could perhaps be the result of clearing out. Parallels are found across the region, and Jobey (1973, 18) suggested that such slots could represent working trenches dating from initial excavation. What was unusual in the ditches at Needles Eye was the apparent application of a clay lining to the upper ditch sides above the level of the slot, possibly in response to a localised variation in the natural sub-stratum which in this particular area was generally quite sandy and prone to collapse. The notable difference in dimensions and profile of Phase 2.4 Ditch 4 to ditches in the preceding and subsequent phases could perhaps indicate a more extensive recut of the perimeter. Again it is not known for certain if the enclosure during Phases 2.2–2.5 was the same size as the latest enclosure, though it is assumed that this is likely to have been the case. The only thing that is known for certain about the earliest phases of ditched enclosure at Needles Eye is that an entrance was maintained in roughly the same location during Phases 2.2–2.5, and during Phase 2.3 this was *c.* 6 m wide. Such wide entrances seem to be fairly typically for single-ditched enclosures in the region; the Fishers Road West enclosure had two entrances 5 m and 12 m wide (McCullagh and Mills 2000). A secondary silting fill within the terminal of Ditch 2 produced an AMS date of cal. BC 350–50 (SUERC–32896). Carbonised residue on a pottery sherd from a Ditch 2 terminal fill produced two possible dates due to the calibration curve; cal. BC 500–460 and cal. BC 430–380 (Beta–208953). These dates show that the earliest ditched enclosures at Needles Eye, represented by these relatively narrow and shallow ditches, date from the Late Iron Age and were in use some time during the last few centuries of the first millennium BC. The AMS dates of cal. BC 160–60 AD (SUERC–32895) from an upper fill of Ditch 2 and cal. BC 160–50 AD (SUERC–32899) from Ditch 4 reflect the final infilling of the upper parts of the ditches.

In the absence of any identifiable internal features, information about the first phases of enclosure at Needles Eye is limited to the artefactual and ecofactual material recovered from Ditches 1–5. A small quantity of pottery was recovered from Ditch 2, including the only examples of Fabric I pottery in the assemblage. Thin-section analysis of this fabric demonstrates that it was likely to have come from much further afield than most of the ceramic assemblage from the site, and the conclusion drawn by Morris is that it may represent the origin of the founding community of the settlement or one of its earliest contacts. The remainder of the sherds from Ditch 2 were from another fabric of non-local manufacture, with a source in the Cheviot Hills being most likely. Sherds from a large cooking pot indicate domestic activity, and the composition of the charred plant assemblage from Ditch 2 demonstrate that arable fields were located in the vicinity and that processing of barley and wheat was undertaken nearby.

During Phases 2.6 and 2.7 the Needles Eye enclosure was bounded by ditches of much more substantial proportions and these survived across a more extensive area than earlier features. By this phase, a ditch aligned north-west to south-east bounded part of the western side of the enclosure. An AMS date of cal. BC 356–60 (SUERC–37168) was obtained from a secondary fill of this ditch, again indicating a Late Iron Age date. Within the excavated area the enclosure had two entrances set 52.50 m apart, each with a minimum width of 10 m. The fenceline that led up to the western side of the southern entrance had been reinstated a

number of times, indicating that it fulfilled an important function. It extended for over 45 m and it may be that as well as demarcating a route into the enclosure, it was used to channel animals into the enclosure.

At some stage an extension to the main enclosure ditch was dug out: a length of ditch extended at right angles south-westwards from the northern entrance, before returning northwards for a short distance. It probably terminated somewhere around this area as (unlike the south-western stretch) it was not identified on the geophysical survey. The purpose of this ditch extension and sharp-angled return is enigmatic; like the fencelines leading up to the southern entrance it may have demarcated an access route into the northern entrance, but the reason for the excavation of a substantial ditch rather than a fenceline is not known. Further indications of stock control related to the northern entrance are provided by the fenceline leading up to the south-western corner of this ditch extension. Little artefactual or ecofactual material was recovered from the Phase 2.6 ditch and it seems to have largely infilled naturally with weathered, slumped and wind-blown material. This absence of maintenance may perhaps suggest that the basal slot in the ditch represents its original profile rather than being a product of periodic cleaning out. This lack of maintenance of enclosure boundaries is paralleled at many excavated sites in the region and at Needles Eye is not interpreted as being associated with intermittent occupation. The general trend seems to be that substantial ditches were excavated then left to silt before being recut along the same alignment; this was also seen at the enclosure at Whittingehame Tower, East Lothian, for example (Haselgrove *et al.* 2009a).

The northern and the southern entrances were maintained during the latest phase of enclosure at a distance of 50 m apart. Both sides of the northern entrance survived, which by this time was 13 m wide, whilst the minimum width of the southern entrance was 10 m. A narrow gap in the ditch, 2 m wide, detected by geophysical survey 15 m to the north of the northern entrance, and beyond the northern limit of excavation (fig. 3) is not thought to be another entrance. A further gap suggested by the geophysical survey within the main segment of enclosure ditch in the excavated area proved not to exist. Another entrance into the enclosure may have been located at the northern end of this length of ditch according to the geophysical survey in this area (fig. 3). The north-western side of the enclosure extending from the excavated northern entrance was therefore apparently bounded by a curvilinear ditch *c.* 70 m in length. Cropmarks suggest the presence of an everted entrance, about 15 m wide, on the north-eastern side of the enclosure leading to or from the cliff edge. Enclosures with two entrances are common in the region but multiple entrances are also known. It has been suggested that the three entrances along one side of the palisaded enclosure at Dryburn Bridge, East Lothian, may have been for the inhabitants of individual dwellings to access the enclosure (Dunwell 2007, 98). The multiple entrances at Needles Eye seem likely to be related to function, designed for herding animals into the enclosure and for accessing the shoreline.

The combined evidence from the excavation, geophysical survey, and aerial photographs indicates that the ditched enclosure was of considerable size, measuring up to 125 m east–west by 118 m north–south, and with an internal area of some 1.26 ha (fig. 3). There is no evidence to suggest that this was a defensive enclosure. It had a single-ditch, punctuated by wide multiple entrances and it had no significant natural defences, being overlooked by higher ground to the west (fig. 4). Only a very small proportion of the internal area of the enclosure was available for excavation (fig. 3) and so interpretation of the function of the enclosure has inherent problems, not least the absence of any dwellings. The function of the

three large stone-filled pits is not known, but the form of these features, along with the presence of the working hollow and the assemblages of briquetage, suggests that the far western part of the enclosure was used for manufacturing and processing activities.

The latest enclosure ditch at Needles Eye was not maintained and seems to have been left to silt up. The upper part of the silted ditch was subsequently infilled with material including quantities of occupation debris; the presence of conjoining fragments of pottery from these deposits and from the upper fills of internal features suggests that many of the internal features were in use when the enclosure ditch was still open. A large proportion of the pottery assemblage had been subject to trampling and this, along with the evidence for conjoining sherds in different features, suggests that much of this material had been redeposited. The most likely scenario is that middens in the interior of the latest enclosed settlement were cleared away and were deposited in the ditches and upper parts of interior features. This would have served the dual purpose of infilling the enclosure ditches and clearing the area for subsequent occupation. The use of midden material to backfill enclosure ditches is well paralleled in the region. At Eweford Cottages, in East Lothian, the enclosure ditches were subject to the same cycle of use as witnessed at Needles Eye. Following the excavation of the original enclosure ditches at Eweford Cottages, the naturally silted ditches were re-cut (Innes 2007, 133–4). A period of neglect then followed and the ditches were left to partially silt naturally before the upper parts were deliberately backfilled with midden material. The scarcity of occupation debris in the lower fills of the ditches at Eweford Cottages indicated that the middens had originally been located away from the enclosure boundaries (Innes 2007, 134) and a similar pattern of refuse storage is likely at Needles Eye. At Broxmouth hillfort, middens within the upper part of enclosure ditches also evidently included material that had been redeposited from elsewhere on the site (Hill 1982, 164; Armit and McKenzie forthcoming) and midden material had also been used to infill an enclosure ditch at St Germains, East Lothian (Alexander and Watkins 1998, 216). Domestic refuse was an important resource to agricultural communities and was stored in middens so that this nutrient-rich material could be spread on fields to fertilise the soil. It is widely acknowledged that in the Iron Age midden material was often deliberately deposited and used as part of structured deposits, presumably being of some significance due to its associations with fertility (cf Hill 1995; Needham and Spence 1997). Middens may well have been deposited within enclosure ditches as a symbolic act to mark the transition of the settlement from enclosed to unenclosed (Lelong 2007, 265). It seems that briquetage may also have played an important role in marking life cycles of settlements; Willis (2009b) suggests that the deposition of this material into final phases of settlement activity on later Iron Age sites might have played a symbolic role in marking the end of occupation, and the substantial dump of briquetage at Needles Eye could have marked this transition from enclosed to unenclosed settlement. The complete quernstone also seems to have been placed within the upper part of the ditch as a closing deposit; the use of quernstones to mark such points in space and time is also becoming widely recognised in this region (Lelong 2007, 264; Heslop 2008, 75; Proctor 2009, 89–90).

Despite the absence of domestic buildings within the excavated area, the artefactual and ecofactual evidence has provided significant information about the activities undertaken at the enclosure, and about its environs. Specialist analyses point to the conclusion that the Needles Eyes enclosure was a site of permanent habitation and the assemblages indicate domestic activity. Thus, the pottery assemblage includes vessels with sooting on the exterior and burnt/carbonised residues on the interior, evidence that these vessels had been used for

cooking. Domestic activity is also attested by the quernstones and by the charred plant assemblages, these demonstrating that crop processing took place here. The economy of the settlement was evidently based on a mixed pastoral and agricultural regime. The three main domesticates were exploited by the inhabitants and Rielly's analysis has shown that animals were culled and butchered within the enclosure. Some of the cattle and sheep supplied one or more secondary products prior to being culled for their meat, although some cattle were also exploited for beef. The spindle whorls also provide evidence for wool processing. Features excavated at the site have been interpreted as being associated with stock herding, suggesting that animals were driven into the enclosure from the surrounding hinterland. Horses were also used by the community, and it may be that, as well as being used for traction and transport, they were also used as a food resource. The remains of red deer indicated exploitation of wild resources, and the large quantities of limpet and periwinkle shells show that marine resources were also exploited. Prehistoric and later assemblages of limpet and periwinkle have often been interpreted as human food waste from 'famine' or subsistence foods, but those of similar composition of medieval and later date are thought more likely to represent waste from the preparation of fishing bait. However, there are records from the British Isles from the late seventeenth century to early modern times of limpets being regularly collected as a staple foodstuff of coastal communities, and elsewhere in the world they are still eaten regularly and sometimes considered a delicacy (Wickham Jones 2003). Periwinkles have always been regarded as edible and no doubt represented a valuable and easily accessible food resource to the Needles Eye community. The single fish vertebra recovered from a Phase 2.7 pit cannot be taken as certain evidence for the consumption of fish at the site; fish were rarely exploited in the Late Iron Age (Dobney and Ervynck 2007). Other sites on or very near to the coast in the region, such as at Dryburn Bridge, the two Fishers Road enclosures, and Broxmouth, produced very few or no fish bones (Thoms 2007; Haslegrove and McCullagh 2000, 156).

O'Brien's analysis of the charred plant remains demonstrates that arable crops were cultivated in the vicinity of the Needles Eye enclosure. The cereal assemblage was dominated by barley, and in common with other sites in the region 6-row barley was cultivated. Emmer wheat was present in greater quantities than spelt wheat suggesting that this was the main wheat crop cultivated in the vicinity. This, along with the weed species present, indicates that small-scale, subsistence farming with well-manured soil was practised. Many of the weed seeds were probably from plants that grew with arable crops in the vicinity and in the fields or on areas of waste or disturbed ground at the site. Heath-grass, sedges and pink give an indication of the grasslands nearby, and it is likely that many of these grassland species reflect the exploitation of turf; turves had a wide range of use such as for roofing material, bedding and fuel. Heather was also present in some quantity and may have been utilised for fuel, bedding, thatch or winter fodder; crowberry was also present, and these moorland and upland plants indicate the wide range of resources exploited by the community. There was also evidence from the plant remains that peat may have been used as a fuel source, transported from mires in the Cheviots, the Northumberland Sandstone Hills or other moorland areas. Birch, hazel and willow/poplar charcoal indicate the range of species exploited for fuel and kindling; these small trees and shrubs may have grown as shrubs at the site or in nearby scrub woodland. Hazel may also have been used as structural material for wattling and fences. Charcoal from mature oak and ash trees was also identified and these had probably been felled from established woodland for use as fuel or structural timbers at the site.

The wide range of pottery fabrics identified by thin section analysis includes boulder clay fabrics likely to be of local manufacture. All or most of the raw materials for pottery production would have been available in the near vicinity, and manufacture could well have taken place at the site with vessels fired in simple bonfire clamps.

The artefactual and ecofactual assemblages therefore demonstrate that in common with many other settlement enclosures in the region, the Needles Eye enclosure was a non-defensive enclosed settlement with a subsistence economy based on mixed pastoral and small-scale arable farming. What is unusual and striking about this site, apart from its sheer size, are the briquetage and pottery assemblages, undoubtedly the most significant assemblages recovered from the site. Morris has concluded that there is compelling evidence that salt-manufacturing was carried out at Needles Eye. Thin-section analysis has shown that the clay source for the briquetage, like some of the pottery fabrics, was of local origin. The majority of the briquetage was recovered from a single deposit within the upper part of the latest enclosure ditch and the condition of this material suggests that it had not been used for producing salt repeatedly for any great length of time. It may be therefore that this particular material represents debris from just one episode of salt-making. However, there was some evidence to indicate that this was not just a one-off production as two fragments of briquetage from a pit show signs of repeated use and many of the pottery vessels had been in contact with brine. The evidence for discolouration by salt points to the fact that these vessels had been used at some stage in the salt manufacturing process — perhaps to transport brine up to the site from the seashore or as ladles to add brine to the briquetage containers in saltern hearths. No hearths were recorded within the excavated area, and so it is uncertain where the salt was actually processed. It may have been on the seashore or within the enclosure or a combination of the two, although the primary processing is most likely to have taken place at sea level. The hard limestone cliffs are unlikely to have eroded any considerable distance since the turn of the first millennium AD, but enough erosion has probably occurred to remove evidence of how the inhabitants of the enclosure gained access to the shoreline. The cropmarks suggest the intriguing possibility that a double-ditched trackway led to the edge of the cliffs and it may be that a suitable route to the shoreline existed just to the north-east of the enclosure. As Morris has discussed, salt manufacture was a seasonal activity and the initial stages of processing could well have taken place on the shoreline beneath the enclosure during the summer months. Evidence for salt-manufacturing taking place at the top of much higher cliffs at a similar period has been recorded at Street House, Loftus, in north-east Yorkshire, where brine evaporation hearths were discovered within a sub-rectangular enclosure situated 300 m from the coast at a height of 170 m OD (Sherlock 2007; 2010). The excavator suggests that salt manufacture may have been carried out seasonally to supplement agricultural work (Sherlock 2007, 44–5). Much further afield, there are several examples of cliff-top salt-production sites dating from the Roman period on the Isle of Purbeck in Dorset as well as an Iron Age production site at Gaulter Gap near Kimmeridge (Farrar 1975). Cliff-top production has also been identified at Trebarveth in Cornwall (Morris 1980).

Salt was a particularly valuable commodity to prehistoric communities as it was used for many purposes, such as the preservation of meat and fish, in the production of cheese and butter, the processing of animal hides (including tanning and dying), and for medicinal purposes such as the reduction of infection. Preservation of food was of vital importance as food could be stored for use during seasonal shortages and it also meant that food was transportable and even tradable. Salt is a necessary dietary requirement, although in temperate

climates, meats and cheese would have provided enough salt to keep humans healthy (Morris 2007, 440). Personal taste, i.e. the use of salt as seasoning, should not be underestimated when considering the uses for salt and the reasons for its production. Salt is also an important pastoral resource and salt licks may have been used to keep animals healthy. The possibility that salt was used as currency and bridewealth, particularly before coinage was adopted, has also been raised. In the Lincolnshire fenlands there is clear evidence for a dramatic intensification of production in the Late Iron Age and early Roman period (Morris 2007). Maltby (2006) suggests this may be associated with an increased demand for salt to cure meat. Intensification in salt production may thus be closely associated with intensification of agricultural production and the population expansion witnessed in the Late Iron Age. Prehistoric and early Roman salt production is well documented from the Lincolnshire fenlands southwards across the county, but there is emerging evidence from newly excavated sites, and from the re-examination of previously excavated site assemblages, that salt was also being traded in the north-east (Willis 1999). As well as the salt-manufacturing hearths identified at Street House, briquetage has been identified at several sites in the Tees valley area (fig. 32). Willis (1999) suggests that Teesmouth is a very likely location for of salt-manufacturing during this period. Briquetage has also been found at two sites in south Northumberland: at Pegswood Moor (Willis 2009, 51) and at Burradon (Willis 1999; pers. comm.).

The extraordinary range of pottery fabrics recovered from the Needles Eye enclosure demonstrates that people were visiting the enclosure from far afield and it is considered that one of the reasons for this is that salt was being traded with the wider community. The enclosure was obviously very well placed for salt-making and exchange; all the raw materials needed, such as clay and fuel, would have been available in the near vicinity, although the evidence suggests that that fuel sources situated farther away, such as peat, were also exploited. The enclosure would have been accessible to people from settlements in the Cheviots and the Breamish valley along the communication route offered by the Tweed valley. By the Late Iron Age this area was densely populated, and an intensification of arable agriculture in this upland region would have resulted in an increased need for salt due to reduced meat consumption in the diets of people in these settlements. The pottery evidence also raises the possibility that inhabitants from a settlement in the Cheviots may even have founded the community at Needles Eye. Expansion of settlement into coastal plain areas was well established by the Late Iron Age. The use of iron-tipped plough shares and the introduction of the rotary quern, along with climatic improvements after *c.* 400 BC, were undoubtedly factors which facilitated agricultural settlement in these lowland boulder clay areas, but these may well have been accompanied by population expansion and associated changes in social organisation (Haselgrove and McCullagh 2000, 188). Expansion into thinly-settled areas, and the social processes underlying this phenomenon, are increasingly emerging as one of the crucial factors of the later Iron Age, and in southern and eastern England this expansion is frequently linked with developing craft specialisation and non-local exchange (Haselgrove 2007, 24). By the first century AD large tracts of the lowland landscape were virtually fully settled and the cropmark evidence from the area around Needles Eye suggests that there could have been several contemporary settlements in the near vicinity. (It is tempting to speculate that the ditched trackway running eastwards from the hillfort at Halidon Hill may even have led to the Needles Eye enclosure.) Readily accessible markets for salt may thus have existed in the near vicinity as well as the wider region. Whilst the pottery fabrics from Needles Eye can show contact with communities at some distance from the site, until pottery

Fig. 32 Salt-producing sites and sites with briquetage in the region.

or briquetage from the enclosure is found at other sites, it cannot be proved that salt was traded outside the community or where precisely it was traded to. An obvious line of enquiry would be the re-examination of ceramic assemblages from excavated settlements across the Cheviots and the lowlands of south-east Scotland and Northumberland in an attempt to identify further examples of briquetage, along with a comprehensive programme of thin-sectioning analysis of ceramic assemblages.

At over 1.25 ha, the Needles Eye enclosure is of considerably greater size than other univallate non-defended settlement enclosures in the region. The vast majority of the numerous curvilinear enclosures recorded in the recent survey of cropmarks in the Tweed and Till valleys have internal areas of less than 0.5 ha, with many being less than 0.2 ha (Gates and Deegan 2009). A similar size range can be seen in East Lothian where heavily defended forts range from 0.6–1.1 ha and lightly enclosed settlements are less than 0.5 ha (Cowley 2009, 209). A study of enclosed sites in Peeblesshire, Berwickshire and East Dumfriesshire shows that all examples in these areas greater than 1 ha are defended settlements with multiple boundaries (Kokeza 2008). The status of the Needles Eye enclosure as a salt-making site and a gathering place for communities within the wider region could well be the explanation for its substantial size. The emerging evidence from the region for networks of contact between communities, as shown by distribution of items such as briquetage and quernstones, has obvious implications for social integration and organisation (Willis 1999). Recent excavations in the south Northumberland coastal plain show that this was a highly organised, extensively occupied landscape, with trade and shared cultural practices and, in some areas, contiguous settlement and agricultural management (Proctor 2009, 102). In East Lothian, a significant increase in woodland clearance and land management, and a move from dispersed transient settlement patterns to larger enclosed settlements in the early to mid-first millennium BC, allowed the development of an extensive farming regime (Lelong 2007, 247). Such farming patterns required greater social organisation and cooperation between communities (Tipping 1997). The model proposed by Hill (2006) fits the evidence from this region well; a less hierarchical society with communities accessing resources within a limited territory but with networks of cooperation formed through kinship and economic relations. A central meeting place such as that proposed at Needles Eye would evidently play a significant role within such a social and agricultural landscape, not just as a place for trade and exchange but also in fulfilling important social functions, such as the celebration of events, and providing a place for social contact between different communities. Gathering of stock would be necessary not just on a practical level for inspection and culling, and the exchange of animals between herds to ensure successful breeding, but there may also have been an element of prestige for local communities in the opportunity to display animals (Giles 2007, 244). The Needles Eye enclosure may have thus had significant social and economic functions within the Late Iron Age landscape; this may be a reason for its unusual form, with multiple wide entrances and particularly large size. One of the conclusions of the Traprain Law environs project, which is of particularly relevance to an understanding of the Needles Eye enclosure, was that settlement enclosures in the mid to late first millennium BC in that part of south-east Scotland were subject to a wide variation in form, size and individual site histories, and that they were likely to have had specialised and variable functions (Cowley 2009, 212).

In common with those at many enclosures in the region, the Needles Eye ditches seem to have been deliberately infilled ahead of a phase of unenclosed settlement. The excavated evidence suggests that this had taken place at Needles Eye by the early first century AD, and

that the former enclosure was a focus for a phase of unenclosed settlement by the first to second century AD. Only a small area of activity from this period was uncovered within the excavated area, but the concentration of pits indicates that significant settlement was present in the very near vicinity. The palaeoenvironmental remains from the pits demonstrated that the pastoral agricultural regime continued as before, with small-scale intensive cultivation of barley and emmer wheat within arable fields surrounding the settlement. The presence of upland plants such as crowberry and bearberry and charcoal from mature woodland and shrubs, shows that a wide range of resources continued to be exploited, whilst hammerscale indicates that iron smithing took place in the near vicinity. There was no evidence recovered from the excavated area to indicate that salt continued to be produced at the site during the unenclosed phase of settlement, though it must be acknowledged that as only a very small area was exposed there remains the possibility that such production could have continued. The single sherd of first-century AD samian ware found in one of the pits is part of a wider incidence of such pottery in small quantities on native settlement sites. However, the mechanisms by which this pottery arrived at these sites are not fully understood, and in any case may have been variable and dependant on local factors. Four sherds of first-century samian were found at Murton High Crags, and Jobey (1987, 172) raises the possibility that these may have been scavenged from the abandoned Roman fort that has been postulated at the end of the Devil's Causeway. It may be that the fragment found at Needles Eye was similarly acquired. Whatever the method of acquisition, the circumstances of its deposition show that this samian sherd was evidently of some particular significance to the inhabitants of the settlement. Glass bangles are also a ubiquitous find on native settlements in the region and it is usual to find them as fragments (Allason-Jones 2009). Recognition of the structured deposition of glass bangles is becoming widespread across the region, indicating that these objects also had a particular symbolic significance (Willis 1999; Proctor 2009; Allason-Jones pers. comm.).

CONCLUSIONS

The evidence recovered from the investigations at Needles Eye is of considerable significance at both a local and a regional level. The briquetage not only represents by far the largest assemblage from the region, but this is also the most northerly site to produce such material. The pottery recovered may well indicate that the site was visited by people from far afield, but there is more work to do before it can be demonstrated that salt was traded out of the settlement. A re-examination of previously excavated settlements further south resulted in the discovery of briquetage at sites such as Thorpe Thewles and Burradon. Future comprehensive reappraisal of ceramic assemblages from sites in the Cheviots, and from the coastal plain in north Northumberland and south-east Scotland, may yet uncover previously unrecognised material. If the excavation undertaken across the westernmost portion of the Needles Eye enclosure is anything to go by, then the importance of the remainder of the site cannot be overestimated. It may be that much additional evidence for salt production survives in this area, as well as domestic structures from both the enclosed and unenclosed periods of settlement at Needles Eye.

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