Prehistoric and Dark Age Settlement Remains from Cheviot Quarry, Milfield Basin, Northumberland

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Abstract

Archaeological excavations in advance of quarrying at Cheviot Quarry have produced evidence for Neolithic, Late Bronze Age and Dark Age settlement. Neolithic pit features containing domestic midden material including broken pottery, lithics and cereal grains, have provided evidence for what is thought to be settlement and subsistence activity from the Early through to the Late Neolithic period. Together with the Neolithic remains from the nearby site at Thirlings, these two areas of settlement provide an important accompaniment to the better known ceremonial complex located nearby. Radiocarbon determinations associated with the full range of Neolithic pottery found in Northumberland have been obtained and analysis of the residues adhesing to the ceramics has provided some of the earliest evidence for dairy farming, as well as information relating to other dietary and subsistence practices. Two substantial roundhouses with protruding porches, internal hearths and pits containing domestic refuse, provide the first evidence for Late Bronze Age lowland settlement in the region. The botanical macrofossil evidence, together with the pottery residues, show clear evidence for arable and pastoral agriculture in a small, unenclosed farming settlement. A detailed programme of radiocarbon dating and the application of Bayesian modelling has shown that these two buildings are contemporary and date to the tenth century cal BC. In addition to this prehistoric archaeology three Dark Age rectangular post-built buildings were also discovered on the site and have been radiocarbon dated to the fifth or early sixth centuries cal AD. These substantial structures are thought to represent the homesteads of a small farming community, although the lack of material culture from these heavily truncated structures makes understanding their cultural

attribution problematic. Because of their early date these buildings could have belonged to either post-Roman British inhabitants or perhaps early Anglo-Saxon settlers. A reconstruction of one of these buildings has been built close to the site at the nearby Maelmin Heritage Trail where it can be visited by the public. The area of Cheviot Quarry also encompasses the former site of RAF Milfield, a World War II training airfield, which played a significant role in the success of the Allied advance into Europe.

INTRODUCTION

The excavations at Cheviot Quarry were centred at NGR NT 9485 3265, 1.5 km south-east of the village of Milfield and 6km north-west of Wooler, in the heart of the Milfield Basin (Illus. 1). The Milfield plain is an area of low-lying ground which contains a complex sedimentary sequence, with glaciodeltaic and glaciofluvial sand and gravel deposits fanning out from the valley of the River Glen to form a series of terraces (Passmore *et.al.* 2002). Eight hundred metres to the north-east of the site lies the present channel of the River Till, and beyond the land rises to the Fell Sandstone escarpment that borders the basin on its eastern side. Three kilometres to the south, the igneous rocks of the Cheviot Hills rise abruptly from the plain above the River Glen, where the summits of Humbleton Hill, Harehope Hill and the double peak of Yeavering Bell form prominent landmarks. To the west, the northern foothills of the Cheviots run parallel to the Fell Sandstone ridge, leaving only a 2km wide corridor at the northern end of the plain through which the River Till meanders. The archaeology of Cheviot Quarry was situated on a terrace of glaciofluvial sand and gravel deposits, situated for the most part at 45m AOD and covered by a ploughsoil of argillic brown earth origin (Payton 1992). Immediately to the south the terrace edge falls steeply away into the Galewood Depression, a large, late-glacial palaeochannel formerly the course of the River Glen, that contains an area of organic sediments.

The sand and gravel terraces contain an incredibly rich archaeological resource and the excavations at Cheviot Quarry have revealed substantial evidence for Neolithic, Bronze Age and Early Medieval occupation. Varied and widespread archaeological features, particularly from the Mesolithic (Waddington 1999), Neolithic (Harding 1981; Miket 1981; 1987; Waddington 1999; Waddington 2000), Bronze Age (Miket 1985) and Anglo-Saxon periods (Keeney 1935; Gates and O'Brien 1988; O'Brien and Miket 1991) are situated across the basin. Sites in the vicinity of the quarry include the extensive Neolithic ceremonial complex that incorporated the henges at Milfield North (NT933349), Milfield South (NT939225), Coupland (NT940330), Marleyknowe (NT942322), Ewart Park (NT956317), Akeld (NT958307), Yeavering (NT92843042) and Wooler Cricket Pitch (NU00102781). Excavations at Coupland (Waddington 1996), Thirlings (Miket 1976), and Yeavering (Ferrel 1990; Hope-Taylor 1977) have produced early and late Neolithic ceramic assemblages. Bronze Age activity from the vicinity of the quarry is evidenced by numerous ring ditches and burial mounds, which include a ring-ditch cemetery at Whitton Hill (Miket 1985). There is also evidence for Anglo-Saxon activity across the landscape, including the royal palace site at Yeavering (Hope-Taylor 1977), its successor at Maelmin (Gates and O'Brien 1988), and the settlement site at Thirlings (O'Brien and Miket 1991).

During World War II the area now occupied by Cheviot Quarry was transformed into RAF Milfield, a fighter pilot training school, which was operational between 1941 and 1946 (Pedersen 2007). The majority of the structures associated with the airfield had very shallow foundations and did not impact below the ploughsoil depth, however some facilities were deliberately dug into the terrace deposits for defensive purposes. These included gun emplacements and an underground Battle Headquarters, as well as service trenches for cables and piping (Pedersen 2007). Very few of the prehistoric and Dark Age features discussed in this report had been impacted on by the World War II facilities.

HISTORY OF INTERVENTIONS

A number of archaeological investigations have been undertaken within the quarry (Illus. 2). In 1993 Archaeological Services University of Durham (ASUD) excavated 17 evaluation trenches; in 2000 MAP Archaeological Consultancy Ltd (MAP) monitored topsoil stripping and excavated some of the exposed features and planned the rest before reinstating the topsoil over them; in 2003 Tyne and Wear Museums Service Archaeology Section (TWMS) undertook geophysical survey, monitored topsoil stripping and excavated evaluation trenches; and in 2005 Archaeological Research Services Ltd (ARS Ltd) monitored topsoil stripping and excavated exposed features. All these investigations were funded by Tarmac Northern Ltd as part of the mitigation works at the quarry. A further phase of investigation was undertaken by ARS Ltd in late 2006 supported by English Heritage through the Aggregate Levy Sustainability Fund to excavate an area that lay outside the planning requirements.

The ASUD excavations identified the remains of pits a gully and postholes in two trenches along with 37 diagnostic pottery fragments. Twenty-eight sherds of Early Neolithic Carinated Bowl were recovered from a pit immediately to the east of the A697 (NT 943 325) and nine sherds of Later Neolithic Meldon Bridge-related Ware (along with 43 tiny and heavily abraded sherds) were recovered from a pit in the south-east of the quarry at NT 951 327 (Waddington 2000).

Working of the sand and gravel deposits at Cheviot Quarry by Tarmac Northern Ltd began in 2000 at the southern end of the site and archaeological monitoring of the topsoil stripping was undertaken by MAP. The initial phase of the work revealed 109 archaeological features dating from the Early Neolithic through to the Early Bronze Age in the south of the extraction area. Operations ceased in this location and all exposed features were recorded in plan, with dating material taken from the surface deposits of some features. The archaeological features were re-covered with a synthetic membrane overlain by topsoil. No further extraction took place in this area. Extraction continued to the north however and 50 archaeological features, some of which produced prehistoric pottery and flints, were fully excavated (MAP 2000). During 2002 and early 2003 monitoring of topsoil stripping and excavation of evaluation trenches by TWMS, revealed further evidence for Neolithic occupation within the quarry area. TWMS 2003a; TWMS 2003b; TWMS 2003c).

In early 2005 ARS Ltd monitored topsoil stripping of 1.5 hectares during the final phase of extraction to the north of the quarry. This revealed evidence for significant Neolithic occupation comprising numerous pits, hearths and postholes, many of which contained Early and Late Neolithic pottery, as well as Dark Age occupation comprising three rectangular post-built structures. An application was made to the Aggregate Levy Sustainability Fund, managed by English Heritage, and funding was acquired to fully excavate the remaining three hectares of the quarry not subject to a planning condition. This revealed Bronze Age occupation in the form of two circular buildings and associated features. Funding was also acquired to bring together the results of all the interventions at the quarry as well as promoting a comprehensive public outreach programme based upon the archaeology of Cheviot Quarry (Pedersen 2007b).

EXCAVATION RESULTS

The archaeology of Cheviot Quarry was situated on land that had been occupied by the remnants of RAF Milfield since the end of World War II. Prior to this the land had been used for agriculture, both arable and pastoral, and parts of it may have been ploughed since World War II. A dark-brown sandy ploughsoil, varying in thickness between 0.1m and 0.25m and containing many modern artefacts associated with RAF Milfield, overlay a coarser grey-brown sandy subsoil that measured between 0.2m and 0.3m thick and contained no artefacts. These two deposits overlay the whole site and the varying thickness can be attributed to the natural unevenness of the underlying glaciofluvial deposits, and also as a consequence of construction activity during the building of RAF Milfield. Beneath the subsoil the glaciofluvial deposits were formed from a mixture of gravel and coarse sand, although in places a fine sand occurred in patches as large as 20m by 20m. No archaeological features survived within the topsoil or subsoil other than those associated with RAF Milfield. The only surviving prehistoric and Dark Age features were those which had been cut into the natural glaciofluvial deposits and all were truncated as a result of agricultural practices and the construction of the WWII airfield. By good luck the usually shallow foundations of the airfield structures missed almost all the prehistoric and Dark Age features, with only one posthole which formed part of one of the Late Bronze Age buildings being slightly truncated by a service trench, and a shallow pit containing early Neolithic pottery having a modern posthole cut into one edge of it.

A note on the reporting of the results

Archaeological interventions at Cheviot Quarry spanned thirteen years, seven 'phases' of work, four different commercial archaeological companies, and comprised watching briefs, evaluation trenching and open-area excavation which produced six separate reports. Therefore a decision has been made on how to present the results of all these interventions. For clarity the results have been divided into three areas of archaeological activity designated Cheviot Quarry South, Cheviot Quarry Central and Cheviot Quarry North (Illus. 2). Each intervention did produce broadly similar evidence for prehistoric, and primarily Neolithic, activity distributed along the terrace edge, however these areas appeared as relatively defined clusters of activity separated by areas of very few or no archaeological features. It should be stated that the only available data for the work undertaken by MAP and TWMS are presented in their respective reports (MAP 2000, TWMS 2003a, 2003b, 2003c) and the artefact archive. The data presented here, taken from these sources, is given in good faith and is as accurate as can be ascertained given the available documentation. Additionally duplication of some numbering has occurred across the various interventions. In the tabular data presented here all features have been prefaced with an F and referenced to all associated contexts that can be referred to the primary documentation.

CHEVIOT QUARRY SOUTH

Archaeological interventions in the Cheviot Quarry South area comprised the excavation of evaluation trenches by ASUD in 1992 (Loveluck *et.al.*, 1992; Waddington, 2000), a watching brief by MAP in 2000 (MAP, 2000), and the excavation of evaluation trenches by TWMS in 2003 (TWMS, 2003b). All the significant archaeology in this area was Neolithic and Early Bronze Age in origin and was primarily situated close to the terrace edge, overlooking the wetland of the Galewood Depression. Four Neolithic features were found situated away from the terrace edge. In the Cheviot Quarry South area a total of 12 pits, one irregular slot and one posthole as well as a further 109 unexcavated features that were interpreted as 64 pits, 15 hearths, 12 postholes, an interrupted linear ditch, a ditch with entranceway, and a curvilinear feature. ASUD discovered one pit containing 28 sherds of Carinated Bowl related to the Grimston Ware tradition (Waddington 2000) and TWMS a pit which contained four sherds of Early Neolithic ceramic from a Carinated Bowl and two from a plain ware vessel. This was closely associated with another pit and an irregular slot that were also thought to date to the Early Neolithic, as an additional six sherds of ceramic, two of which were from the plain ware vessel found in the pit, were recovered from the turf root mat in the vicinity of these features.

The watching brief by MAP, which constituted the majority of the work undertaken in this area, revealed a total of 120 features. To the south (Illus. 3) a total of 109 features were discovered in an area measuring slightly less than a hectare. Tarmac Northern Ltd decided not to extract the mineral deposits in this southern area and the features were left *in-situ*. They were recorded in plan, with surface finds of pottery, flint and nutshell recovered from at least ten contexts. The remains were interpreted as predominantly pits (70%) with some possible hearths (16%), although other features included an interrupted linear ditch, a probable ditch with entranceway and a curvilinear feature (MAP 2000). As surface finds were only recovered from a small percentage of these features ascribing functions and dates to them should be treated with considerable caution.

Ceramics were recovered from ten features (F203, F204, F205, F207, F219, F249, F274, F279, F305 and F310; Illus. 4), and comprised Early Neolithic Plain Wares, Impressed Wares, Beakers and other Late Neolithic-Early Bronze Age vessels. No Grooved Ware was found in the Cheviot Quarry South area. Carbonised residues from the Impressed Ware and Beaker assemblages were submitted for residue analysis and to acquire radiocarbon dates. A single, unstratified rim sherd of Flat-Rimmed Ware of Late Bronze Age-Early Iron Age date was also recovered from this area and four undiagnostic lithics were recovered from the surface of F204.

A further ten features were situated in the northern part of Cheviot Quarry South (Illus. 3) and these were fully excavated by MAP (MAP 2000). The features comprised a diffuse cluster of small pits and a possible posthole which occupied an area of around a quarter of a hectare. The pits averaged 0.66m in diameter and survived to a depth of 0.19m below the start of the archaeological horizon. They were filled predominantly with a very dark brown or greyish-brown sandy-silt. F2 produced ceramic sherds from one Early Neolithic Carinated Bowl and three Early Neolithic Plain Ware vessels. A further three sherds were recovered from the topsoil in this area that could not be attributed to a particular ceramic tradition and eight lithics were recovered.

Cheviot Quarry Central

Archaeological interventions in the Cheviot Quarry Central area comprised a watching brief by MAP in 2000 (MAP 2000) and a watching brief by TWMS in 2003 (TWMS 2003a). The MAP watching brief revealed a total of 39 archaeological features to the south, whilst the TWMS watching brief revealed a total of seven archaeological features to the north (Illus. 5). These features comprised 27 pits, two hearths, one posthole and a curvilinear feature as well as some modern ditches associated with the World War II airfield. All the significant archaeology in this area was Neolithic in origin and was situated close to the terrace edge. Only six features had more than one fill and most were comprised of one cut and one fill.

Of the 24 features in the southern part of this area, 21 were interpreted as pits (or 'scoops'), two were hearths and there was one posthole. The pits were of varying sizes, ranging from 0.25m in diameter and surviving to a depth of 0.10m below the start of the archaeological horizon, up to 2.10m in diameter and surviving to a depth of 1.6m below the start of the archaeological horizon. The average pit size was 0.70m in diameter and survived to a depth of 0.28m below the start of the archaeological horizon. Most of the pits were of a similar sub-circular shape, with only three having a more elongated cut. The fills of most of the features were also broadly similar, predominantly consisting of brownish sandy-silts with some charred material. One of the hearths measured 1.00m in diameter and survived to a depth of 0.20m below the start of the archaeological horizon and the second measured 0.38m in diameter and survived to a depth of 0.18m below the start of the archaeological horizon. Both were sub-circular in plan and contained very dark fills and charred material. F102, the largest pit in this area, contained eight fills, the final two of which (1030 and 1051) were contained in a recut of the upper part of the feature. The pit was very steep-sided and flat-based and contained a complete, undecorated Beaker vessel in fill (1055). Carbonised residue from this vessel was submitted for analysis and to acquire a radiocarbon date. Charred material was present throughout the fills and charred hazelnuts were recorded from the primary fill (2000).

Ceramics (Illus. 6) were recovered from five features (F102, F114, F119, F124 and F126), and comprised Early Neolithic Plain Wares, Impressed Wares, Beakers and other Late Neolithic-Early Bronze Age vessels. No Grooved Ware was found in this area. Two lithics were found and burnt bone was recovered from two pits (F113 and F139) and one hearth (F136). Hazelnut fragments were also recovered from pitsF101, F102 and F106 (MAP 2000). In addition one well-preserved wheat (*Triticum* sp.) grain was found in a feature in this area. However, it is unclear which feature this macrofossil came from so it has little informative potential.

Of the seven features revealed in the northern part of this area, six were interpreted as pits and there was one curvilinear feature. The pits were all large, varying in size between 0.85m and 1.45m in diameter and surviving to a depth of between 0.1m and 0.91m below the archaeological horizon. The average pit size was 1.12m in diameter and survived to a depth of 0.35m below the archaeological horizon. The pits were all sub-circular and the fills were predominantly darkish-brown silty-sand, often with an 'ashy' component and containing charred material. Early Neolithic Carinated Bowls and Plain Wares from 18 vessels were recovered from four features (F9, F13, F18 and F21). F9 contained five distinct fills of which six vessels were recovered from fill 8, an 'ashy' brown silty-sand, one from fill 4, a redeposited natural gravel, and two from fill 3, an 'ash and charcoal' deposit. One broken Neolithic blade segment was also recovered from fill

3. Charred material was recovered from some of these features, but no environmental work appears to have been carried out on this material and none survives in the archive.

CHEVIOT QUARRY NORTH

This area of the quarry contained the greatest concentration and variety of archaeological features. Interventions in this area comprised the excavation of evaluation trenches by ASUD in 1992 (Loveluck *et.al.* 1992; Waddington 2000), the excavation of evaluation trenches by TWMS in 2003 (TWMS 2003 c) and open-area excavation of 4.5 hectares by ARS Ltd in 2005 (Illus. 7). The excavations revealed evidence for Neolithic domestic occupation consisting of seven pits, nine hearths, two postholes and a possible structure; Bronze Age settlement comprising two circular buildings and an associated feature; and three Dark Age post-built buildings also thought to be a settlement. There was also evidence for Mesolithic and Iron Age activity, represented by lithics and radiocarbon dates.

Mesolithic

No features could be attributed to the Mesolithic period, although there is evidence for Mesolithic activity in the form of 21 lithics, mostly recovered from the top of the sand and gravel substratum. In addition, a radiocarbon date, taken on a residual oak (*Quercus*) twig from the fill of a posthole in one of the Late Bronze Age buildings, provided a Late Mesolithic date of 4690 – 4490 cal BC (5740 ± 35 bp, SUERC-9114). Given the proximity of the Galewood Depression, which was most likely an area of carr during the Mesolithic, as well as the small, widely-dispersed lithic assemblage and the radiocarbon date it is plausible that some of the undated features in this area of the quarry belong to the Mesolithic. Extensive fieldwalking has shown that Mesolithic occupation of the

Milfield Basin was focussed on these raised gravel terraces and they could have formed a zone of relatively permanent occupation during the Later Mesolithic (Waddington 1999).

Neolithic and Early Bronze Age

Neolithic and Early Bronze Age occupation on the site was characterised by a series of pits, postholes and hearths, predominantly situated close to the terrace edge overlooking the Galewood Depression. ASUD discovered one pit (F1303) which contained nine sherds of Meldon Bridge Ware, a local Impressed Ware ceramic style, together with a further 43 tiny and heavily abraded sherds (Waddington 2000). TWMS found one pit (F175) which contained two fills, both an 'ashy' silty-sand, and a secondary fill which was 'less ashy' than the primary fill (TWMS 2003c). The feature contained Early Neolithic Plain Ware vessels and Carinated Bowls as well as six lithics. A small linear feature, interpreted as an animal burrow, intruded into this feature and contained a further six sherds from a single Carinated Bowl and one unattributable sherd. This pit was also revealed during the excavations by ARS Ltd (F005) and a further four sherds of Carinated Bowl from two more vessels and two lithic flakes were recovered.

Twenty-one of the features revealed during the open area excavation by ARS Ltd could be ascribed to the Neolithic period. These consisted of eight pits, two hearths, one stakehole, one posthole and a group of nine features that are interpreted as a possible structure. The possible structure (Illus. 8; Illus. 9) comprised an irregular group of postholes and pits, that may represent a large freestanding structure with two or more phases of activity. It covered an area that measured 18.5m by 4.5m and comprised two large pits (F031 and F033), a curvilinear feature (F029), and an irregular rectangular arrangement of smaller stakeholes and postholes (F035, F037, F039, F041, F043, and F047). Some features outside the structure (F027, F009) were aligned on two of the pits (F031, F033) within the structure. The arcing structural slot (F029) was situated at the north-western end of the structure and, given its form, may have held continuous timber uprights. It measured nearly 4m in length, orientated roughly north-east to south-west, with an average width of 0.4m, and a maximum depth of 0.25m below the start of the archaeological horizon, and held a single dark-brown to dark-grey sand fill. Two shallow depressions towards the northern half of the deposit may represent individual postholes. One of the depressions produced large quantities of charcoal and burnt hazelnut shell, accounting for the darkness of the fill in this particular location, but otherwise the sediment was identical to that from elsewhere in this feature. No artefacts were recovered but charred organic material was present throughout. Situated 3.5m to the south-east of the northern end of curvilinear slot F029 and around 3.5m to the north-east of the large pit F033, was an artefact-rich pit F031. This pit measured 1.38m by 1.2m and survived to a depth of 0.65m below the start of the archaeological horizon, with a clear undercut and two distinct fills, the secondary deposit (031), a medium brown silty-sand, being clearly differentiated from the primary fill (052), a black and burnt silty-sand which did not appear to have been burnt *in-situ*. The pit contained ceramic sherds from 11 Carinated Bowls of which four had sherds in both the primary and secondary fills, five had sherds exclusively in the secondary fill and two had sherds exclusively in the primary fill, including the most complete Carinated Bowl recovered from the site (Illus. 10; Pot 28). Carbonised residues from these vessels were submitted for analysis and radiocarbon dating. An additional radiocarbon date was taken on a charred hazelnut shell fragment. Four lithics, and charred material including over a thousand hazelnut shell fragments, were recovered from the secondary fill whilst the primary fill contained one lithic and was also exceptionally rich in charred hazelnut shells. It also included five cereal grains that were identified as wheat (*Triticum* sp.), although the exact species could not be determined. A small number of other indeterminate cereal grains were found within both pit fills. Two radiocarbon dates, one on a sherd residue and one on a hazelnut shell, were taken from the primary fill. A second large pit (F033) lay 3.5m to the south-west of F031. This pit produced no artefacts or organic material. A further six postholes (F035, F037, F039, F041, F043 and F054) formed the rest of the structure and averaged 0.43m diameter and survived to an average depth of 0.23m below the start of the archaeological horizon. All the postholes were very steep-sided and contained predominantly brown sandy-silt fills. Two postholes (F037 and F054) were much longer than they were wide, and it is possible that these represent phases of rebuilding activity although no differentiation could be seen in the fills of these particular features. None of the postholes produced any artefacts, although some did contain charred material.

The pits, hearths and postholes were found predominantly to the west of the possible structure. The pits varied considerably in size and form and all were substantial features. The largest measured 3.12m long and 1.2m wide, but only survived to a depth of 0.07m below the start of the archaeological horizon, whilst the smallest was 0.65m in diameter and survived to a depth of 0.16m below the start of the archaeological horizon. Pit F009 (Illus. 11) was situated 26m south-west of pit F033 in the possible structure and formed an alignment with F031, F033 and F027. It measured 1.47m by 1.25m and survived to a depth of 0.55m below the start of the archaeological horizon, with a clear undercut around its base and two distinct fills. Its shape, size, contents and nature of the two distinct fills makes it virtually identical to pit F031. The secondary fill (009) was 0.34m thick and consisted of a medium-brown sand and the primary fill (051) was 0.21m thick, consisting of a very dark-brown to black medium-textured sandy-silt. Significant burning of this lower deposit had occurred, although apparently not *in-situ*, and both fills contained charred organic material including numerous hazelnut fragments and eight emmer wheat (*Triticum dicoccum*) seeds and associated chaff along with 25 indeterminate cereal grains. Sherds from 21 Early Neolithic Carinated Bowls and Plain Wares were recovered from these fills and, as with F031, a number of vessels had sherds present in both fills. Carbonised residues from sherds in the secondary fill were submitted for analysis and radiocarbon dating. A total of twenty-two lithics were recovered. These were generally undiagnostic with one Neolithic blade that may have been an awl and one possible broken microlith being the most noteworthy pieces. Also of interest were a number of coarse stone objects found in this pit. A quartzite carved stone ball roughout was found in the secondary fill, and a fine sandstone whetstone, a quartzite hammerstone and a possible granite roughout were recovered from the primary fill (Illus. 12). The finds were all distributed haphazardly with no evidence of structured deposition in the pit and all were either broken, flawed or heavily used. Pit F015 was situated 6m east of pit F009. It measured 0.65m by 0.32m and survived to a depth of 0.15m below the start of the archaeological horizon with a single medium-brown to black sandy-silt fill. No artefacts were recovered from this deposit but charred material was present in abundance and it is thought to form a part of the cluster of Neolithic activity in this area. Pit F049 was situated 9m south-east of F009. It measured 2.02m by 0.95m and survived to a depth of 0.15m below the start of the archaeological horizon with shallow sides and an irregular flat base and a single red-brown sand fill. Ceramic sherds from three Early Neolithic Carinated Bowls and a coarse Plain Ware vessel were recovered and some sherds were submitted for carbonised residue analysis. Pit F224 was situated 60m south-west of the possible structure and 2.5m to the south-east of the alignment of F033, F031, F027 and F009. It measured 3.12m by 1.20m and survived to a depth of 0.07m below the start of the archaeological horizon with a single dark-brown-black sandy-silt fill which had been disturbed to the south-west by a modern posthole. Ceramic sherds from five Early Neolithic vessels were found in this pit and carbonised residues from some of these sherds were submitted for analysis. Pit F262 was situated 75m south-west of the possible structure. Sub-oval in plan it measured 1.81m by 1.74m and survived to a depth of 0.27m below the start of the archaeological horizon with quite steep sides, a flat base and two fills. The primary fill (262), a dark-brown-black sandy-silt filled the base to a maximum thickness of 0.08m although it was much thinner to the south and east sides. The secondary fill (297), a distinctive strong-brown silty-sand, overlay this to a depth of 0.19m. A quartzite hammerstone was recovered from the primary fill and charred organic material was present throughout, particularly in 262.

Two pits containing Grooved Ware were situated immediately to the east of Dark Age Building 3 (cf Illus. 25). Pit F2133 measured 0.85m by 0.80m and survived to a depth of 0.36m below the start of the archaeological horizon, whilst pit F2168 measured 0.85m by 0.68m and survived to a depth of 0.19m below the start of the archaeological horizon. Both contained mid-brown silty-sand fills as well as numerous charred hazelnut shell fragments and the size and preservation of the fragments in F2133 suggest that the deposits had not been reworked but formed part of the original deposition event. Pit F2133 also contained ceramic sherds from four Grooved Ware vessels as well as three lithics, one of which was a knife, and a sandstone whetstone. Pit F2168 contained sherds from two Grooved Ware vessels and both pits had sherds with carbonised residues submitted for analysis, as well as radiocarbon dates taken from charred hazelnut shells. A further pit, F2061, was situated inside the north-west corner of Dark Age Building 2 (cf Illus. 23) and contained a single sherd of Grooved Ware, and a few charred hazelnut fragments. An additional pit (F469) was situated in the north-east corner of the site. Sub-circular in plan it measured 1.52m by 1.28m and survived to a depth of 0.27m below the start of the archaeological horizon with a single light-brown silt fill. A single unattributable prehistoric ceramic sherd was recovered from the fill.

A number of hearths were revealed during excavation but, given the multi-period activity occurring in this area, definitively ascribing them to a specific period is difficult. Two hearths (F232 and F2005) are thought to be Neolithic in origin. Hearth F232 was situated 60m south-west of the possible structure and 3.5m to the north-west of the alignment of F033, F031, F027 and F009. It measured 1.0m by 0.5m and survived to a depth of 0.25m below the start of the archaeological horizon and contained two fills. The upper fill (232), was a brown silty-sand that overlay the primary fill (296), a black sand that filled the base and tapered up the sides of the pit. The presence of fire-reddened and cracked stones lining the cut suggest that *in-situ* burning occurred. No artefacts were recovered but charred material was present throughout, particularly in 296. Given the location of other Neolithic activity close by this feature has been ascribed to the Neolithic period. Hearth F2005 was situated to the south-east of the possible structure and measured 0.91m by 0.68m and survived to a depth of 0.31m below the start of the archaeological horizon, containing a single very dark-brown silty-sand fill. Fire-cracked limestone (which is not native to the gravel terraces) lined the base and sides of the pit, and the deposit above was blackened from *in-situ* burning. Two undiagnostic flint lithics were recovered and charred material, including charred hazelnut shells, were present throughout.

A solitary stakehole, F027, may also be Neolithic. This feature was situated 7.5m south-west of pit F031 and formed an alignment with F033, F031 and F009. It measured 0.26m by 0.39m by 0.15m deep with a steep W-shaped profile which may represent two phases of activity. It had a single very dark-brown silty sand fill, which in places was almost black from charring. No artefacts were recovered from this deposit but given its location it is thought to be Neolithic.

Late Bronze Age

Evidence for Late Bronze Age activity on the site came from two post-built roundhouses (Buildings 4 and 5) with associated hearths and pits, as well as a small sub-rectangular post-built building (Building 7) situated between them. Building 4 (Illus. 13; Illus. 14; Illus. 15) measured 5.8m across its internal diameter with an entrance porch to the south-east. It comprised a circle of eight postholes (F344, F346, F355, F359, F361, F363, F367, and F373), an off-centre posthole (F478), three double postholes (F338, F348 and F365) to the south and south-east, a central hearth (F342), a large artefact-rich internal pit (F340), a shallow pit to the north (F352), a very shallow pit (F375) to the south, a stakehole in the south side of the circle of postholes (F369) and a small outlying posthole (F350) to the north-east. The postholes forming the structure averaged 0.36m in diameter and survived to an average depth of 0.27m below the start of the archaeological horizon and were filled with a brown to dark-brown sandy-silt. Ceramic sherds from three Flat-Rimmed Ware vessels were recovered from postholes F346, F361 and F367 and eight charcoal samples from short-lived species were collected from the postholes and submitted for radiocarbon dating. The double postholes averaged 1.14m long, 0.54m wide and survived to an average depth of 0.34m below the start of the archaeological horizon and were also filled with a brown to dark-brown sandy-silt. The central hearth measured 0.63m in diameter and survived to a depth of 0.19m below the start of the archaeological horizon and the surrounding fire-reddened gravel indicates that the black sandy-silt fill was burned *in-situ*. Five ceramic sherds from one vessel, one piece of daub and a possible stone used as a pestle or rubber were recovered, as well as significant volumes of charred organic material including 89 barley (Hulled *Hordeum* vulgare) seeds and two pieces of burnt bone. A barley seed was submitted for radiocarbon dating. The large internal pit measured 1.64m by 1.4m and survived to a depth of 0.62m below the start of the archaeological horizon with two distinct protuberances to the east and west sides respectively. The pit was undercut to the north and south sides, with vertical sides to the east and west. The pit contained four fills. In order of deposition these were: a basal fill (483) measuring 1.4m by 0.75m by 0.4m of dark-brown sandy-silt to the south side of the pit and into the undercut, a fill of brown coarse sand (482) measuring 1.4m by 0.90m by 0.04m overlying 483 to the centre and south of the pit, a fill (477) of black silt measuring a maximum of 0.12m deep, with a very irregular upper surface and filling the base of the pit and into the undercuts on the north and south sides and a final fill (340) of dark-brown silt measuring a maximum 0.52m thick and filling the rest of the pit. Ceramic sherds from 31 Flat-Rimmed Ware vessels were recovered and all but one of the vessels had sherds in only one fill. One fragment of daub was also recovered from 340 and one lithic, a Mesolithic agate core, was found. Large quantities of charred organic material was recovered from throughout the fills including over 4000 barley (*Hordeum vulgare*) seeds and over 500 emmer wheat (*Triticum dicoccum*) seeds, as well as substantial amounts of chaff in the form of rachis segments, spikelets and glume bases. A further 270 barley grains and 29 emmer wheat grains were recovered from the postholes and hearth of Building 4. A total of seventeen fragments of burnt bone were recovered, with six from 340, and eleven from 477, two of which could be identified as being from cattle and some which were from sheep- or goat-sized animals. Two quernstone fragments, from different querns but both made from Cheviot granite, were also recovered from 340. In total ceramic sherds from 37 Flat-Rimmed Ware vessels were recovered from features within this building and a number had carbonised residues taken for analysis. A shallow pit, F352, situated to the north of the circle of posts measuring 0.31m diameter by 0.13m deep contained a Flat-Rimmed Ware ceramic sherd and one very finely worked oblique arrowhead on a dark grey flint, which is obviously residual. Soil samples for geochemical analysis were taken from this building.

Building 5 (Illus. 16; Illus. 17; Illus. 18) was a roundhouse that measured 7.8m across its internal diameter with an entrance to the south-east. It was more heavily truncated than Building 4 and comprised a circle of nine postholes (F302, F304, F308, F312, F318, F322, F453, F457, and F459), two large post-pits with internal post-pipes (F491 and F310; F493 and F489) to the south and south-east forming a porch, two hearths, one centrally placed (F314) and one to the south (F306), and an outlying feature

(F321) to the north-east. The postholes forming the structure averaged 0.38m in diameter and survived to an average depth of 0.13m below the start of the archaeological horizon and were filled with a brown to dark-brown sandy-silt. Eight charcoal samples from short-lived species were selected from four of the postholes and submitted for radiocarbon dating. The large sub-rectangular post-pits holding the entrance posts of the porch averaged 1.25m by 0.85m and survived to a depth of 0.39m below the start of the archaeological horizon and the post-pipes averaged 0.59m in diameter and 0.37m deep. Both pits contained substantial amounts of post-packing in their dark-brown silt fills. Post-pit F493 and post-pipe F489 had been truncated on their southern side by a Second World War service trench. The internal hearth features measured 0.80m by 0.66m by 0.13m deep (F306) and 0.50m by 0.49m by 0.14m deep (F314) and contained very dark-brown silt fills which included substantial amounts of charred organic material, a few fragments of burnt bone and were fire-reddened around their sides. Ceramic sherds from three Flat-Rimmed Ware vessels were found in this building and had sherds submitted for carbonised residue analysis. A possible pit, F320 was situated 1.0m to the north-east of the ring of posts. It had been very badly damaged by mole action but charred organic material was present throughout, including one fragment of burnt bone. Given the mole activity, the original form and function of this feature is unclear and it may represent a mole burrow into which archaeological material has been dragged. Both Building 4 and Building 5 are interpreted as substantial dwellings associated with a farming settlement.

Building 7 (Illus. 19; Illus. 20) measured 2m by 2.5m internally and comprised six postholes (F326, F328, F330, F332, F336 and F451) in a sub-rectangular arrangement, and two internal pits or postholes (F324 and F334). The postholes averaged 0.3m in diameter and survived to an average depth of 0.21m below the start of the archaeological horizon and contained brown silt fills. No material was recovered from this building and its function is unclear. Given its location mid-way between Buildings 4 and 5 however, it is thought most likely to be Late Bronze Age in date and the large size of the postholes in comparison to the small surface area they cover may indicate that the timbers supported a tall superstructure raised to a considerable height off the ground. A potential storage facility or other farm building is considered the most likely interpretation. Soil samples for geochemical analysis were taken from this building.

Two hearths, situated to the north-east of the buildings, may also date to the Late Bronze Age. Hearth F381 measured 0.81m by 0.53m and survived to a depth of 0.16m below the start of the archaeological horizon and hearth F383 measured 0.45m by 0.40m and survived to a depth of 0.11m below the start of the archaeological horizon. Both contained fire-cracked cobbles in their dark-brown to black silty-sand fills and were fire-reddened at their edges. No artefacts were recovered from these features but their proximity to, and upwind location from, the two buildings means they are thought to be associated with activities external to the roundhouses.

Iron Age

No definite features or material culture belonging to the Iron Age were identified However two radiocarbon determinations, on an indeterminate twig fragment and a piece of willow (*Salix*), provided mid-Iron Age dates of 410 – 260 cal BC (2315 ± 35 bp, SUERC-8961) and 400 – 230 cal BC (2290 ± 29, OxA-15547). The samples were taken from the posthole of a Dark Age building and are obviously residual, suggesting Iron Age activity on site has left little or no archaeological trace. Extensive Iron Age settlement is known from the Cheviot uplands overlooking the Milfield Basin (Jobey 1964; 1965), and it may be that these charcoal fragments represent clearance activity associated with Iron Age agricultural practices on the fertile gravel soils.

Dark Age

Dark Age activity on the site is represented by the heavily truncated remains of three rectangular post-built structures, located in a triangular layout about 15m apart and each orientated on an east-west axis. Samples for geochemical analysis were taken from all these buildings.

Building 1 (Illus. 21; Illus. 22) measured 7.30m by 3.60m internally being defined by six postholes along each of its long axes that were directly opposed to each other (F2009, F2015, F2017, F2019, F2021 and F2023 from west to east on the north side; F2039, F2037, F2035, F2115, F2033 and F2031 from west to east on the south side). The ends of the building were defined by postholes F2025, F2027 and F2029 at its eastern end and F2011 and F2041 at its western end. Two external postholes (F2111 and F0277) 0.6m to the south of the western end of the southern alignment of postholes formed a porch that is assumed to represent the entrance. An internal posthole (F2079) was situated to the south-east of the building. The postholes averaged 0.28m in diameter and survived to an average depth of 0.11m below the start of the archaeological horizon and were filled with a brown to dark-brown sandy-silt. One posthole (F2011) produced an agate scraper that is residual from Mesolithic activity on the site.

Building 2 (Illus. 23; Illus. 24) measured 9.28m by 4.72m internally being defined by seven postholes along each of its long axes that were directly opposed to each other (F2085, F2105, F2059, F2057, F2107, F2055 and F2099 from west to east on the north side; F2045, F2047, F2103, F2051, F2053, F2089 and F2091 from west to east on the south side). The ends of the building were defined by postholes F2083, F2081 and F2113 at the western end and F2097, F2109 and F2165 at the eastern end. Two internal postholes to the south-east (F2093 and F0295) may have formed an inner vestibule, while an internal shallow pit to the west (F2087) probably created an internal partition to the building. The postholes averaged 0.40m diameter and survived to an average depth of 0.18m below the start of the archaeological horizon and were filled with a brown to dark-reddish-brown sandy-silt. One lithic, a residual broken blade, was recovered from F2053. As mentioned previously, a large pit (F2061) was located in the north-west corner of this building which contained two sherds of Grooved Ware and evidence of *in-situ* burning. This pit may be Dark Age, however it is suggested that it more likely to be Neolithic, and its positioning within the building is purely fortuitous.

Building 3 (Illus. 25; Illus. 26) measured 8.80m by 4.40m internally being defined by seven postholes along each of its long axes that were directly opposed to each other (F2147, F2145, F2143, F2141, F2139, F2137 and F2136 from west to east on the north side; F2117, F2119, F2121, F2123, F2171, F2125 and F2127 from west to east on the south side). The ends of the building were defined by postholes F2149, F2155, F2151 and F2153 on the western side and F2131 and F2129 on the eastern side. A line of three external postholes to the east (F2173, F2175 and F2177) may represent an extension of the structure in this direction, or more likely a short fenceline associated with the two Grooved Ware pits (F2133 and F2168) mentioned previously. The postholes forming the structure averaged 0.36m in diameter and survived to an average depth of 0.16m below the start of the archaeological horizon and were filled with a dark-brown to dark-reddish-brown sandy-silt. The three external postholes averaged 0.22m in diameter and survived to an average depth of 0.10m below the start of the archaeological horizon and were filled with a reddish-brown sandy-silt. One lithic, a residual possible Neolithic scraper, was recovered from posthole F2149.

No Dark Age material culture was recovered, either from the buildings or the wider site, but three barley (*Hordeum vulgare*) seeds were recovered from two postholes in Building 2 and four barley grains from a posthole in Building 3. Building 1 and Building 2 had charred material submitted for radiocarbon dating. Two samples of short-lived species from each of four postholes in both buildings were submitted. Insufficient material suitable for radiocarbon dating was recovered from Building 3.

World War I and World War II

The wartime aviation history of RAF Milfield began in 1917. During World War I it was known as Woodbridge and comprised a 90 acre field, used by BE.2 and RE.8 aircraft from 77 Squadron, who were based in Edinburgh. The squadron was tasked with the defence of Edinburgh and the Firth of Forth from zeppelins on bombing missions, although this threat never appeared and it primarily provided a base from which to undertake patrol and training missions. There is no indication (either archaeological or documentary) of buildings or facilities associated with this early airfield, and it most likely consisted of an open grassy area with fuel drums for use by the pilots (Pedersen 2007).

Sometime in either 1939 or 1940 the decision was made by the Air Ministry Directorate of General Works to build an airfield to serve a bomber Operational Training Unit (OTU), although it was soon decided that the airfield would serve a Fighter OTU instead. The OTU's provided familiarisation and training to Commonwealth pilots and RAF Milfield saw Canadians, Poles, Czechs, Norwegians, French and Americans, as well as British airmen training predominantly in Hurricanes and Masters. As the war progressed the emphasis at RAF Milfield changed to concentrate on air-to-ground attack in Typhoons and Tempests, using practice bombs dropped on Doddington Moor to the south-east and rocket systems test-fired at a range on Goswick Sands on the Northumberland coast. It was in this role that RAF Milfield had a significant impact on the progression of World War II, as the successful invasion depended to a great degree on realising the air dominance of the Allied forces. As well as producing pilots to escort bombers on their raids on German industrial targets, the airmen from RAF Milfield provided close support to advancing ground forces throughout the liberation of Europe, with the air-to-ground attack planes primarily intended for destroying armoured units on the ground (Pedersen 2007).

The facilities built at RAF Milfield comprised an 'A' Class Expansion Airfield, with a main runway 1600m long and two subsidiary runways measuring 1000m long forming a triangular shape. One hundred and twelve buildings surrounded the runways, constructed variously of timber-frame, or prefabricated steel and brick, with a concrete render, and comprising hangars, barracks, service bays and defensive emplacements as well as buildings with more prosaic uses such as a barber's and a tailor's. Most of these buildings had little impact below the plough horizon, having shallow foundations or built on concrete rafts, although certain structures were deliberately dug into the gravel deposits. These included a battle headquarters used to direct the defence of the airfield, should it come under attack. Other components, such as administration facilities, were more widely dispersed, away from the main site. At its peak the airfield supported as many as 2000 personnel (Pedersen 2007).

Virtually nothing of RAF Milfield now survives, with most of it having been removed during the expansion of gravel extraction at Cheviot Quarry. Some of the satellite buildings, such as the gatehouse, still survive, as do elements of the dispersed structures that complemented the airfield, such as the sergeant's mess, although most are, at best, only visible as concrete foundations. Two large concrete eagles perched on concrete globes, built by Polish and American airmen to stand at the entrance to RAF Milfield are the only obvious evidence that a significant airfield once existed here (Pedersen 2007). The reinstatement work being undertaken at the quarry is returning the area to the state it was in prior to World War II and it is now used by the Borders Gliding Club as an airfield.

RADIOCARBON DATING

By D Hamilton, P Marshall, C Waddington, C Bronk Ramsey, and G Cook

A total of 41 samples were submitted for radiocarbon dating by Accelerator Mass Spectrometry (AMS) at the Scottish Universities Environmental Research Centre (SUERC), East Kilbride and the Oxford Radiocarbon Accelerator Unit (ORAU). These consisted of 20 samples of charred wood, seven samples of carbonised wheat, six samples of carbonised hazelnut shell, and seven carbonised residues adhering to the interior surface of pottery sherds. The samples submitted to SUERC were prepared using methods outlined in Slota *et al* (1987), and measured as described by Xu *et al* (2004). Those submitted to ORAU were prepared according to methods given in Hedges *et al* (1989) and measured as described in Bronk Ramsey *et al* (2004). Both laboratories maintain continual programmes of quality assurance procedures, in addition to participation in international inter-comparisons (Scott 2003). These tests indicate no laboratory offsets and demonstrate the validity of the measurements quoted.

The results, given in Tables 6 and 7, are conventional radiocarbon ages (Stuiver and Polach 1977), and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). The calibrations of these results, relating the radiocarbon measurements directly to calendar dates, have been calculated using the calibration curve of Reimer *et al* (2004) and the computer program OxCal (v3.10) (Bronk Ramsey 1995; 1998; 2001). The calibrated date ranges for these samples are given in Tables 6 and 7 and have been calculated using the maximum intercept method (Stuiver and Reimer 1986). They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years. The graphical distributions of the calibrated dates, given in outline in Illustrations 27, 20 and 33, are derived from the probability method (Stuiver and Reimer 1993).

General Approach

The Bayesian approach to the interpretation of archaeological chronologies has been described by Buck *et al* (1996). It is based on the principle that although the calibrated age ranges of radiocarbon measurements accurately estimate the calendar ages of the samples themselves, it is the dates of archaeological events associated with those samples that are important. Bayesian techniques can provide realistic estimates of the dates of such events by combining absolute dating evidence, such as radiocarbon results, with relative dating evidence, such as stratigraphic relationships between radiocarbon samples. These 'posterior density estimates', (which, by convention, are always expressed *in italics*) are not absolute. They are interpretative estimates, which will change as additional data become available or as the existing data are modelled from different perspectives.

The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program OxCal (v3.10) (http://units.ox.ac.uk/departments/rlaha), which uses a mixture of the Metropolis-Hastings algorithm and the more specific Gibbs sampler (Gilks *et al* 1996; Gelfand and Smith 1990). Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001). The algorithms used in the models described below can be derived from the structure shown in Illustrations 27, 20 and 33.

Objectives and sample selection

The four structures with samples suitable for radiocarbon analysis at Cheviot Quarry were both spatially separated and morphologically different, there being two roundhouses and two rectangular buildings. The site also had numerous pit features that contained Neolithic pottery including sherds of Carinated Bowl, Impressed Ware, Grooved Ware, and Beaker.

The objectives of the dating programme were to:

1) establish a chronology for the features on the site,

2) determine the chronological relationship between the Neolithic pits, the roundhouses, and the rectangular buildings,

3) establish the temporal relationship between the roundhouses,

4) establish the temporal relationship between the rectangular buildings,

5) determine whether the internal features relate to the use of the structures,

6) provide precise direct dates on pottery styles in the north of England.

The first stage in sample selection was to identify short-lived material, which was demonstrably not residual in the context from which it was recovered. The taphonomic relationship between a sample and its context is the most hazardous link in this process, since the mechanisms by which a sample came to be in its context are a matter of interpretative decision rather than certain knowledge. All samples consisted of single entities (Ashmore 1999). The categories of material selected for dating from Cheviot Quarry were:

- Charcoal from short-lived species - from a context in which it seemed to have been freshly deposited, e.g. fuel in a hearth

- Charred hazelnut shells — where they formed substantial and discrete deposits likely to represent a single event.
- Residues on well-preserved joining sherds — where the survival of the residue seemed to indicate that the sherds had not been exposed to weathering and the proximity of a number of sherds from the same vessel suggested that the vessel was not redeposited.
- Samples of intrinsic interest — where the context was not the issue, such as residues on pottery sherds to date the pottery style.

Other samples with a less certain taphonomic origin submitted comprised material from the fill of post-holes; interpreted as relating to the use of structures rather than its construction, as suggested by experimental archaeology (Reynolds, 1995). Where possible, duplicate samples from these contexts were submitted to test the assumption that the material was of the same actual age.

Model Development and Analysis

Building 4

Building 4 is made up of eleven postholes. Duplicate samples were submitted from three postholes, and a fourth which was believed to be associated but is now thought to be a highly truncated feature that is not part of the structure, and has produced a late-Mesolithic date (SUERC-9114; 5740 ±35BP). Two samples of charcoal were submitted from posthole [346], which forms part of the east-side entrance. The two measurements (SUERC-9109; 2725 ±35 BP and SUERC-9110; 2800 ±35 BP) are statistically consistent

(T'=2.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age.

One sample of charcoal and one charred seed of emmer wheat were submitted from posthole [363], which forms part of the north-side of the structure. The two measurements (SUERC-9513; 2765 ±35 BP and SUERC-9113; 2745 ±35 BP) are statistically consistent (T'=0.2; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [348], which lies on the south-side of entrance double post-pit. The two measurements (SUERC-9111; 2775 ±35 BP and SUERC-9112; 5015 ±35 BP) are not statistically consistent (T'=1983.7; v=1; T'(5%)=3.8; Ward and Wilson, 1978), suggesting the context contains material of two different ages. One sample of charcoal (SUERC-9114) was dated from posthole [369], which appears to form part of the south-side wall. A further three samples were dated from a hearth and pit feature within the structure. A single grain of *Hordeum* sp. and a carbonised residue from [483], a pit feature within the building were also submitted. The two measurements (OxA-16066; 2759 ±30 BP and OxA-16067; 2693 ±30 BP) are statistically consistent (T'=2.4; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Finally, a grain of carbonised *Hordeum* sp. (SUERC-11294) came from the central hearth [342].

The ten measurements on samples from Building 4 are not statistically consistent (T'=11244.9; v=9; T'(5%)=16.9; Ward and Wilson 1978). However, if the two obvious Mesolithic dates (SUERC-9112 and -9114) are excluded, the remaining eight measurements are statistically consistent (T'=8.1; v=7; T'(5%)=14.1) suggesting that these dates could all be of the same age. Because SUERC-9112 and -9114 are clearly residual they have been excluded from the model shown in Illustration 27 as denoted by the '?' next to the laboratory identification number.

Building 5

Building 5 is made up of eleven postholes. Duplicate samples were submitted from four postholes. Because of damage caused during the stripping of the site, the four postholes all make up the porch, as these were the best-preserved and most-intact features. One sample of charcoal and one grain of carbonised *Hordeum* sp. were submitted from posthole [489]. The two measurements (SUERC-9101; 2805 ±35 BP and SUERC-9100; 2850 ±35 BP) are statistically consistent (T'=0.8; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [312]. The two measurements (SUERC-9094; 2820 ±35 BP and SUERC-9093; 2795 ±35 BP) are statistically consistent (T'=0.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [308]. The two measurements (SUERC-9092; 2785 ±35 BP and SUERC-9091; 2735 ±35 BP) are statistically consistent (T'=1.0; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [316]. The two measurements (SUERC-9098; 2855 ±35 BP and SUERC-9099; 2790 ±35 BP) are statistically consistent (T'=2.0; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age.

All eight measurements from Building 5 are statistically consistent (T'=8.5; v=1; T'(5%)=14.1; Ward and Wilson 1978) and suggests that these samples could all be of the same actual age. A chi-square test of the sixteen measurements on all of the non-residual material from the roundhouses shows that they are not statistically consistent (T'=25.4; v=15; T'(5%)=25; Ward and Wilson 1978). However, the chi-square value is just slightly above the 95% confidence threshold and within the 97.5% confidence limit (T'(2.5%)=27.5). This is not unexpected due to the high number of measurements and the effects of random scatter on radiocarbon dates, and we would suggest that these two buildings might be of the same actual date.

Building 1

Building 1 is made up of nineteen postholes. Duplicate samples were submitted from four postholes, although one sample from each posthole failed at pre-treatment due to insufficient carbon. This was all of the available suitable material so no replacement samples could be submitted. One sample of charcoal (SUERC-9104) was dated from posthole [029], which forms part of the east gable wall. One sample of charcoal (SUERC-9104) was dated from posthole [037], which is an entrance post in the south wall. One sample of charcoal was dated from each posthole [017] (SUERC-9102) and [019] (SUERC-9103), which are positioned next to one another and form part of the north wall.

The four measurements on samples from Building 1 are not statistically consistent (T'=882.0; v=3; T'(5%)=7.8; Ward and Wilson 1978). However, by removing SUERC-9104 and -9108, the remaining two measurements are statistically consistent (T'=0.8; v=1; T'(5%)=3.8; Ward and Wilson 1978). The removal of these two Bronze Age measurements in favour of the 'Dark Age' measurements is based upon the spatial proximity and morphological similarity of Building 1 and Building 2, which with nearly twice as many measurements has been attributed to the 'Dark Ages'. SUERC-9104 and -9108 have therefore been excluded from the model shown in Illustration 27.

Building 2

Building 2 is made up of twenty postholes. Duplicate samples were submitted from four postholes, although one sample failed from posthole [057]. Two samples of *Hordeum* sp. were submitted from posthole [053], which is centrally located in the south wall. The two measurements (SUERC-8959; 1520 ±35 BP and OxA-15545; 1517 ±26 BP) are statistically consistent (T'=0.0; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [047], which lies to the west end of the south wall. The two measurements (SUERC-8960; 1545 ±35 BP and OxA-15546; 1531 ±27 BP) are statistically consistent (T'=0.1; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. One sample of charred *Hordeum* sp. (SUERC-8962) was dated from posthole [057], which is centrally located in the north wall. Two samples of charcoal were submitted from posthole [107], which is centrally located in the north wall, next to [057] and opposed to [053]. The two measurements (SUERC-8961; 2315 ±35 BP and OxA-15547; 2290 ±29 BP) are statistically consistent (T'=0.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age.

The seven measurements from Building 2 are not statistically consistent (T'=890.4; v=6; T'(5%)=12.6; Ward and Wilson 1978). However, if the two measurements from posthole [107] are excluded as being residual Iron Age material, the remaining samples are statistically consistent (T'=2.1; v=4; T'(5%)=9.5; Ward and Wilson 1978). The model in Illustration 30 has therefore excluded both SUERC-8961 and OxA-15547. A chi-square test of the seven measurements on all of the non-residual material from the rectangular buildings shows that they are statistically consistent (T'=7.4; v=6; T'(5%)=12.6; Ward and Wilson 1978) and suggests that these two buildings might be of the same actual date.

Pottery

Seven radiocarbon determinations were made on carbonised residues adhering to the interior surfaces of pottery sherds. To test the accuracy and consistency of the residue dates with associated material (i.e., hazelnut shells) two Carinated Bowls with carbonised residues also had a hazelnut shell from the same pit fill submitted to check the accuracy of the results. The two contexts that this material came from were clearly "structured deposits" with well over 50 pottery sherds and very numerous hazelnut shells represented in each.

Pit F031 [052] contained 85 Carinated Bowl sherds and over 1000 hazelnut shells. Two samples were submitted, one each of carbonised residue and hazelnut shell. The two results (OxA-16068; 4999 ±32 BP and OxA-16069; 4906 ±34 BP) are not statistically consistent (T'=4.0; v=1; T'(5%)=3.8; Ward and Wilson 1978). They are, however, consistent at the 99% critical value (T'(1%)=6.6), and this slight inconsistency is likely due to random statistical scatter on the measurements. Therefore, it is possible that these two samples could be of the same actual age.

Pit F009 [051] contained 63 Carinated Bowl sherds and numerous hazelnut shells. Two samples were submitted, one each of carbonised residue and hazelnut shell. The two results (OxA-16097; 4933 ±35 BP and OxA-16162; 4348 ±34 BP) are not statistically consistent (T'=143.7; v=1; T'(5%)=3.8; Ward and Wilson 1978) and are therefore of different ages. However, the date for the carbonised residue on the Carinated Bowl sherd is much later than would be expected for this pottery type.

The reasons for this are twofold; firstly inaccurate measurements on carbonised residues are still apparent in results that are both too old and too young for the pottery types from which they come. This suggests that we do not still have an adequate understanding of the chemistry of dating from carbonised residues. This is not a site specific problem at Cheviot Quarry but a methodological problem inherent in the dating of carbonised residues from any site/period. Secondary carbon contamination may have occurred through the absorption of humic acids, fulvic acids and lipids from the surrounding soil. All these organic fractions will be younger than the ceramic sherd with radiocarbon ages related to the turnover of organic matter (Hedges *et al* 1992). Secondly, our archaeological understanding of chronological changes in fabric types might be flawed, although this might in part be due to a paucity of excavated sites with large assemblages of Neolithic pottery in this part of the country

Although the Grooved Ware had no visible residues, this pottery style was dated by submitting duplicate charred hazelnut shells from the same deposit, where the two materials were clearly associated and thought to be part of the same depositional event, thereby providing a date for the Grooved Ware in the absence of surviving residue. Pit F2133 [2133] contained 10 Grooved Ware sherds and a small number of hazelnut shells. Two hazelnut shells were submitted for dating from this context. The two measurements (OxA-16070; 4152 ±31 BP and SUERC-11295; 4130 ±35 BP) are statistically consistent (T'=0.2; v=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. Pit F2168 [2168] contained 3 Grooved Ware sherds and a small number of hazelnut shells. Two hazelnut shells were submitted for dating from this context. The two measurements (OxA-16096; 4177 ±33 BP and SUERC-11296; 4250 ±35 BP) are statistically consistent (T'=2.3; v=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. Pits F031 and F009 were located to the immediate SW of the roundhouses. Pits F2133 and F2168 were located immediately (less than 1 metre) east of Building 3.

The pottery samples from the MAP excavations are from the Cheviot Quarry South area.

Discussion of Results

The models shown in Illustrations 27 - 29 share the underlying assumption that the samples selected from postholes, hearths, and pits come from continuous phases of activities at each locus (i.e., at each structure), and that the morphologically similar pairs of structures are also from a similarly continuous phase of activity, but that the two structural-types are discontinuous in use. While the Bayesian models allow us to provide estimates for specific archaeological events, the truncated nature of the archaeological deposits only really allows us to provide estimates for the start of the use of individual structures and their minimum use-life along with minimum end dates, and minimum spans of activity.

Buildings 4 and 5

The model and results for the Roundhouses, Buildings 4 and 5, are presented in Illustrations 27 - 29. This model shows good overall agreement ($A_{overall}$=100.2%; A'=60.0%) and provides an estimate for the start of activity associated with the two dated Roundhouses of *1040–910 cal BC* (*95% probability*; Illus. 27; *start_Roundhouses*). The use of Building 5 is estimated to have started in *1020–910 cal BC* (*95% probability*; Illus. 27 and 28; *Building5 start*), and it was in use for a minimum of *1–150 years* (*95% probability*), and was likely in use *20–120 years* (*68% probability*). The use of Building 4 is estimated to have started in *1000–910 cal BC* (*95% probability*; Illus. 30 and 31; *Building4 start*), and it was in use for a minimum of *1–150 years* (*95% probability*), and was likely in use *30–120 years* (*68% probability*). Activity associated with the Roundhouses probably did not end before *920–810 cal BC* (*95% probability*; Illus, 27; *end_Roundhouses*) and lasted for a minimum of *1–200 years* (*95% probability*; Illus. 29), and probably for *40–160 years* (*68% probability*).

Buildings 1, 2 and 3

The model and results for the Rectangular Buildings 1 and 2, are shown in Illustrations 30 - 32. This model shows good overall agreement ($A_{overall}$=100.2%; A'=60.0%). The model estimates that activity associated with the two dated Rectangular Buildings began in *cal AD 360–550* (*95% probability*; Illus. 30; *start_Rectangular Buildings*). Building 1 was in use by *cal AD 410–550* (*95% probability*; Illus. 30 and 31; *Building1 start*), and for a minimum of *1–100 years* (*95% probability*), and was likely in use *1–40 years* (*68% probability*). The start of use of Building 2 is estimated at *cal AD 420–550* (*95% probability*; Illus. 30 and 31; *Building2 start*), and it was in use for a minimum of *1–140 years* (*95% probability*), and was likely in use *1–90 years* (*68% probability*). Activity associated with Rectangular Buildings 1 and 2 probably did not end before *cal AD 440–650* (*95% probability*; Illus. 30; *end_Rectangular Buildings*) and lasted for a minimum of *1–260 years* (*95% probability*; Illus. 32), and probably for *1–140 years* (*68% probability*).

Pottery

The Bayesian model for the pottery (Illus. 33) assumes a simple linear progression from Carinated Bowl to Impressed Ware, Grooved Ware, Beaker, and eventually Flat-rimmed Ware. It is generally understood that these typologies are not such that the pottery types would be chronologically distinct groups. The model shows clearly that there is an overlap between Impressed Ware, Grooved Ware, and Beaker at Cheviot Quarry.

The model has poor agreement ($A_{overall}$=0.0%). This is because of either the late date on a sherd of Carinated Bowl (OxA-16162) or an early date on a sherd of Impressed Ware (OxA-16099). If either result is excluded from the model, for reasons stated above, then the model does show good overall agreement. With the current data it is not possible to confidently determine that one or both results is incorrect, but these data are an excellent beginning to the development of an absolutely dated typological sequence for Neolithic–Bronze Age pottery in north-eastern England.

BOTANICAL MACROFOSSIL ANALYSIS

Ben Johnson

Methodology

Ninety-four features from the ARS Ltd excavation, comprising pits, hearths and postholes, were excavated by hand and all material excavated was processed on site by flotation. The bulk samples, of varying volumes from 10 to >100 litres, were sieved to five fractions (5mm, 2mm, 1mm 500 microns and 300 microns). Each fraction was bagged separately and assigned a unique sample number. All bagged material from each context was then bagged in one larger bag. 21 contexts were analysed by J Cotton and 20 contexts by B Johnson. Due to the absence of wetland areas at the site waterlogged plant remains would not be preserved. Non-charred material present in samples are not contemporary to the contexts and have not been analysed as these represent later intrusive material such as roots *etc*. All material was scanned at low magnifications using a Leica MZ6 microscope and identifications made with reference to modern material and published sources. The flot matrix of all samples was also recorded. For clarity, all material is discussed with relation to the context from which it derived and has been divided by period into Neolithic, Late Bronze Age and Dark Age. The period divisions have been ascribed based upon radiocarbon dating and ceramic associations.

Results

Results are tabulated in Table 8. Counts of all charred plant macrofossils were recorded. In one instance (Late Bronze Age Pit Fill 340), the very high abundance of cereal grains meant that the number present in the sample was derived by weight, by counting the number of cereal grains present in 25% of the sample and taking a mean weight that could be used to estimate the total number of each type of cereal grain present. The flot matrix in all samples was almost entirely charred wood fragments, with most containing rootlet material. The material varied in preservation quality, with some being very well preserved and some being highly abraded, suggesting it had been moved around prior to burial. This information is presented in Table 8 and has been taken into account in the discussion. The flots were generally very clean, with little adherence of fine silts.

Neolithic contexts

Artefact-rich pit F031 produced over 1000 charred hazelnut fragments, which included fragments over 5mm in size, suggesting the material was fresh when deposited. Five grains of wheat (*Triticum* sp.) were found in the basal fill, with the remainder, form both fills, being too degraded to allow identification. Artefact-rich pit F009 contained little charred material in its upper fill, although 23 charred hazelnut fragments and six degraded cereal grains were counted. The basal fill contained over 100 hazelnut fragments and 8 wheat (*Triticum* sp) grains along with 21 indeterminate cereal grains and 28 emmer wheat (*Triticum dicoccum*) spikelet fragments. Feature F2061 contained one hazelnut fragment and moderate amounts of charred wood. Pit F2133, outside Building 3 contained charred hazelnut shell fragments, some over 5mm in size, and charred wood, suggesting the material was fresh when deposited. Pit F2168 also contained charred hazelnut shell fragments although these were small and abraded, as was the small quantity of charred wood, suggesting movement of the deposit prior to burial, or that the material was washed or blown into the deposit. Hearth feature F2013 produced one charred hazelnut fragment and one indeterminate cereal grain. Charred weed seeds were only recorded in hearth F2005, and only in low numbers. These were dominated by grasses (*Poaceae* sp.), sedges (*Cyperaceae* sp.) and knotweeds (*Polygonaceae* sp.).

Late Bronze Age contexts

Cereal grains were the most common and abundant material, with most being barley (*Hordeum vulgare*). Well-developed hulled barley grains were frequent although some from the naked variety were noted. The small amount of chaff present (rachis segments) suggest that all were from the 6-row variety. In addition there was considerable numbers of grains of emmer wheat (*Triticum dicoccum*), and its chaff, particularly as glume bases and spikelet forks. Barley was recovered from almost every context in Building 4, with the exception of posthole F355 and F361 and shallow pit F375. The most significant quantities were recovered from large, artefact-rich pit F340 however, which contained around 4000 grains. Over 550 wheat (Triticum sp.) grains were found in the fills of large pit F340, with over 500 of those grains coming from the upper fill of that pit. Small numbers of wheat grains were also found in hearth F342, postholes F346, F348, F359 and F365, as well as pit F352. Glume bases and spikelets from emmer wheat (*Triticum dicoccum*) were also recovered from Building 4, predominantly from the upper fill of large pit F340 and it is suggested that the wheat grains found are therefore emmer, rather than spelt (*Triticum spelta*). An apple pip (*Malus* sp.) was recovered from posthole F346, a sloe stone (*Prunus spinosa*) from hearth F342 and small quantities of charred hazelnut were found in the uppermost fill of pit F340. Barley was also recovered in small amounts from postholes F312 and F489, forming the entrance porch to Building 5, and its internal hearth F314. No wheat grains were found in Building 5, but a glume base and a spikelet from emmer wheat (*Triticum dicoccum*) were found in the large entrance pit F491. Weed seeds were uncommon throughout contexts from Buildings 4 and 5. The seeds which were present were dominated by sedges (*Cyperaceae* sp.) and knotweeds (*Polygonaceae* sp.) with some grasses (*Poaceae* sp.). Few contexts produced more than a handful of any particular weed, and they are not thought to represent specific collection practices by human action, but are thought indicative of the local environmental context.

Dark Age contexts

None of the Dark Age contexts sampled produced any plant macrofossils, other than posthole F2131 in Building 3, which contained four barley (*Hordeum* sp.) grains. Only small amounts of abraded charcoal were recovered from these contexts.

Discussion

Neolithic

The two large artefact-rich pits F031 and F009 contained slightly different assemblages. F031 contained large amounts of charred hazelnut shells, which may have been used as fuel, or formed an important food source. The material in this pit also appears fresh, suggesting the deposit had been placed into the pit immediately after the burning episode. The small number of cereal grains recovered from this pit, coupled with the absence of chaff indicates the grain deposits were incidental and that the pit was not in proximity to, or used as, a grain store and food processing and its waste deposition took place elsewhere. F009 contained smaller numbers of environmental remains that F031, but did include some charred hazelnut shells, as well as emmer wheat spikelet fragments and glume bases, which represent the waste products from processing arable crops (Hillman 1981). The presence of chaff suggests that some of the deposit comes from the waste products from nearby cereal processing, and indicates the cultivation of arable crops for consumption at, or near, the site. Only F009 produced any chaff and may suggest that wheat processing was specific to this locality on the site. The absence of chaff from the upper fill may be a result of preservation conditions, or may suggest a reduction in the production and deposition of food processing waste in this area. The small numbers of plant remains from hearth F2005, thought to be Neolithic in date, are only from weed species, with no evidence of either domesticated or wild resources being harvested. The weeds seeds are very similar to those found in association with the Late

Bronze Age buildings, and are from a grassland environment, perhaps used for stock grazing. Pits F2133 and F2168, situated externally to Building 3, both contained charred hazelnut fragments. Those in F2133 were much better preserved than those in F2168 and suggest deposition in the pit immediately after the burning episode during which they were charred. They may represent the burning of nuts for fuel, or the accidental inclusion of nuts within the wood used as fuel. Conversely, and probably most likely, they represent food waste products. The fewer, more abraded charred hazelnut fragments from F2168 could represent different depositional or preservation conditions, and it may be that the material was blown or washed into the feature, which had a different function to that of F2133.

Late Bronze Age

Large volumes of barley and emmer wheat were recovered from almost all contexts in Building 4, as well as some barley, and a very small amount of emmer wheat chaff, being recovered from two postholes and the central hearth in Building 5. The plant remains associated with the Late Bronze Age buildings show clear evidence of arable agricultural practices. The much larger volumes were recovered from Building 4, in comparison to Building 5, may be due to differential preservation conditions, and Building 5 was more heavily truncated than Building 4. Alternatively there may have been less processing and deposition of cereal crops in Building 5, when compared to Building 4. The recovery of barley and emmer wheat grains, as well as emmer wheat chaff, from almost all the pits and postholes in Building 4 indicate significant processing of cereals within this building. The deposition of botanical macrofossils within the postholes is thought to have occurred during the use of the house, as suggested by experimental archaeology (Reynolds 1995). The deposition of the material within hearth F342 shows food processing activities around the fireplace. Pit F340 produced by far the largest concentration of macrofossils and given the presence of large volumes of broken pottery, as well as the broken quernstones, within this feature it is thought most likely that this pit contains domestic rubbish deposits. The well-preserved nature of the macrofossils is indicative of their being buried almost immediately after the burning episode during which they were charred, and that they were not moved around prior to deposition. The assemblage was dominated by barley, suggesting significant local cultivation of this cereal. Emmer wheat formed around 15% of the cereal assemblage again, suggesting significant local cultivation of this cereal, although in less quantities than barley. The small numbers of weed seeds are not thought to represent any deliberate harvesting of these plants, but were most likely accidentally incorporated into the assemblage during harvesting and processing activities. All are indicative of grasslands, probably representing areas of pasture for stock grazing, or present as weeds amongst the arable fields. The presence of a single sloe stone and a single apple pip, along with small number of charred hazelnuts, indicates the small-scale harvesting of wild resources.

Dark Age

The only plant macrofossils recovered from Dark Age building 3 were four barley seeds. These were heavily abraded and it was not clear whether they were from the hulled or naked variety. They most likely indicate local agricultural practices, but suggest that cereal processing and storage did not take place within the structures to any great extent.

COARSE STONE ARTEFACTS

Dr Clive Waddington

The coarse stone assemblage comprises a small number of artefacts all of which came from the northern area of the site. The artefacts came from a restricted number of features; these being the fills of one of the Neolithic artefact-rich pits (F009), one from a pit associated with Building 3 (F2133) and two quernstones from the fill of an artefact-rich pit (F340) inside one of the Late Bronze Age roundhouses (Building 4). Eleven coarse stone objects were recovered including two quernstones, one small rubbing stone, one hammerstone and a possible hammerstone, two whetstones, a shaped stone ball and a quartz nodule, a smoothed granite piece – possibly a roughout of some sort, and a group of degraded sandstone fragments.

Stone Ball

Stone balls are known from North-East England and include examples from Hetton to the east of the Milfield basin (Speak and Aylett 1996) and Houghton-le-Side in County Durham (Speak and Aylett 1996; Marshall 1977). The one reported here has quite clearly been intended to have six faces, which would place it in Marshall's Type 4a classification (1977), but a flaw in the rock has meant that two of the faces were damaged during the chipping process by too much being removed and the piece has then been discarded. Though unprepossessing in comparison with some of the more finely decorated specimens, this example is still important as it adds to a growing corpus of such artefacts from Northern England. Other isolated examples are known from Cumbria and Yorkshire. Identifying a use for such an object is problematic as they evidently have some kind of symbolic value rather than being tools designed for a manual task. Given their size they appear to be for holding in the hand, as far as human contact goes, but equally they could have been intended for display items perhaps intended for special placement within the home. Elaborately carved stone balls and related objects have been found in domestic settings, as at Skara Brae (Childe 1931), and so the presence of this ball in a pit filled with discarded domestic material does not mean this site has to be interpreted as a 'ritual' site. Rather it is in keeping with the site's interpretation as a predominantly residential site with domestic midden material purposely buried in the pits– though this is not to say that activities at the site did not include ritualised and symbolic behaviour.

Quartz Nodule

A single smooth white quartz nodule was found in the same pit as the stone ball. Being alien to the immediately surrounding geology this suggests that this piece may have been deliberately selected for inclusion in the fill of the pit. An interest in white quartz is well testified across Neolithic monuments in the British Isles and if this stone was intended as something deserving of deposition in this pit it would not be unusual given the wider interest in this rock type.

Whetstones

One whetstone came from the Neolithic pit that contained the stone ball and this has some chips evident on it. It is possible this whetstone may have been used as a smoothing stone in the manufacture of other stone tools and artefacts. The second whetstone is from Dark Age Building 3 and, given the date of these buildings, is more likely to be associated with sharpening metal objects.

Hammerstones

The quartzite hammerstone shows wear at both ends indicating its use in the process of lithic reduction. Being harder than flint the quartzite, which can be found locally, appears to have been specially selected for use in the knapping process. Other quartzite hammerstones are known from North-East England (e.g. Fig 27 in Waddington 2004, 18). The granite cobble, interpreted as a hammerstone due to its symmetrical ovoid shape, does not have obvious signs of wear so may have been new or unused.

Querns

The presence of quernstones from Late Bronze Age Building 4 indicates that grain was being grown nearby and processed into flour for use, no doubt, in a range of flour-based products. This supports the botanical macrofossil evidence from the same pit (see specialist report) which revealed that barley and wheat were both being cultivated close to the site.

LITHICS ANALYSIS

Dr Clive Waddington

Introduction

A small assemblage of chipped stone lithics totalling 93 pieces was retrieved from the various archaeological interventions at Cheviot Quarry. The Excavation work by MAP at the southern site produced a total of 16 chipped stone artefacts while a total of 9 lithics were retrieved from the various evaluation trenches by Tyne and Wear Museums Service in the northern and central area of the site. The excavation of the northern area by ARS Ltd produced a total of 68 chipped stone lithics. Most of the lithics came from the fills of features (66 pieces) while only a few (27 pieces) came from unstratified contexts. As a result of long term burial in feature fills the majority of the assemblage is in a good state of preservation with little evidence for any of the Neolithic pieces having developed patinas, and those that are broken have clearly broken in antiquity prior to deposition.

Method Statement

All lithics were washed on return to the laboratory and, after air drying, placed in labelled polythene bags. Measurements are given for complete pieces only in accordance with standard lithic recording conventions (Saville 1980). Colours are only recorded when the piece is not burnt or patinated. The lithics for each area are reported in separate catalogues below. All ARS Ltd contexts were dry-sieved through a 5mm mesh to maximise finds recovery and their remaining fills passed through a flotation tank and graduated brass sieves.

Discussion

Types

The chipped stone artefacts recovered from excavations at Cheviot Quarry can be broken down into their broad types. Table 13 below summarises these artefacts.

The range of flint tools is quite extensive for such a small assemblage and includes primarily Mesolithic pieces from the unstratified contexts such as the topsoil and top of the sand and gravel substratum and Neolithic pieces from the buried pit fills. The Mesolithic pieces include a variety of microlithic blade cores together with some small modified flakes and blades and an awl. The Neolithic material is more wide-ranging and together with the usual flakes and blades, the latter being frequently parallel-sided, includes an oblique arrowhead and the tip portion of what appears to have been a leaf-shaped arrowhead, together with a possible awl, a knife and an assortment of other modified blade tools including one of which has been used as a double-ended composite tool (find 197, northern area) and two classic Neolithic end scrapers (finds 2 and 14 from the southern area). Most of the other pieces are blades of one form or another but there are also occasional flakes and chips, much of which is debitage.

Flaking and Manufacture

The lithics from the Neolithic features on the site are characterised by a parallel-sided blade tradition. The employment of a blade-based technology has been noted on Neolithic sites elsewhere in Northumberland (e.g. Waddington 2000; 2001; 2004; Waddington and Davies 2002). However, in contrast to the Mesolithic blade tools the Neolithic blade material tends to be larger and made on better quality flint, some of which appears to be nodular and imported into the region. The Mesolithic pieces are characterised by their microlithic size, and the microlithic size of blade scars on cores, as well as by comparison with types such as those found in the securely dated assemblage from the Howick Mesolithic hut (Waddington in press).

The flaking scars indicate the use of hard and soft hammers to knap the flint as well as evidence for the use of indirect percussion using a punch. The use of hard hammers is confirmed by the presence of a quartzite hammerstone in pit F009 (northern area) which has wear on two of its opposed ends. In Northumberland it is rare to find a knapping implement directly associated with a period-specific flint assemblage. The quality of the waste flakes reveal experienced workmanship, however most of the working on site appears to be associated with the finishing and maintenance of tools with very little evidence for primary chipping which appears to have taken place elsewhere.

Raw Material

The raw material comes from diverse sources including boulder clay flint, recycled chipped and patinated flints, and imported nodular flint. The speckled grey boulder clay flint could be from a local source, but given the size of some of the pieces it is thought more likely that some of this material could have been imported from North East Yorkshire where good quality light grey flint can be found in the boulder clay (Young 1984). The nodular flint has evidently travelled a considerable distance from its primary source to arrive in the Milfield plain. The closest source of nodular flint is that from the Wolds which lies over 160km to the south.

The non-flint raw materials can all be obtained locally in the river gravels, screes and boulder clays of the surrounding landscape. However, the flint material is varied in colour and quality suggesting a variety of sources. The occurrence of at least 2 nodular flints is important as this indicates wide-ranging contacts and shifting of bulky and heavy goods over substantial distances from the nearest source in the Yorkshire Wolds. Some of the flint is from secondary sources such as boulder clays, gravels and the beach.

The assemblage includes pieces made from the following materials (Table 14):

The lithic industries represented by the assemblage include a small element of Mesolithic material based around the use of locally available (usually non-flint) materials (i.e. agate and chert) and their chipping into small, stubby, blade forms. The Neolithic industry on the other hand is based primarily around the working of flint to produce larger blades and blade-based tools together with some flakes.

The lithics add an important dimension to the Cheviot Quarry site as the presence of Mesolithic cores and scrapers testify to activity on this site prior to the Neolithic. The Mesolithic cores from the excavations in the northern area are from an unstratified horizon (subsoil) whereas the scraper (ARS Ltd small find 1) is from a posthole in building 1, so the latter is likely to be residual and the same is also the case for the scraper (ARS Ltd small find 78) from a structural slot [F037] that forms part of the possible freestanding Neolithic structure in the northern area. A retouched bladelet, that is probably a microlith fragment (ARS Ltd small find 88), is from an indisputably Neolithic pit and so this is also likely to be residual. The scraper (ARS Ltd small find 14) is from pit F2063 which lies away from the buildings and could suggest that this feature is in fact Mesolithic or it could be a residual artefact in a later feature. Only AMS dating could test whether this latter feature belongs to the Mesolithic. Two single entity charred wood samples were recovered from this context.

It is perhaps surprising that given the quantity of ceramics recovered a greater number of flints were not found in the Neolithic deposits. This suggests that greater attention may have been given to the disposal of ceramic material relative to lithics, probably because broken pots are more difficult to repair or re-use than a broken flint tool. Furthermore, the lithics and coarse stone objects found in the pits were usually broken or flawed, and this is paralleled by the find of a broken stone axehead in a pit at the Bolam Lake Neolithic settlement (Waddington and Davies 2002). Although objects that could have symbolic and ritual connotations were found in Pit F009 (carved stone ball, possible macehead roughout, whetsone), these artefacts are discarded roughouts and flawed pieces. Therefore, it is inappropriate to assume that the presence of these objects necessarily indicate a 'ritual' site. Instead, the presence of these flawed pieces, deposited with a hammer stone and smoothing stone, indicates the *production* of objects that may have been used in either day to day or 'ritual' activities took place on the site. Bearing in mind that spiritual, ritualised, and symbolic behaviour will have transcended many of the daily routines of these early farmers, settlement sites should be considered as much an arena for ritualised discourse as a place for residence. What marks a settlement site out as different from a ceremonial, religious or burial site is that the main purpose of the site is focused towards a particular behavioural realm; that of residency. It is clear that when this is taken into account labels such as 'settlement' and 'ritual' site are somewhat inadequate as they provide a grossly simplistic characterisation of more complex human behaviour. The types of coarse stone material present on the site, and their nature of deposition, points more towards the disposal of artefacts flawed in production rather than special deposition within a ritual setting. As such, the presence of these objects on the site do not detract from interpreting the site as one primarily used for settlement, though this is not to say that aspects of behaviour on this site did not have a ritual or ceremonial dimension. This finds support in the comparable situation at the Bolam Lake settlement referred to above, and also by the use of similar objects at other Neolithic 'village' sites such as Skara Brae (Childe 1931; Piggott 1954, 330-32) and the other Orkney settlement sites.

Apart from the coarse stone objects from Pit 009 the flint assemblage is a purely functional and utilitarian set of material. The range of tools, including a variety of blade tools, an awl and a knife indicate that a range of activities took place across the site. The range of blade tools present in the Neolithic assemblage are indicative of general processing activities while the arrowheads may have been manufactured on site for use elsewhere. The relative paucity of debitage indicates that, although stone tool production clearly took place, most of the primary chipping took place elsewhere. The lack of cores suggests that at least part of the knapping process may have taken place elsewhere from the site. Indeed the complete absence of primary waste is important in this regard as it indicates two things: 1) that the primary working took place away from the settlement site, presumably at or near the source of the raw material, and that 2) flint densities are going to be higher at the source/knapping sites than at settlements away from the source area. This finds support in the generalised model put forward by Schofield (1991, 119) based on his work in Hampshire, that at settlement sites there should be a high proportion of tools and a low proportion of primary waste (see Table 3 below) and this is certainly the case at both the northern and southern area Neolithic sites at Cheviot Quarry.

Some of the lithic pieces comprising the Neolithic assemblage are chronologically diagnostic such as the arrowheads, end scrapers and blade tools. However, the problem of dating Neolithic tools in Northern England is compounded by the fact that there are very few dated assemblages of Neolithic flintwork in this region, and so recognising datable signatures relies on noting the presence of just a few universal artefact types. What is more, in the case of Northern England, those few assemblages that are dated are small, consisting of just a handful of flints (e.g. Waddington and Davies 2002).

The vast majority of the lithic assemblage originally associated with this site will have lain within the topsoil and this horizon has been heavily disturbed by earlier ploughing, the construction of the airfield buildings in the northern area and finally by its complete removal by machine during the surface strip. Therefore, the importance of the topsoil for hosting archaeological remains such as flints and a record of past Stone Age activity should not be overlooked.

CERAMIC ANALYSIS

Dr Clive Waddington

Introduction

A substantial assemblage of prehistoric pottery was recovered from pit features in the north, central and south areas of Cheviot Quarry. In the northern area the Neolithic pits produced mostly Early Neolithic Carinated Bowl pottery allied to the Grimston Ware tradition, together with a small amount of Grooved Ware pottery. A further 9 sherds and 43 fragments of Impressed Ware (Meldon Bridge sub-style) pottery were found during evaluation trenching by Archaeological Services, University of Durham also in the northern area. The latter pottery has been published previously (Waddington 2000) and it provides an important link in the sequence from Carinated Bowl to Grooved Ware in this part of the quarry. Elsewhere on the northern site the two Late Bronze Age roundhouses produced an important assemblage of Flat-Rimmed Ware material, primarily from internal pits and hearths, with a few additional sherds found in posthole fills.

In the central area fieldwork by Tyne and Wear Museums Service uncovered a small dispersed group of pits that contained Early Neolithic Carinated Bowl fragments. In the southern area fieldwork by MAP led to the identification of a large group of Neolithic pits and associated features. Some of these were excavated producing a sequence of Neolithic pottery that included Carinated Bowl and Plain Ware sherds, Impressed Ware, Beaker and other Late Neolithic-Early Bronze Age ceramic (MAP 2000). Some vessels referred to in the original pottery assessment for the MAP intervention no longer exist in the artefact archive and this includes sherds from a single vessel in each of features F7 (context 1018) and F207, and three supposed early Beaker vessels, including two cord decorated Beakers (AOC) and a comb decorated vessel from feature F254. These missing sherds are not discussed further in this report.

Evaluation trenching by Tyne and Wear Museums Service, also in the southern area, revealed a pit that contained fragments of several carinated vessels. A further 28 sherds of Carinated Bowl pottery were recovered from a pit in an evaluation trench excavated by Archaeological Services, University of Durham in this part of the quarry, and these have been published in full elsewhere (Waddington 2000).

Together, the ceramic assemblage from Cheviot Quarry forms one of the largest collections of Neolithic pottery so far recovered in Northumberland numbering over 400 sherds in total and representing 108 pots; the only assemblage that has produced a similar quantity being the excavations at nearby Thirlings (Miket 1987). Likewise, the assemblage of Late Bronze Age Flat Rimmed Ware is also substantial comprising 136 sherds that represent at least 42 individual pots.

Method Statement

The pottery recovered by ARS Ltd from the northern site was taken directly from the excavated deposits and placed in acid-free paper before being individually bagged and labelled. On return to the laboratory the pottery was left to air dry before being lightly brushed with a soft sable shaving brush to remove excess soil. The sherds were laid out by context and then individually analysed and grouped into distinct pots on the basis of size, fabric and form. No further cleaning or washing was undertaken so as to allow for the possibility of residue analysis.

The sherds recovered by MAP from the southern site have in some cases been cleaned in water and then air dried. They were then placed in acid-free paper before being bagged and labelled, sometimes with several sherds to a bag. None of the sherds were ascribed individual find numbers.

The finds recovered by Tyne and Wear Museums Service have, for the most part, been cleaned in water and then air dried. They were then placed in acid-free paper before being bagged and labelled. Not all sherds were ascribed individual find numbers.

Neolithic Pottery

Early Neolithic Ceramics

The sherds comprising the Early Neolithic ceramic assemblage display the typical attributes associated with Carinated Bowls and related pottery including a well-fired highly burnished fabric, everted rims, carinations, occasional upright shoulders, an absence of decoration and in many cases an open and shallow profile (Gibson and Woods 1997, 175-8). Although earlier commentators have attempted to distinguish 'Grimston Ware' from other types of Early Neolithic carinated vessels, such as Heslerton Ware (Piggott 1954, 114) and Towthorpe Ware (Manby 1964; 1975), the most recent review of this pottery type sought to differentiate between Carinated Bowls, most similar to the Grimston Ware from the type site at Hanging Grimston, and Shouldered Bowls which have an upright shoulder and carination on the upper part of the vessel (Herne 1988). The majority of the Early Neolithic ceramic material from Cheviot Quarry fits into the Carinated Bowl class as defined by Herne (1988) and the original Grimston Ware class as defined by Piggott (1954, 114). From the southern area of the site there are occasional examples of what Herne has termed Shouldered Bowls as well as Plain Ware vessels that have no shoulder or carination but rather an upright body with plain rounded rim.

Fabric

The Early Neolithic fabrics all contain crushed stone inclusions as an opening agent. These inclusions have clearly been specially prepared for the purpose and are usually made out of either sandstone or quartz. The fabrics are, generally, evenly fired throughout making the pots strong and durable. Both thick and thin-walled vessels are evident with most of the material ranging between 4mm and 10mm in thickness. Pitted surfaces are common where organics have burnt out during the firing process. The consistent colouring on most pots indicates an even firing process which is likely to have taken place in a reducing atmosphere given the dark colour of many of the sherds. Seed impressions can also be seen. The pots are finely made and have a very highly burnished finish on both the inner and outer surfaces, with grass-wiping common. A few of the rougher pots, from the southern area of the site, have crushed stone inclusions erupting from the surface indicating vessels that have been less-well finished than the very highly burnished vessels from the northern area of the site. A number of the sherds have fractured along coil lines revealing the method by which the pots were constructed.

Form

The vessels are mostly of carinated bipartite form usually, though not always, with a slack shoulder. They range in size from large storage/cooking vessels to small bowls. The sherds from Pot 1 (ARS Ltd intervention) are a little unusual in that they appear to have some lightly incised horizontal linear drag lines on their outer surface. Decoration is unusual, though by no means unique, on Early Neolithic ceramics from northern England. There is a good example of a lugged vessel from the southern area assemblage (Pot 6 MAP intervention). The Cheviot Quarry sherds are from vessels of different sizes including some of substantial proportions (e.g. pots 18 and 28).

Numbers

A total of 79 Early Neolithic vessels could be identified. Thirty three of the pots (148 sherds) came from the fills of two pits; F009 and F031 in the northern area. No certain matches could be made between sherds or pots from different pits, although some sherds from the same pot were found distributed between the upper and lower fills of the same pit (e.g. Pots 1 and 3 in pit F009). Pit F009 contained 21 pots, pit F031 contained 11 pots.

Impressed Ware

No Impressed Ware was recovered from the northern area of the quarry site during the interventions reported here, although a small assemblage of Impressed Ware related to the Meldon Bridge sub-style was recovered during evaluation trenching in this area by

Archaeological Services, University of Durham and has been published elsewhere (Waddington 2000). Finds of Impressed Ware are relatively rare in Northumberland and their chronology and use remains perhaps the most poorly understood Neolithic ceramic type in the region. The sherds from Cheviot Quarry show a distinctive coarse fabric from substantial vessels with roughly burnished surfaces, sometimes unevenly fired and with typical fingernail, comb and stab decoration. The rims are distinctive and include flattened 'T' profiles, bevelled rims and large rounded rims – all of which can be richly decorated on their outer, upper and inner lips.

Fabric

The Impressed Ware ceramics have a distinctive fabric being hard, thick-walled, sometimes fairly coarse pots of varying size. They have been made using the coil technique and contain large prepared, angular, crushed stone inclusions as well as sand in some cases. They can be evenly or unevenly fired and the stone inclusions can often be seen erupting on the inner and outer surfaces.

Form

As with Impressed Ware ceramics from elsewhere in the British Isles the material form this site indicates vessels with flat, and occasionally, rounded bases. The base sherd from Pot 1 indicates a flat-based vessel with rounded decorated rim, while the rims from Pots 2 and 3 indicate vessels with 'T' profile rims and flattened rims respectively. The body sherds give the impression of some having slightly rounded profiles while others (e.g. Pot 1) having a more flower pot-shaped profile. This range of Impressed Ware material is in keeping with other sherds of this ceramic tradition from the region including those from Thirlings (Miket 1987), Yeavering (Ferrel 1990), Crookham (Leeds 1927; Longworth

1969; Miket 1976), Redscar Bridge (Leeds 1927; Miket 1976), Kyloe Crags (Tait 1968), Alnwick (Leeds 1927), Elson (Tait 1968) and Allendale (Tait 1968).

Numbers

A total of 4 Impressed Ware pots can be identified from the southern area, however, this may underestimate the actual number somewhat as several of the unattributable vessels from the southern area interventions could also belong to this tradition (see additional catalogue below).

Grooved Ware

The only Grooved Ware recovered from the site came from the northern area. Finds of Grooved Ware are relatively rare in Northumberland and their chronology and use remains poorly understood (see Gibson 2002). The sherds from Cheviot Quarry show clear evidence for grooved decoration on the outer surfaces, and in one case on the inner rim bevel (Pot 2), while fingernail impressions are present on two sherds from pots 5 and 6.

Fabric

The Grooved Ware ceramics are from well-made, fairly coarse, pots of varying size. They have been made using the coil technique and contain prepared crushed stone inclusions. They show evidence of having been evenly fired and burnt out organics can sometimes be noted.

Form

The base sherd from Pot 2 indicates flat-based jars while the rim sherd from the same pot indicates vertical rims. The body sherds tend to be straight-sided along the vertical axis. This evidence points towards fairly substantial bucket-shaped vessels. The unusually shaped and decorated sherd from the TWMS intervention indicates an open dish vessel, perhaps with a rounded base, with a plain rounded rim but with tightly spaced parallel groove decoration running from the rim towards the base. The grooved decoration and suggestion of lozenge motifs on the decoration of some sherds implies parallels with Smith's 'Clacton' style (Smith 1956), whereas the fingernail impressions on pots 7 and 8 recall Smith's Woodhenge style, and the near-vertical internal bevel on pot 2 is suggestive of Durrington Walls style. This range of Grooved Ware styles is in keeping with the styles known to be present in the Milfield basin as, in Gibson's recent review, these styles are also present at the nearby sites of Old Yeavering, Ewart 1 pit alignment, Redscar Bridge and Milfield North (see Gibson 2002 for site reviews).

Numbers

A total of 9 Grooved Ware pots can be identified comprising 17 sherds. Pit F2133 contained four pots, Pit F2168 two pots, pit F2061 one pot and Pit F163 one pot. Pot 1 from the TWMS intervention came from the unstratified topsoil horizon from an evaluation trench.

Beaker and other Late Neolithic - Early Bronze Age ceramics

The only Beaker and other Late Neolithic-Early Bronze Age ceramics recovered from the site came from the southern area. Although most of this material is undoubtedly Beaker ceramic there are some vessels present (4, 5 and the unattributable) that do not fit easily into the Beaker tradition despite coming form the same contexts as some of the other undoubted Beaker material. Consequently the term 'other Late Neolithic - Early Bronze Age ceramics' has been used in this section. It is also worth noting that sherds from two early cord decorated Beakers (AOC) and a comb decorated Beaker were found in pit F254 during the MAP intervention and they are reported in the assessment undertaken by Terry Manby. However, these sherds are missing from the archive and so are not included in the catalogue below.

Fabric

The Beaker ceramics are well-made pots with prepared fine inclusions of stone, quartz and sand with thin-walls that have been evenly fired. They have been made using the coil technique and contain prepared crushed stone inclusions. They show evidence of having been evenly fired and burnt out organics can sometimes be noted.

Form

The large undecorated Beaker (Pot 1), which falls more towards a long neck classification rather than a short, has virtually all its component sherds present, having fractured in the ground due to soil pressure. The other beaker vessels are represented only by small fragments of rim and body sherds and it is difficult to reconstruct the pot profiles from these tiny sherds. However, there is evidently a wide range of decoration present including comb impressions, grooves forming lozenges and triangles for zoned decoration, cord and fingertip decoration as well as the presence of cordons. The amount of decoration observable from the small sherds recovered show similarities with the wider corpus of Beaker ceramics from Northumberland with zoned decoration and use of geometric patterns formed by grooves, jabbed and fingernail impressions as well as the presence of cordons (for comparanda see Tait 1965). There is no cord decoration apparent on any of the sherds reported here though this does not mean that it did not exist on the rest of the pot surfaces. Little can be said in relation to decorative styles due to the small size of the surviving sherds with decoration.

Numbers

A total of five Beaker and related vessels are present (Pots 1, 2, 3, 6 and 7) together with two other Late Neolithic – Early Bronze Age vessels (Pots 4 and 5) and one unattributable vessel. Two beakers and the two Late Neolithic – Early Bronze Age vessels and the unattributable vessel came from pit F219. The complete Beaker came from pit F102 whilst two other probable Beakers (Pots 6 and 7) came from pit F310.

Unattributable Pottery

Later Prehistoric Pottery

Flat Rimmed Ware

Although the term 'Flat Rimmed Ware' has in the past been used to refer to coarsewares dating from the third to first millennia cal BC (Coles 1970, 97), it is used here specifically to refer to an assemblage comprising predominantly flat-rimmed vessels that date to the late second and early first millennia cal BC as Hedges outlined sometime ago (Hedges 1975, 69). As Hedges stated, the term Flat Rimmed Ware is really a reference to what are "simple, crude, bucket and barrel shaped pots", although it is probably unfair on the potters of this utilitarian coarseware to label it as "the lowest common denominator of bad pottery" as Piggott described it in the 1950's (Piggott 1955, 57). All the Flat Rimmed Ware sherds in this assemblage, with the exception of one sherd from the topsoil in the southern area, were recovered from the two Late Bronze Age roundhouses in the northern area of the site with the majority of sherds coming from pit F340 inside Building 4. The sherds display the typical attributes associated with Flat Rimmed Ware pottery including flat, but also bevelled and flared rims, coarse fabric, a mixture of evenly and poorly fired vessels, an absence of decoration and a mixture of bowl, situlate (barrel), bucket and flower pot-shaped vessels (see Feacham 1961, 83-4; Jobey 1978, 85-7; Gibson and Woods 1997, 156-7). Cordons and grooving, though present in some regional assemblages of this period such as those from Green Knowe (Jobey 1978), Dalnagar (Coles 1962) and Culbin Sands (Coles and Taylor 1970), are only occasionally found amongst the assemblage. This somewhat featureless ceramic material is the principle pottery of the middle to late Bronze Age outside Deverel-Rimbury and Trevisker areas and is typical in North-East England and Eastern Scotland where it has been found at other sites such as Green Knowe (Feacham 1961; Jobey 1978), Standrop Rigg (Jobey 1983) and Lookout Plantation (Monaghan 1994), the latter lying less than 8km north-west of Cheviot Quarry.

Fabric

The fabrics all contain coarse, crushed sandstone inclusions, some of which erupt on both surfaces, as an opening agent. These inclusions have clearly been specially prepared for the purpose and are made out of either sandstone or quartz. The fabrics are usually evenly fired throughout making the pots strong and durable. Both thick and thin-walled vessels are evident with most of the material ranging between 4mm and 13mm in thickness. Pitted surfaces are common where organics have burnt out during the firing process. The consistent colouring on most pots indicates an even firing process which is likely to have taken place in an oxidising atmosphere given the bright orange colour of many of the sherds. The surfaces are generally orange-brown in colour with the cores being usually a darker brown to black, though in some cases the entire fabric is orange-brown throughout. The pots are coarsely made, though some have a burnished finish on both the inner and outer surfaces, with grass-wiping common. A number of the sherds have fractured along coil lines revealing the method by which the pots were constructed.

Form

The vessels are all hand built and are of bowl, situlate or bucket shape typically with upright flat rims or slightly rounded rims. Occasionally rims with internal bevels are present and there are a few examples of slightly more developed rims which, though still flat, flare out beyond the wall of the vessel. They range in size from large storage and cooking vessels to small bowls. The sherds are from vessels of widely different sizes including some of substantial proportions (e.g. Pots 1, 5, 6, 20, 21, 22, 23, 24 and 27). The presence of burnt carbon encrustations on a number of sherds indicates the use of these vessels for cooking purposes (see also residue analysis).

Numbers

About 137 sherds of Flat Rimmed Ware pottery were found with around 42 different vessels represented. Thirty one of the 38 pots from Building 4 came from the various fills of pit F340, whilst three vessels were present in the more truncated deposits from Building 5. No certain matches could be made between sherds or pots from different pits, although some sherds from the same pot were found distributed between the upper and lower fills of the same pit (e.g. pots 21 and 23 in pit F340).

CARBONISED RESIDUE ANALYSIS BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY, BULK STABLE ISOTOPES AND COMPOUND SPECIFIC-COMBUSTION ISOTOPE RATIO-MASS SPECTROMETRY.

Dr Ben Stern

Molecular and isotopic analyses have been undertaken on a total of 54 ceramic sherds and selected associated soils. The sherds are from Cheviot Quarry, Northumberland (UK) and have been dated by typology and radiocarbon dating to the early, mid and late Neolithic (Carinated Bowls, Impressed Wares and Grooved Wares), Late Neolithic/Early Bronze Age (Beaker) and Late Bronze Age (Flat-Rimmed Ware). Molecular analysis has been used to examine lipids present in visible organic residues (where present) and ceramic absorbed lipids from the interior and exterior surfaces of each sherd, in order to determine vessel use and function. Isotopic analysis of both the bulk visible residues and compound specific analysis of the $C_{16:0}$ and $C_{18:0}$ fatty acids has been used to distinguish ruminant dairy and ruminant/non-ruminant adipose fats.

Methods

Sample preparation

Where present, scrapings of any adhering visible residues were taken from the surfaces of the sherds. Sub-samples of the ceramic (between 0.1 and 0.3 g) were also removed to a depth of 2mm from both the exterior and interior surfaces of each sherd with a *Dremmel* electric drill fitted with a tungsten abrasive bit. The interior/exterior was determined by the sherd curvature.

Preparation for Gas chromatography-mass spectrometry (GC-MS)

These samples were extracted with three aliquots of ~3 ml DCM:MeOH (dichloromethane:methanol 2:1, v/v), with ultrasonication for 5 min. The solvent extract was transferred to a clean glass vial. The solvent was removed under a stream of nitrogen. Excess BSTFA (N, O- bis(trimethylsilyl)trifluoroacetamide) with 1% TMCS (trimethylchlorosilane) (*Pierce*) was added to derivatise the sample. An additional drop of DCM was added to ensure thorough mixing of sample and reagent, and the sample was left overnight. Excess derivatising agent was removed under a stream of nitrogen. The samples were diluted in DCM for analysis by GC-MS. A modern pot (previously solvent extracted) was also analysed using the same method as the samples.

Preparation for Gas chromatography-combustion isotope ratio-mass spectrometry (GC-CIR-MS). Method adapted from Dudd et al. (1999) and Mottram et al. (1999*).*

Selected sherd powders (from the interior surfaces) and visible residues were solvent extracted as described above. The solvent was removed under a stream of nitrogen. The lipid extracts were then saponified by heating with 4 ml 5% aqueous methanolic NaOH (5% NaOH in 95:5 methanol:deionised water v/v) for 2 hours at 70°C in closed vials. Once cooled, the samples were acidified using approximately 20 drops concentrated HCl (checking the samples are acidic). The solvent soluble portion was the extracted with 3x 2ml hexane, again evaporating to dryness with gentle heat and a stream of nitrogen. The saponified lipid extracts were then methylated using 2ml boron trifluoride (BF_3) methanol complex per sample and heated in a closed vial at 70 *°C* for 1 hour. The resultant fatty acid methyl esters (FAMES) were extracted using 3x 2ml hexane and evaporated to dryness. 2ml of DCM was added to each sample and either allowed to stand or shaken gently to dissolve the FAMES. A 400 µl sub-sample was transferred to a clean vial and evaporate to dryness for analysis by GC. The remainder of the sample was transferred to a clean vial, evaporated to dryness and stored in freezer prior to GC-CIR-MS analysis.

Instrumental

Gas chromatography-mass spectrometry (GC-MS)

Analysis was carried out by combined gas chromatography-mass spectrometry (GC-MS) using a Hewlett Packard 5890 series II GC connected to a 5972 series mass selective detector. The splitless injector and interface were maintained at 300°C and 340°C respectively. Helium was the carrier gas at constant inlet pressure. The temperature of the oven was programmed from 50°C (2 min.) to 340°C (10 min.) at 10°C/min. The GC was fitted with a 15m X 0.25mm, 0.1μm OV1 phase fused silica column (MEGA). The column was directly inserted into the ion source where electron impact (EI) spectra were obtained at 70 eV with full scan from m/z 50 to 700.

Bulk stable isotopes δ 13C and δ 15N (IR-MS)

Pressed tin capsules (5 x 9 mm) were used, into which approximately 1 mg amounts of samples were weighed. Samples were flash combusted in a column containing Cr2O3 and silvered cobalt (I) oxide held at a temperature of 1020°C and the resultant gases reduced in a column of elemental copper at 680°C then passed through a water trap of magnesium perchlorate before being separated by the GC column prior to introduction to the MS (Europa 20/20).

Gas chromatography-combustion isotope ratio-mass spectrometry (GC-CIR-MS) of the major fatty acids ($C_{16:0}$ and $C_{18:0}$).

Analysis was carried out by Dr. Andy Stott of the Centre for Ecology & Hydrology, Lancaster, UK. Originally 20 samples were selected for GC-IR-MS, however after sample preparation and confirmation of correct derivatisation by GC it was found that only fourteen of these samples contained sufficient $C_{16:0}$ and $C_{18:0}$ for analysis. Samples were determined in duplicate. The error on the fatty acid methyl ester standard which were analysed 'in batch' was better than 0.2 per mil for both $C_{16:0}$ and $C_{18:0}$. As the fatty acids are derivatised with an extra carbon we needed to take account of this (the results are presented as corrected values). The $\delta^{13}C$ value of the methyl group carbon was determined as -44.67 ‰. Values for archaeological samples are corrected using the formula: $C_{16:0}$ = (16 chain length FA + 1 extra from methyl group) x (measured $\delta^{13}C$ value of compound by GC-CIR-MS) - ($\delta^{13}C$ of BF_3) divided by number of original C atoms in fatty acid chain (i.e. 17 x (Deriv fame value) - (-44.67) / 16 For the C18 = 19 x deriv fame value - (-44.67) / 18)

Results and Discussion

Molecular results: Gas chromatography-mass spectrometry (GC-MS)

Typical examples of the GC-MS results are shown in Illustration 34. Due to the large number of samples the molecular data is summarised in Table 29 which includes the sherd type and interpretation of the recovered lipids.

The solvent extracts from selected soil samples yielded a range of fatty acids, *n*-alkanes and alcohols. However, the distribution was dissimilar to those of the sherd samples and therefore contamination from the burial matrix can be excluded. In addition, the modern pot which was used to examine contamination during sample preparation and analysis yielded only trace levels of fatty acids. These are ubiquitous compounds and despite the precautions used to avoid contamination their presence at such low abundances is not unexpected. Almost all the samples yield a number of compounds called phthalate plasticisers (labelled as P, Illus. 34); these are modern synthetic compounds and are associated with leaching from plastics. In addition, a number of known analytical artefacts (labelled as x) were identified. All these components do not represent significant contamination and do not interfere with the interpretation of the extracts from the samples.

Overall a wide range of lipids were extracted from the archaeological sherds and the general preservation of the organic residues was very good, although there was evidence of degradation of some lipids. For the interpretation of vessel use, the presence of mono-, di- and triacylglycerols was used to indicate the presence of an oil/fat. When these biomarkers were not present, but significant abundances of fatty acids were recovered from the vessel, this was interpreted as containing a degraded oil/fat. Based on a degraded fatty acid or acylglycerol distribution, it is not possible to identify the source any further (i.e. to distinguish animal fat from plant oil). However, the sterol cholesterol was used to identify the presence of an animal input and the absence of squalene was used to confirm that cholesterol had not been introduced as contamination due to recent handling. Phytosterols were used to indicate the input of plant materials. Molecular evidence that the vessel was used for heating was based on the presence and distribution pattern of odd numbered ketones, which are known to be derived from the heating of oils in ceramic vessels to temperatures in excess of 300°C (Evershed *et.al.*. 1995; Raven *et.al.*. 1997). Beeswax was tentatively identified from the presence and distribution of *n*-alkanes, long chain alcohols and wax esters (e.g. Heron *et.al.*. 1994; Evershed *et.al.*. 1997; Regert *et.al.*. 2001). Levoglucosan was extracted from one sample this molecule is a marker for burning biomass, in particular cellulose (Simoneit 2002). This could originate from the fuel used for heating, or from the burial matrix which for some samples is known to contain burnt remains.

141 archaeological samples were analysed by GC-MS for this study (including soils, visible residues, exterior and interior ceramic absorbed). Of these, 58 (41%) yielded no lipid, 30 contained a degraded oil/fat (with an additional 18 possibly containing degraded oil/fat (a total of 37%)), 22 (16%) had molecular evidence that the vessel was used for heating, 10 had biomarkers indicating the fat was an animal source, 2 contained an animal/plant mixture and 2 possibly contained beeswax. When the same data is examined 'per sherd' the majority of the lipids are extracted from the interior 2mm of each vessel. Where lipids are extracted from the interior 2mm only (and not from the exterior), contamination from the burial environment as a source of the lipids can be excluded and the lipids can be considered to represent the content of the vessel. In addition to the interior surface, lipids were also extracted from the exterior surface – this

can either be attributed to overspill from the vessel or to migration of the vessel contents through the ceramic.

Results for bulk stable isotopes (IR-MS) and gas chromatography-combustion isotope ratio-mass spectrometry (GC-CIR-MS)

For bulk stable isotope analysis 20 visible residues were selected for their potential to contain preserved organic material. Bulk analysis determines the combined isotopic value of the sample which may itself be very heterogeneous in its composition, for example containing a mixture of lipid, carbohydrate and protein, each component having its own isotopic signature. All these samples were visible residues adhering to the surfaces of the sherds and many were also selected for radiocarbon dating. For these samples the recovered carbon varied between 2 and 44%, indicating that the majority of the visible residues were not organic material and that they were highly heterogeneous. In addition, the yields of nitrogen were all less than 5%, making the $\delta\,^{15}N$ values unreliable and therefore they are not interpreted any further. The low nitrogen yields do however exclude the presence of protein in these samples. The bulk $\delta\,^{13}C$ values ranged from -30.6 to -26.1‰ with an average of -27.5‰. This is typical of a terrestrial C3 environment, and although only a crude measure, can be use to exclude a marine input which would be expected to have more positive values.

Fourteen samples containing sufficient $C_{16:0}$ and $C_{18:0}$ fatty acids for analysis were selected for compound specific analysis (Illus. 35). Previous work has shown that when the characteristic lipid distributions have been lost by degradation it is still possible to assign sources based on the carbon isotopic values of the principle fatty acids. This is due to differences in the biosynthesis and routings of these components and has been used to distinguish ruminant dairy, ruminant adipose and porcine adipose fats amongst others (e.g. Dudd *et.al.*. 1999; Mottram *et.al.*. 1999; Evershed *et.al.*. 2002; Copley *et.al.*. 2005a; Copley *et.al.*. 2005b). Corrections for derivatisation and the modern burning of fossil fuels have previously been applied (Evershed *et.al.*. 2002) and therefore make the two data sets directly comparable. Illustration 35 shows it is easily possible to exclude sources such as pig, fish, goose, deer, chicken *etc* (although the number of data points for these modern samples are limited and therefore the true natural variability is not known).

Illustration 36 shows a more detailed plot of the same data as in Illustration 35. Five samples; 51/65 (Carinated Bowl, 4348 BP), MAP1V (Beaker, Late Neolithic/Early Bronze Age), 224222 (Carinated Bowl, Early Neolithic), and the mean value of samples 5134 (Carinated Bowl, 4348 BP) and 306/406 (Flat-Rimmed ware, Late Bronze Age), all plot within the area defined by modern cows milk. Two samples; 306413 (Flat-Rimmed ware, Late Bronze Age), 52123 (Carinated Bowl, Early Neolithic) are within the overlapping isotopic values of cows milk and cow adipose fat. Sample MQ219 (Beaker, Late Neolithic/Early Bronze Age) is just within the overlapping areas of modern sheep and cow adipose fat.

The remaining six samples (482369 (Flat-Rimmed ware, Late Bronze Age), 483388 (Flat-Rimmed ware, Late Bronze Age), 352248 (Flat-Rimmed ware, Late Bronze Age), 314421 (Flat-Rimmed ware, Late Bronze Age), F219 (Impressed ware, Mid-Neolithic) and 485389 (Flat-Rimmed ware, Late Bronze Age)) are not within the boundary values of the modern reference samples. Of these, samples 352248, 314421, F219 and 485389 could be on the theoretical bovine and porcine mixing line, or could represent different isotopic values due to a different animal dietary regime in antiquity as compared to the modern day samples (Evershed *et.al.* 2002).

Due to the relatively small number of samples and the selection of samples for analysis based on the presence of sufficient $C_{16:0}$ and $C_{18:0}$ fatty acids it is not possible to identify any clear patterns of vessel use relating to either date or pot type (Illus. 36 and Table 29). It is however apparent that dairying was present in all periods from the Early Neolithic to the Late Bronze Age. Previous studies of dairying as evidenced by lipid residues from a large number of sherds from a range of sites in Southern Britain (Copley *et.al.* 2005a and b) report the extensive use of ruminant dairy fats (5 to 41% of sherds) during the British Bronze Age and approximately 25% during the British Neolithic. Copley *et.al.* (2005a) report during the Neolithic there was little intra-site variation. An examination of vessel use with type found that Beakers were less likely to contain lipids, and although Carinated Bowls from one site yielded more dairy products than adipose fats, overall no association was found with lipid content and vessel type (Grooved Ware, Impressed Ware, and Beakers). These reported findings contrasts with a previous study by Dudd *et.al.* (1999) who observed that Grooved Wares were more likely to be associated with porcine fats whilst Impressed Wares were associated with ruminant fats.

The possible assignment of beeswax to three sherds 340257, 485389 (both Flat-Rimmed Ware, Late Bronze Age) and F219 (Impressed Ware, Mid-Neolithic) is intriguing, especially as all three contained degraded fat/oil in addition to the beeswax. Although the addition of honey is a possibility, the usual assumption is that the beeswax was used as a waterproofing/sealing agent. The use as a sealant is possible for two of the vessels as it was recovered from the interior surfaces, however from sample 485389 the beeswax was extracted from the exterior surface. Low numbers of sherds containing beeswax have also been reported by Copley *et.al.*. (2005b and b) who examined a large number of British Bronze Age and Neolithic vessels. The authors also report the mixing of animal and plant products with the beeswax and they argue that that beeswax was not commonly used with vessels associated with cooking or processing of foodstuffs.

Plant products were positively identified in only two sherds MAP204 and MAP2204 (both Impressed Ware). Both these vessels also had evidence for animal fats. Similar mixing and the pattern of low numbers of sherds with plant biomarkers was observed by Copley *et.al.*. (2005b).

Conclusions

Molecular analysis of 54 sherds from Cheviot Quarry, ranging in date from the Early Neolithic to the Late Bronze Age revealed that 41% contained no lipid, 37% contained a degraded oil/fat and 16% had molecular evidence that the vessel was used for heating. In addition, a small number of sherds contained an animal or plant lipid input, beeswax and there was evidence for burnt cellulose. The majority of lipids were extracted from the interior 2mm of each vessel, indicating recovery of the original vessel contents.

Bulk stable isotope analysis of 20 visible residues indicated that these samples were highly heterogeneous. The yields of nitrogen were all less than 5%, excluding the presence of protein in these samples. The carbon isotope values are typical of a terrestrial C3 environment, and can be use to exclude a marine input (e.g. marine fish).

Fourteen samples containing sufficient $C_{16:0}$ and $C_{18:0}$ fatty acids were selected for compound specific analysis. Of these, five samples all plot within the area defined by modern cow's milk. Two samples are within the overlapping isotopic values of cow's milk and cow adipose fat. One is just within the overlapping areas of modern sheep and cow adipose fat. The remaining six samples are not within the boundary values of the modern reference samples and could represent mixing of ruminant and non-ruminant fats.

Geochemical Survey

Introduction

Geochemical analysis was undertaken across Late Bronze Age roundhouse 4 and the adjacent rectangular Building 7, as well as the three Dark Age buildings (Buildings 1, 2 and 3) in order to give some insight into the level of anthropogenic activity within these areas. Each building had a rectangular grid set out to cover the area outside the structural postholes to a distance of 1.5m and encompassing the whole interior. An additional six soil samples were taken at each building at a distance of 4.5m away from the structural postholes to act as controls. All samples were taken from the surface of the sand and gravel substratum using small hand tools and placed in individually labelled, sealed plastic bags. All small plastic bags from each building were placed in a series of larger labelled, sealed plastic bags. The samples were taken at 0.8m intervals for Buildings 1, 2 and 3 and at 1m intervals for Buildings 4 and 7. The area of Building 1 covered 93.6 m^2; Building 2, 104.5 m^2; Building 3, 97.4 m^2; Building 4, 159 m^2; and Building 7, 50.5 m^2. No samples were taken from Building 5 which, due to the heavy truncation of the deposits, was not deemed suitable for geochemical analysis.

Analytical techniques

Multi-Element Soil Analysis: the technique

Multi-element geochemical survey relies upon the assumption that changes occur within the soil chemistry of an area as a result of human intervention and that the function of various structures in and around archaeological sites is reflected in the elemental composition of the associated deposits. Thus, where as geophysical surveys can inform on the type of structures present on sites, geochemical analysis has the potential for more specific archaeological interpretations for the use of space in and around archaeological settlements. The method utilises energy dispersive X-ray fluorescence (EDXRF) to provide a rapid quantitative multi-element analysis of soils from archaeological deposits/sites. The technique allows for the simultaneous accurate analysis of all the major and minor elements present within the sample, thus providing a detailed characterisation of the soil. The elements under investigation are sodium (Na), magnesium (Mg), aluminium (Al), silicon (Si), phosphorus (P), sulphur (S), potassium (K), calcium (Ca), titanium (Ti), manganese (Mn) and iron (Fe) The group was chosen as it includes 11 of the 16 most abundant geological elements, five of which are soil macronutrients (Ca, Mg, K, P & S) and two micronutrients (Mn & Fe).

Analytical Method

Sample preparation

The samples were dried and sieved to collect the < 2mm fraction. This was ground to a fine powder and 0.5 grams were pressed into a 13mm diameter pellet ready for analysis.

Analysis

The analysis was undertaken using an Oxford Instruments ED2000 energy dispersive X-ray fluorescence spectrometer (EDXRF) employing a silver anode X-ray tube running at 10kV. All analyses were carried out under vacuum to allow detection of the low atomic number elements and the spectra were collected for a live time of 100 seconds. Simultaneous analysis was undertaken for the elements sodium (Na), magnesium (Mg), aluminium (Al), silicon (Si), sulphur (S), potassium (K), calcium (Ca), titanium (Ti), manganese (Mn) and iron (Fe). The results being calibrated using an intensity based correction model (LaChance and Traill 1967; Lucas-Tooth and Price 1961; Lucas-Tooth and Pyne 1964) derived from the analysis of a suite of eight international soil standards. The results as weight percent of element were then transferred to appropriate software for statistical analysis and mapping.

Presentation

The raw data (Illus. 38 - 48) for each element are mapped as separate two dimensional colour coded images using a scaling based on the rainbow sequence of colours. This offers a smooth transition from indigo and blue that represent low values, through yellow, to orange and red that represent the high values, and provides a very intuitive means of visually interpreting the data. This empirical observation allows such factors as the topography of the area, the geology and, for example, the history of land use to be taken into account. When appropriate, interpolation of the raw data, using a spherical kriging model (Isaaks and Srivastava 1989), was undertaken to further aid visualisation and facilitate comparison between data sets. Further interrogation of the data may be undertaken using Trend Surface analysis (Davis 1986). The data were separated into two components. The widespread or regional variations across the area, and the local deviations from this trend, thus producing a simulation of the broad features, which may be seen as background variation, and, through observation of the residuals, highlighting any local anomalies (Clogg and Ferrell 1993). The results are again presented as colour coded maps (Illus. 37 - 48).

Survey Results

Display

Summary colour coded plots of the analytical data were produced at a scale of 1:350 for the elements magnesium, aluminium, silicon, phosphorus, sulphur, potassium, calcium, titanium, manganese and iron in addition to the results of the magnetic susceptibility measurements. The results for sodium were not included as the concentrations were below the minimum detectable levels. Trend surface analysis was not deemed appropriate as the sampled areas were not contiguous. A colour scale accompanies each plot showing the maximum and minimum percentage element concentrations.

Discussion of Results

The present discussion of the results of the survey is based on the observed distribution patterns for the elements. From these observations a number of areas of archaeological activity have been identified and within these areas a variety of levels and type of activity. These are shown in the interpretation plot (Illus. 37).

Late Bronze Age

Aluminium, titanium and iron (Illus. 38, 39 and 40)

The distribution patterns for these elements are generally similar in relatively undisturbed soil and can give an insight into the general nature of the soil and any changes across the sampled area. They can therefore highlight areas of erosion, removal of soil horizon, provide evidence as to the extent of disturbance within deposits and identify any changes in the underlying geology. Considering the distribution of these elements is also particularly useful in assessing and interpreting the distribution of the more well-defined anthropogenic indicators (e.g. phosphorus). It can be seen that the plots of these elements are very similar across both buildings. They show a fairly homogeneous distribution with typical concentration ranges indicating little change in the general characteristics of the soil. A number of discrete areas of enhancement or depletion are present, particularly within the plot of iron concentrations and these will be considered within the later discussion.

Silicon (Illus. 41)

As with the aluminium and titanium this shows a reasonably homogeneous distribution across the two buildings with a typical concentration range. This supports the evidence that the general soil characteristics within the two areas are similar. Areas showing lower concentrations generally correlate with more mineral rich deposits (see later discussion and interpretation).

Calcium (Illus. 42)

Buildings 4 and 7 show clear discrete areas of enhancement which correlate well with the distribution of the elements phosphorus, sulphur, iron and magnesium suggesting significant anthropogenic deposits. Calcium-rich material includes bone of which some quantity was excavated from features within these areas.

Phosphorus (Illus. 43)

There is a clear difference in the phosphorus distribution across the two buildings. When considering this in light of the previous discussion of aluminium *etc* the evidence suggests that these areas of high concentrations reflect the high level and possibly extended duration of anthropogenic activity.

Manganese, sulphur, potassium and magnesium (Illus. 44, 45, 46 and 47)

The distribution of these elements is difficult to interpret in terms of the archaeology. It is probable that the general variations are due to factors such as drainage and soil coverage across the areas. There are however a number of anomalies which may be associated with archaeological features.

Manganese

Depleted manganese values have been found to be associated with long term occupation sequences and there is a suggestion that a similar pattern can be seen across the areas here particularly in defining Building 4. The high anomalies occur as discrete spots indicating mineral rich deposits.

Sulphur

In many respects the sulphur follows a similar pattern to that of manganese and phosphorus with broad concentrations occurring in Buildings 4 and 7. Again the particularly high values are present as discrete spots suggesting presence of individual mineral rich features.

Potassium and magnesium

Both these elements are often associated with hearths or areas of burning due to their relatively high concentrations in wood ash. From the distribution plots however there appears to be little correlation between the two elements. The concentration level and range for magnesium is however low and narrow and most probably reflects the variation in the natural soil matrix. The concentration range for potassium is much greater and the delineation of areas of enhancement much clearer suggesting areas of activity (possibly a hearth) within Building 7.

Magnetic Susceptibility (Illus. 48)

Enhancement of magnetic susceptibility of soils can be attributed to heating or burning and to a lesser extent by fermentation caused by bacterial action on organic deposits, and can therefore indicate anthropogenic activity. The distribution plot for magnetic susceptibility correlates well with areas identified in the previous discussion of the geoelemental signatures particularly in a broad sense with that of phosphorus. There is also correlation with a number of discrete area/features such as those identified by high potassium concentrations. Enhanced magnetic susceptibility is clearly seen across Buildings 4 and 7 (cf. phosphorus).

Dark Age

Aluminium, titanium and iron (Illus. 38, 39 and 40)

The distribution patterns for these elements are generally similar in relatively undisturbed soil and can give an insight into the general nature of the soil and any changes across the sampled area. They can therefore highlight areas of erosion, removal of soil horizon, provide evidence as to the extent of disturbance within deposits and identify any changes in the underlying geology. Considering the distribution of these elements is also particularly useful in assessing and interpreting the distribution of the more well-defined anthropogenic indicators (e.g. phosphorus). It can be seen that the plots of these elements are very similar across all three buildings. They show a fairly homogeneous distribution with typical concentration ranges indicating little change in the general characteristics of the soil. A number of discrete areas of enhancement or depletion are present, particularly within the plot of iron concentrations and these will be considered within the later discussion.

Silicon (Illus. 41)

As with the aluminium and titanium this shows a reasonably homogeneous distribution across the three buildings with a typical concentration range. This supports the evidence that the general soil characteristics within the three areas are similar. Areas showing lower concentrations generally correlate with more mineral rich deposits (see later discussion and interpretation).

Calcium (Illus. 42)

Buildings 1 and 3 show a reasonably even spread of calcium values with depleted areas within the south east corners A number of discrete high values occur towards the north edge of the areas. Building 2 however shows a clear division between high and low values following a north south divide. These features may be due to natural drainage systems or indicate the presence of anthropogenic deposits.

Phosphorus (Illus. 43)

There is a clear difference in the phosphorus distribution across the three buildings. Within Building 2 the higher values extend along the north edge showing a very similar distribution to that of calcium. Values are much lower within Buildings 1 and 3 which could well reflect less extended periods of activity. There are two spreads of higher values within Building 1 whilst Building 3 shows small discrete features which could be related to post hole deposits.

Manganese, sulphur, potassium and magnesium (Illus. 44, 45, 46 and 47)

The distribution of these elements is difficult to interpret in terms of the archaeology. It is probable that the general variations are due to factors such as drainage and soil coverage across the areas. There are however a number of anomalies which may be associated with archaeological features.

Manganese

Depleted manganese values have been found to be associated with long term occupation sequences and there is a suggestion that a similar pattern can be seen across the buildings. The high anomalies occur as discrete spots indicating mineral rich deposits.

Sulphur

In many respects the sulphur follows a similar pattern to that of manganese and phosphorus with broad concentrations occurring in Building 1. Again the particularly high values are present as discrete spots suggesting presence of individual mineral rich features.

Potassium and magnesium

Both these elements are often associated with hearths or areas of burning due to their relatively high concentrations in wood ash. From the distribution plots however there appears to be little correlation between the two elements with the exception of an area to the east of centre of Building 3. The concentration level and range for magnesium is however low and narrow and most probably reflects the variation in the natural soil matrix. The concentration range for potassium is much greater and the delineation of areas of enhancement much clearer suggesting areas of activity (possibly hearths) within Buildings 2 and 3.

Magnetic Susceptibility (Illus. 48)

Enhancement of magnetic susceptibility of soils can be attributed to heating or burning and to a lesser extent by fermentation caused by bacterial action on organic deposits, and can therefore indicate anthropogenic activity. The distribution plot for magnetic susceptibility correlates well with areas identified in the previous discussion of the geoelemental signatures particularly in a broad sense with that of phosphorus. There is also correlation with a number of discrete area/features such as those identified by high potassium concentrations. Enhanced magnetic susceptibility is clearly seen across a substantial area of Building 1 whilst smaller discrete areas of enhancement can be identified in Buildings 2 and 3.

Investigation of control samples

As phosphorus appears to be the prime indicator of anthropogenic activity the relationship between the samples from inside the surveyed area and the controls was undertaken by plotting the mean and standard deviation of this elements concentration from each area and control set. The results are shown in Illustration 49. It can be seen that there is a clear difference between the interior of buildings 1, 2, 3 and to some extent 7 and the control samples from the exterior of the buildings. With building area 4 however there is less distinction and it is probable that the anthropogenic deposits extend slightly to the north east of the area.

Magnetic Susceptibility

Magnetic susceptibility is a measure of how magnetic a sample is. This can provide information on the minerals found in soils and sediments and hence the processes of their formation. Enhancement of magnetic susceptibility of soils can be attributed to heating or burning and to a lesser extent by fermentation caused by bacterial action on organic deposits and can therefore indicate anthropogenic activity.

Sample preparation

The samples were dried and sieved to collect the < 2mm fraction.

Analysis

The measurements were undertaken on a known weight (approximately 10g) of sample using a Bartington MS2B sensor. The resulting values were mass corrected to 10g to allow comparison of absolute mass-specific magnetic susceptibility.

Presentation

The magnetic susceptibility results were plotted as colour coded images as with the elemental data

Conclusion

The survey has detected a number of areas of potential archaeological activity and within these areas a variety of levels and types of activity. There was however no consistent pattern across the building areas. The main indicators for suggested areas of anthropogenic activity have been shown to be phosphorus, magnetic susceptibility, potassium and manganese. Calcium and magnesium have provided some supporting evidence whilst aluminium, titanium and iron have shown the nature and variation in the soil coverage across the area. The identified areas of activity are shown in the interpretation plots (Illus. 37) and are defined as follows:

Late Bronze Age

General areas of archaeological activity

These are zones of activity that suggest a concentration of archaeological features and material. These zones may exist *per se* or may have been produced by the movement of material from discrete features through, for example, ploughing. Both the interior and exterior of Building 4 showed evidence of archaeological activity, whilst activity at Building 7 was confined to its interior and primarily its north, with a small area of activity to the south-east. All these zones of activity extended beyond the areas sampled.

Areas of intense archaeological activity

These are discrete areas or features that are potentially archaeologically rich through either very intense or lengthy use. Typical features would be pits, rubbish deposits, middens, the remains of ditches *etc*. Building 4 in particular shows a broad spread of intense activity which could be attributed to material from a number of archaeological rich deposits. These have been identified at around external areas C and D (Building 4) and around the internal hearth and large artefact-rich pit F340 whilst another potentially rich area is internally to Building 7 at position B.

Possible hearths or areas of burning

Areas in which the chemical fingerprint particularly enhanced potassium, magnesium and magnetic susceptibility suggests some form of pyrotechnological activity most probably the presence of hearths. No such areas exist in Building 4, although an internal hearth was found during the excavations, but a possible area was plotted to the north of Building 7.

Discrete features

These are small areas which show a slightly different chemical fingerprint to the general background and may be features of archaeological origin. Only three areas were identified in Buildings 4 and 7 and do not relate to any specific archaeological features.

Mineral rich deposits

Areas where the chemical signature shows enhanced levels of a number of elements suggesting a significantly different deposit type from the immediate surroundings. This could be due to the build up of sediments within cut features. An area of mineral rich deposits were found

Dark Age

General areas of archaeological activity

These are zones of activity that suggest a concentration of archaeological features and material. These zones may exist *per se* or may have been produced by the movement of material from discrete features through, for example, ploughing. Archaeological activity in Building 1 appears to have been confined to the interior of the structure, whilst activity at Building 2 is situated externally to the north side. No general zones of activity were noted in Building 3, and the variation across the three buildings probably represents different activities in each building.

Areas of intense archaeological activity

These are discrete areas or features that are potentially archaeologically rich through either very intense or lengthy use. Typical features would be pits, rubbish deposits, middens, the remains of ditches *etc*. These have been identified externally at around position A (Building 2).

Possible hearths or areas of burning

Areas in which the chemical fingerprint particularly enhanced potassium, magnesium and magnetic susceptibility suggests some form of pyrotechnological activity most probably the presence of hearths. Evidence for burning in Building 2 was confined to the area around large pit F2063, which contained an *in-situ* hearth deposit in its fill, and Building 3 showed a discrete feature situated centrally to the structure, presumably from a hearth feature that was not cut into the sand and gravel substratum.

Discrete features

These are small areas which show a slightly different chemical fingerprint to the general background and may be features of archaeological origin. The majority of these would appear to be post holes.

Mineral rich deposits

Areas where the chemical signature shows enhanced levels of a number of elements suggesting a significantly different deposit type from the immediate surroundings. This could be due to the build up of sediments within cut features. Areas of mineral rich deposits were found in all three halls, externally to the north-east in Buildings 1 and 2 and internally to the north-west in Building 3.

DISCUSSION

The results of these excavations are of considerable significance to research into the Neolithic, Late Bronze Age and Early Medieval periods in Britain, however full integration of this information into the wider regional and national picture will appear in a forthcoming synthesis (Waddington and Passmore in prep.). The discussion presented here therefore seeks only to interpret the archaeology of Cheviot Quarry within its immediate setting and identify the main themes of interest.

Neolithic

The excavations at Cheviot Quarry have added significant information to the understanding of Neolithic occupation of the Milfield Basin. Whilst excavations on sites of this period have occurred across the Basin, Whitton Park (Waddington 2006), Coupland (Waddington 1996) and the various henge sites (Harding 1981), this site, together with that at Thirlings (Miket 1976; 1987; see also this volume), have been the first opportunities to analyse and interpret data from such a large area of landscape, positioned in the centre of the Milfield plain, proximal to the henge complex.

Chronology

The areas of Neolithic archaeology at Cheviot Quarry lie to the east of the main ceremonial complex in the Milfield plain and to the west of the River Till. The areas of Neolithic archaeology at Cheviot Quarry date from the earliest phase of the Neolithic *c.* 4000 cal BC through to the terminal Neolithic and Early Bronze Age *c.* 2000 cal BC, and therefore at least some of the Neolithic occupation must be associated with the ceremonial aspects of the landscape in some way. The radiocarbon dates retrieved from the site are taken from residues on the ceramics and charred hazelnut shell fragments directly associated with the ceramics. The spread of dates, together with the sequence of Neolithic pottery evident on the site, suggest that the Cheviot Quarry sites formed important parts of the landscape throughout the Neolithic period. Two of the dates are clearly incorrect, OxA-16098 on a residue from a Beaker vessel is too early and OxA-

16162 on a residue from a Carinated Bowl is too late, when compared to the known corpus of dated pottery from the region. However if these two dates are excluded from the discussion, the rest of the dates show Carinated Bowls and Plain Ware being used in the earliest half of the fourth millennium BC, a clear overlap in the use of Impressed Ware and Grooved Ware in the early third millennium BC, and Beaker vessels in use by the late third millennium BC.

Site function

It is argued here that the archaeology from Cheviot Quarry primarily represents domestic settlement activity even though there is an absence of any obvious dwelling structures. None of the pits, hearths and postholes can be neatly grouped into a building form and yet there is clear evidence for extensive human activity in both the north and south areas of the site. Most of the Neolithic pits contained domestic midden material comprising food waste, processing tools, cooking, storage and serving vessels, all of which had been used or broken. This range of residues and material culture has clearly resulted from food consumption that could be typically associated with settlement activity. Similar clusters of pits with this distinctive content have been discovered elsewhere in the region, directly associated with buildings, some of which contain hearths. Examples include the recent find of eight Neolithic structures at the nearby Lanton Quarry, associated with pits and hearths containing predominantly Carinated Bowl and Plain wares (Stafford and Johnson 2007), the Early Neolithic settlement at Bolam Lake (Waddington and Davies 2002), the site at Whitton Park in Milfield village (Waddington 2006) and the settlement at Thirlings (Miket 1987; elsewhere in this volume). Both Bolam Lake and Whitton Park produced evidence for structures built around a triangular arrangement of postholes. That at Bolam Lake was interpreted as a structure 'supported by a slight timber frame' (Waddington and Davies 2002, 23) and that at Whitton Park a group of postholes with 'evidence for fairly substantial timbers' (Waddington 2006, 13). At Thirlings, pits and posthole clusters were found containing large amounts of Carinated and Plain Ware Bowls, Impressed Ware and Grooved Ware, and all of these sites can be understood as indicating domestic occupation associated with post-built structures. This said, the attribution of these sites as settlements does not in any way preclude their conception has having ritualised or other types of behaviour. Although there was no direct evidence for specially placed deposits within the pit fills, the deliberate burial of midden material in deep pits is clearly a routine practice, and this in itself indicates the integration of structured routines and ideologically driven practice within what is ostensibly a settlement locale.

The lack of evidence for settlement structures at the Cheviot Quarry sites could be explained in two ways, either that there never were any such structures or, that if such structures existed, their foundations were never deep enough to leave any traces in the sand and gravel substratum. Given that these Neolithic 'domestic pits' contain debris connected with food consumption, and this is a phenomenon widely observed throughout the Neolithic of the British Isles, these enigmatic archaeological signatures could be related to day to day living practices and settlement, or alternatively they could represent the remains resulting from special occasions when festive eating and drinking took place. Closer examination of the deposits retrieved from the nearby ceremonial sites together with those from the various settlement locales in the Milfield plain could provide some sense of the linkages between these sites and the lifeways of the Neolithic inhabitants.

It is suggested that the Neolithic settlement was short-term in nature and so repeated visits must have been made to the location, beginning in the Early Neolithic and continuing sporadically through to the Early Bronze Age. A total of 79 Early Neolithic Carinated Bowls were found across the whole site and, in comparison with a total of 21 Later Neolithic and Early Bronze Age vessels, it is thought that a greater number of

Early Neolithic visits were made to the area. Additionally the much smaller numbers of Later Neolithic and Early Bronze Age vessels found were only recovered from specific locales within the Quarry as a whole. The Beaker vessels and Impressed Ware, but no Grooved Ware, were found exclusively in the Cheviot Quarry South Area, and Impressed Ware and Grooved Ware but no Beaker vessels were found in the Cheviot Quarry North area. This presumably indicates less activity and/or visits during the Late Neolithic and Early Bronze Age, and can be interpreted as the selection of fewer locales for the disposal of certain types of pottery, as the widely dispersed pattern of Carinated Bowls and Plain Wares changes to fewer, nucleated locales. This pattern is replicated at the nearby site of Lanton Quarry, where large numbers of Carinated Bowl and Plain Ware sherds were discovered dispersed across the site, with a small handful of Grooved Ware, Impressed Ware and Beaker ceramic sherds found in specific locales (Stafford and Johnson 2007). It is possible that this increased nucleation in domestic activity on the gravel terrace is due to the development of the monument complex during the Late Neolithic and Early Bronze Age and may well reflect changing social attitudes to landscape use.

Symbolic behaviour

The burying of domestic midden material in pits could be interpreted as symbolic behaviour, as it represents a repetitive, though functionally unnecessary, task. There is no particular reason to excavate pit features to discard such material, which could easily be disposed of elsewhere. It has been noted that in the Later Bronze Age domestic material was used to manure field plots at Houseledge West (Burgess 1980) in the Cheviots, and such practices could have been undertaken in earlier periods, for which no evidence survives. However, at least some domestic material during the Neolithic was deliberately buried, and this practice must relate to peoples belief systems particularly as it is a practice noted throughout all of the British Isles. Whatever ideological or symbolic belief lay behind this practice there was clearly a need to dispose of certain artefacts and materials in a prescribed fashion when consumed in a particular kind of way, whether this be feasting or settlement. What is apparent is that all the Neolithic and Early Bronze Age material recovered during the excavation was either broken, as in the case if the pottery, or had been used, as for example the quartzite hammerstone and the flint tools. Even the stone ball roughout, an artefact with symbolic rather than functional connotations, was a flawed and unfinished piece. Such practices are typical of Neolithic 'domestic pit' sites, and can be directly compared with the site at Bolam Lake, also in Northumberland, where a group of intercutting pits also contained broken domestic debris that included a broken Group VI ground and polished stone axe head (Waddington and Davies 2002).

Material Culture

The dating programme has supplied radiocarbon dates on the full range of Neolithic pottery encountered in Northumberland, from Carinated Bowls and Plain Ware through Impressed Ware, Grooved Ware and Beaker vessels, as discussed above. The Early Neolithic Carinated Bowls and Plain Wares vary in size from large storage or cooking vessels through to small bowls and were generally well-fired, highly burnished pieces. All display the typical attributes associated with this style including everted rims, carinations, occasional upright shoulders and an absence of decoration. One fragment from the northern part of the site did appear to have lightly incised decoration, an unusual but not unheard of practice, and there was a good example of a lugged vessel from the southern part of the site. Four Impressed Ware vessels were recovered from the southern area of the quarry and were all from substantial vessels, one a distinct 'flowerpot' shape, with coarse fabrics and roughly burnished surfaces. Decoration on some of the pieces included fingernail, comb and stab impressions. The seven Grooved Ware vessels were all recovered from the northern area of the quarry and were well-made, bucket-shaped vessels of varying size. The sherds show evidence of grooved decoration, made with fingernails, on their outer surface and in one case on the inner rim bevel. Five Beakers and three other Late Neolithic-Early Bronze Age vessels were recovered, all from the southern area of the site. Reconstructing the Beaker vessel forms is difficult from the few, tiny fragments, although one large, undecorated Beaker survived almost intact. The other Beaker fragments show a wide range of decorative techniques including comb impressions, grooves forming lozenges and triangles for zoned decoration, cord and fingertip decoration as well as the presence of cordons.

The analysis on the residues adhering to the pottery sherds has not shown any linkage between vessel type and content (see above), however there is clear evidence for dairy practices, beginning in the Early Neolithic and continuing through to the Beaker period. Mixed plant and animal residues within vessels show the use of pots for cooking stews, whilst pots with specifically plant or animal residues may represent the cooking of food or drink products, or may be residues from other processes such as the creation of medicines or dyes.

Land-use and environmental context

There is some evidence to infer that areas of open ground existed at, or close to, the site, based upon the few weed seeds recovered from Neolithic and Early Bronze Age contexts, and it may be that these formed areas of grazing for the dairy animals whose presence is testified by the use of secondary dairy products in the Neolithic ceramics. In addition there must have been areas of arable agriculture where barley and emmer wheat were grown locally, whilst areas of wetland or carr, such as the Galewood Depression, and areas of woodland would have provided wild resources such as hazelnuts. This picture is reinforced by excavated evidence from nearby sites such as the Coupland Enclosure, situated only 1km to the north-west. Here emmer wheat, barley and oats were recovered, indicating limited cultivation close to the site, and abundant charred hazelnut shells were also found (Waddington 1996). Pollen analysis also indicated a relatively open grassland environment with sporadic tree cover (Waddington 1999).

Overall it is argued that the archaeology from Cheviot Quarry dating to the Neolithic and Early Bronze Age is from semi-permanent domestic settlement, probably in light-framed temporary structures situated within a patchwork landscape, most likely dominated by areas of open grassland used for stock grazing and arable agriculture, but still with a considerable presence of 'wild' environments that were used to harvest natural resources. A decrease in the number of visits or activity in the quarry during the Later Neolithic and Early Bronze Age can be argued and, although the reasons for more infrequent, nucleated settlement during this time is unclear, it may well be due to changing social beliefs during the expansion and development of the ceremonial monuments.

Late Bronze Age

The Late Bronze Age archaeology, comprising two substantial circular houses and an associated structure, provides new insights into this poorly understood period within the North-East and is the first evidence for Late Bronze Age lowland settlement in the region. This important evidence will contribute to the debate regarding Late Bronze Age upland abandonment of the Cheviot Hills and elsewhere (for example see Burgess 1984 and Young and Simmonds 1995). The presence of substantial dwelling structures, coupled with extensive agricultural and pastoral practices, are in contrast to the more ephemeral domestic archaeological record for the Neolithic and Early Bronze Age and represent a change in the use of this part of the Milfield plain.

Chronology

Based upon the radiocarbon dating undertaken as part of this work, the use of the buildings is estimated to have started during the tenth century cal BC and most likely lasted in use well into the ninth century cal BC. Building 4 was probably in use for between 20 and 120 years, whilst Building 5 was probably in use for between 40 and 160 years (both at 68% probability). These houses would therefore have been significant features in the landscape for at least one generation and perhaps more. Prior to the discovery of these buildings little settlement evidence had been found across much of northern England dating to between the 12th and the 8th centuries BC, in marked contrast to the extensive upland settlement across the Cheviots and parts of the sandstone escarpment known from the Middle Bronze Age (Burgess 1985).

Site form

The two circular buildings with distinct protruding porches, and constructed using substantial timber uprights, appear to have supported a weighty superstructure and could have been in use for a considerable period of time, a hypothesis that is substantiated by the dating programme. The substantial posts and their close spacing imply a heavy roof covering that could have been made either from turf or thatch. The double postholes at the entrances may also support the argument that the houses were long-lived, as they could represent repair episodes to the porch area. However given that all the LBA buildings so far discovered in the region have these double-posts at the porch entrance repair would seem an unlikely interpretation. Rather, they may have provided for an elaboration of the house entrances consistent with pervading needs for symbolism and show. The large quantities of barley and emmer wheat recovered are the first such assemblage from Northumberland dating to the Late Bronze Age and, in association with the fragments of burnt animal bone and the plant and animal residues surviving on the pottery fragments, represent domesticated agricultural and pastoral practices. Additionally the pottery is domestic in form and associated with storage, cooking, serving, eating and drinking, in a mixture of flat-based and bowl-shaped vessels. The geochemical analysis from the area of Building 5 suggests human activity having caused changes to the geochemical signature of the sand-and-gravel substratum in specific locales internally and externally to the house (see above). This signature appears to have been spread by ploughing but there is a defined area to the north side of the house, opposite the entrance porch, and an internal area surrounding the central hearth and near the large artefact-rich pit. The activities undertaken in these areas are unknown but the presence of two quernstones, one in the hearth and one in the artefact-rich pit, in association with large quantities of barley and emmer wheat, show that the area around the hearth was used, at the very least, for the preparation of flour for use in making bread and other such products. The area would also have been used for other domestic activities, perhaps including woodworking, clothes making and tool repairs, although no direct evidence of such activities survives. The archaeology is therefore interpreted as a permanent unenclosed farming settlement situated on the valley floor. The structural forms of the Middle to Late Bronze Age upland farming settlements are very similar to those found at Cheviot Quarry, although many of the upland sites have stone-founded walls or clearance stones mounded against where the timber walls had stood, and typically measure between six metres and eight metres in diameter (Gates 1983). The two houses from Cheviot Quarry fit comfortably within this settlement tradition and it is only their location that is different. It seems that the lowland ritual landscapes of the Neolithic and Early Bronze Age, with associated short-term settlement and small-scale agricultural practices, gave way to a secular, domesticated world by the Later Bronze Age, and these houses are evidence of that process.

Land-use and environmental context

The large quantities of barley and emmer wheat recovered are the first such assemblage from Northumberland dating to the Late Bronze Age and, in association with the fragments of burnt animal bone and the plant and animal residues surviving on the pottery fragments, represent domesticated agricultural and pastoral practices. The analysis of the macrofossils and residues shows evidence for local mixed farming, that included growing barley and wheat as well as raising cattle for meat and dairy products and possibly sheep, goats and pigs as well. In addition there appears to have been some use of gathered resources including hazelnuts, apples and sloes.

Shifting Bronze Age settlement?

The abandonment of many upland farming settlements during the Late Bronze Age is thought to be due to a combination of processes that included the effects of soil erosion, soil exhaustion, deforestation, climatic impacts and perhaps changing socio-political organisation. The consequence of the settlement contraction would be that occupation on attractive areas such as the valley floor would have become more intensive. As timber-built Late Bronze Age settlements are virtually invisible to standard archaeological prospection techniques such as geophysical prospection and aerial photography, and are highly unlikely to be found by evaluation trenches, no settlements of this period have previously been found on the valley floor. It is only by the opportunity afforded by large-scale open-area excavation that the very ephemeral traces of the Late Bronze Age houses were able to be detected. The occurrence of another LBA house of exactly the same form from another open-area excavation nearby (Stafford and Johnson 2007) adds weight to the view that Late Bronze Age settlement on the valley floor may have in fact have been quite intensive.

Dark Age

The three rectangular Dark Age buildings provide new evidence for what is presently a poorly understood period in the North-East.

Chronology

The dating of the three buildings is intriguing. Whilst only two produced enough material to allow radiocarbon dating all three buildings, given their form, layout and proximity, are considered to be contemporary. The dating has shown that the buildings are 5th or early 6th century cal AD in date and were probably in use for between 1 and 140 years at 68% confidence (see above), with the most likely span of use falling within the centre of the range. This suggests that the houses were probably used by at least two generations of people and possibly more. Given the dates of the buildings there exists a currently unanswerable question over who built them. The documented invasion of Bamburgh on the Northumberland coast is placed around 547 AD and it is almost certain that these timber halls predate this invasion, and so raises the possibility that they may have been the homes of an indigenous British population. However, Anglian and Saxon mercenaries are known to have been in the British Isles since it's abandonment by the Romans in the early 5th century AD, and these buildings could feasibly represent the dwellings of such a group, or their descendants. The cultural attribution of these buildings therefore remains a puzzle, though it is worth noting that the structural form is different to the definite Anglo-Saxon buildings found at Thirlings where continuous trenches were used to hold the foundations, or paired timbers were set in each posthole

(O'Brien and Miket 1991). The latter style was also found recently at Lanton Quarry, in association with a number of sunken-featured buildings (Stafford and Johnson 2007).

Settlement form and function

The three large Dark Age buildings pose challenges to their interpretation. As with the Late Bronze Age circular buildings they were built with substantial timber uprights and would have supported a large superstructure, presumably covered with thatch. The series of opposed postholes can be interpreted as supporting crossbeams which in turn supported a wall-plate and rafters (see below for fuller discussion of the reconstruction). The entrances to each structure also vary slightly; Building 1 having an external porch to the south, Building 2 having a possible internal division representing an entrance to the south-east and Building 3 having a distinct gap in the postholes on the short east side that presumably held the door. Whether these are due to different functions associated with each building is unclear as, being heavily truncated, no contemporary material culture was recovered. The geochemical results from each building do show some internal variation in the geochemical signature of the sand-and-gravel substratum, and these most likely represents different areas of activity within each building although, as with the results from the Late Bronze Age houses, these have been spread by ploughing (see above). It does show however that internal features to the halls, such as hearths indicated by the presence of high concentrations of potassium, have not survived. The activity shown by the geochemical analysis is most likely associated with human actions however, shown by enhanced levels of potassium, magnesium and magnetic susceptibility indicating hearths, and it appears that the halls were used as dwellings rather than as byres or hay barns for example. The lack of any material culture associated with industrial activity (smithying, pottery making *etc.*) also suggests that these were domestic dwellings and, during Anglo-Saxon times at least, industrial activity is typically associated with sunken-featured buildings, rather than post-built structures (Hamerow 2002). Given the small amount of barley seed recovered the buildings may represent the homes of a small nucleated farming community, and this is thought to be the most likely interpretation.

Summary

The rich and varied archaeology of Cheviot Quarry has shown that the gravel terraces of the Milfield Basin formed a key focus for human activity from prehistoric to early medieval times. These raised, free-draining terraces are attractive for early agriculture and settlement and this particular terrace, sited along the northern fringe of the Galewood Depression and close to the River Till, would have formed an appealing situation with easy access to water supplies, potential hunting and fowling in the wetland and light, fertile soils for agriculture, of particular importance during the Late Bronze Age and Early Dark Age.

The large-scale open-area excavations, only possible when huge infrastructure projects such as quarrying are undertaken, have shown that there is evidence surviving for very significant multi-period archaeology within the heavily cultivated lowland fields of the Milfield plain. The only reason this wealth of Neolithic, Bronze Age and Dark Age archaeology was found was because large areas of the landscape were stripped back under archaeological supervision. Traditionally, Neolithic settlement, Late Bronze Age lowland settlement and Dark Age settlements are very rarely found, yet Cheviot Quarry has produced significant and abundant evidence of such sites. Moreover, none of these sites could have been discovered through traditional archaeological prospection techniques such as aerial photographic survey or geophysical survey. This is most clearly demonstrated if it is considered that extensive evaluation trenching in the Cheviot Quarry North area revealed evidence for a solitary Neolithic pit but, when the surrounding area was stripped, a large number of further Neolithic features, along with

Late Bronze Age and Dark Age buildings were revealed. Therefore, without the opportunities afforded by large-scale topsoil stripping, such sites would be unlikely to be found.

Reconstruction of one of the Dark Age Buildings

During late 2006 and early 2007 a 1:1 reconstruction of one of the Dark Age buildings was made at the Maelmin Heritage Trail in the village of Milfield, about 1.5km north of where the building originally stood. The Maelmin Heritage Trail is an archaeological heritage trail named after the early medieval town of 'Maelmin' mentioned by Bede in his 'Ecclesiastical History' as one of the royal estates of the kings of Northumbria, which lies next to the site. The trail is open all year round and is free to visit. The reconstruction was undertaken by professional joiner, Peter Stapley, and thatcher, Alan Jones, with assistance from local volunteers and archaeologists who had worked on the original excavations. The timbers used were local softwoods, supplied by the Alnwick Estate and A.J. Scott timber merchants, and the thatching material was water reed. It was decided to use the plan of Building 2, with seven opposed postholes along each long axis and three on each short axis, to make the reconstruction. As all the archaeological remains that survived were postholes anything from the ground upwards is an interpretation of how the building may have been constructed. All wood was fitted together using simple jointing techniques (Illus. 50) and held in place using wooden pegs, techniques that would have been used by the Dark Age builders. The opposed postholes most likely supported a post-and-lintel construction, given that the holes were vertical, with rafters up to a ridge beam forming the roof and this method was therefore adopted for the reconstruction.

A series of timber uprights were concreted into hand-dug postholes and a joist framework inserted to provide support for a planked timber floor. Each upright was 3m tall along the long axes but increasing in height to over 4m towards the centre of the short axes. A series of lintels were then attached, using mortise-and-tenon joints, between each pair of opposed postholes (Illus. 51). This framework then had a timber wall-plate laid along both long axes to provide support for the rafters and a series of upright posts, mortise-and-tenoned to the centre of each lintel provided support for the ridge beam (Illus. 52). Vertical boards, similar to those used on the floor, were attached between the wall plate and the floor joists, to produce a simple wall and the cracks between the boards were filled with a daub material. A simple door, made of a timber frame and more of the boards used for the walls, was placed in the larger gap in the postholes in the centre of the northern long axis. The construction took a group of four people just over two weeks to complete. The thatch was attached to the rafters using a technique known as 'fleeking' where a woven mat of reed forms the base to the overlying waterproofing layer (Illus. 53). This process two people three weeks to complete.

The reconstruction has provided a very substantial timber hall (Illus. 54) for use by schools and community groups who visit the Maelmin Heritage Trail. Information panels, relating it to the archaeology of Cheviot Quarry and the wider landscape, were also produced, to provide visitors to the Trail with an experience of life in Dark Age Northumberland.

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