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An early Neolithic occupation site at Holbeck Park Avenue, Barrow-in-Furness

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with contributions from Carol Allen, Elizabeth Huckerby, Alison Sheridan and the late Alan Vince

Archaeological investigations ahead of development at Holbeck Park Avenue, Barrow-in-Furness, identified a tree-throw hollow containing a significant assemblage of early Neolithic pottery, lithics and a cereal grain, radiocarbon dated to *3950-3800 cal BC*. The site represents a very early date for the presence of cereals (evidence for the first farming) and pottery at a national scale. Holbeck Park lies within a cluster of Neolithic sites and lithic scatters, and its environs have been subject to palaeoenvironmental analysis. It is possible, therefore, to interpret the site with reference to the contemporary landscape and discuss it in relation to current academic understandings of the Mesolithic-Neolithic transition, around 4000 cal BC.

Introduction

In 2002, Oxford Archaeology North was commissioned by Neil Price Ltd to establish the archaeological potential of a development site at Holbeck Park Avenue, on the outskirts of Barrow-in-Furness (SD 23040 69980; Fig. 1). This revealed an assemblage of Neolithic pottery and stone tools within a tree-throw hollow. A watching brief and further excavation took place between July 2005 and January 2006, but no additional datable features were identified.

Location and topography

The Furness peninsula is defined to the north by the Duddon estuary, and to the south by the Leven estuary and Morecambe Bay. St Bees Red Sandstone forms the bedrock, with carboniferous limestone characterising the higher land north of Dalton and Aldingham (BGS 2017). Most of the sandstones and limestones are covered by boulder clays which, to the north and east of the Holbeck Park site, form numerous drumlins; to the south and west, the landscape is cut by a series of fluvioglacial channels.

The Mill Beck and Beckansgill valleys separate the modern town of Barrow from the rest of the Furness peninsula, running from the Duddon estuary at Askam, through Dalton and the grounds of Furness Abbey to Roose, just to the west of the Holbeck Park site. A third glacial valley, Sarah Beck, branches from the Beckansgill valley at Roose, passes to the immediate south of Holbeck Park, then turns south and exits into Morecambe Bay at Roosebeck (Fig. 2). Flanked by ridges of fluvioglacial sand deposited by glacial meltwaters from the Beckansgill valley, the Sarah Beck valley is now filled by drained peatlands.

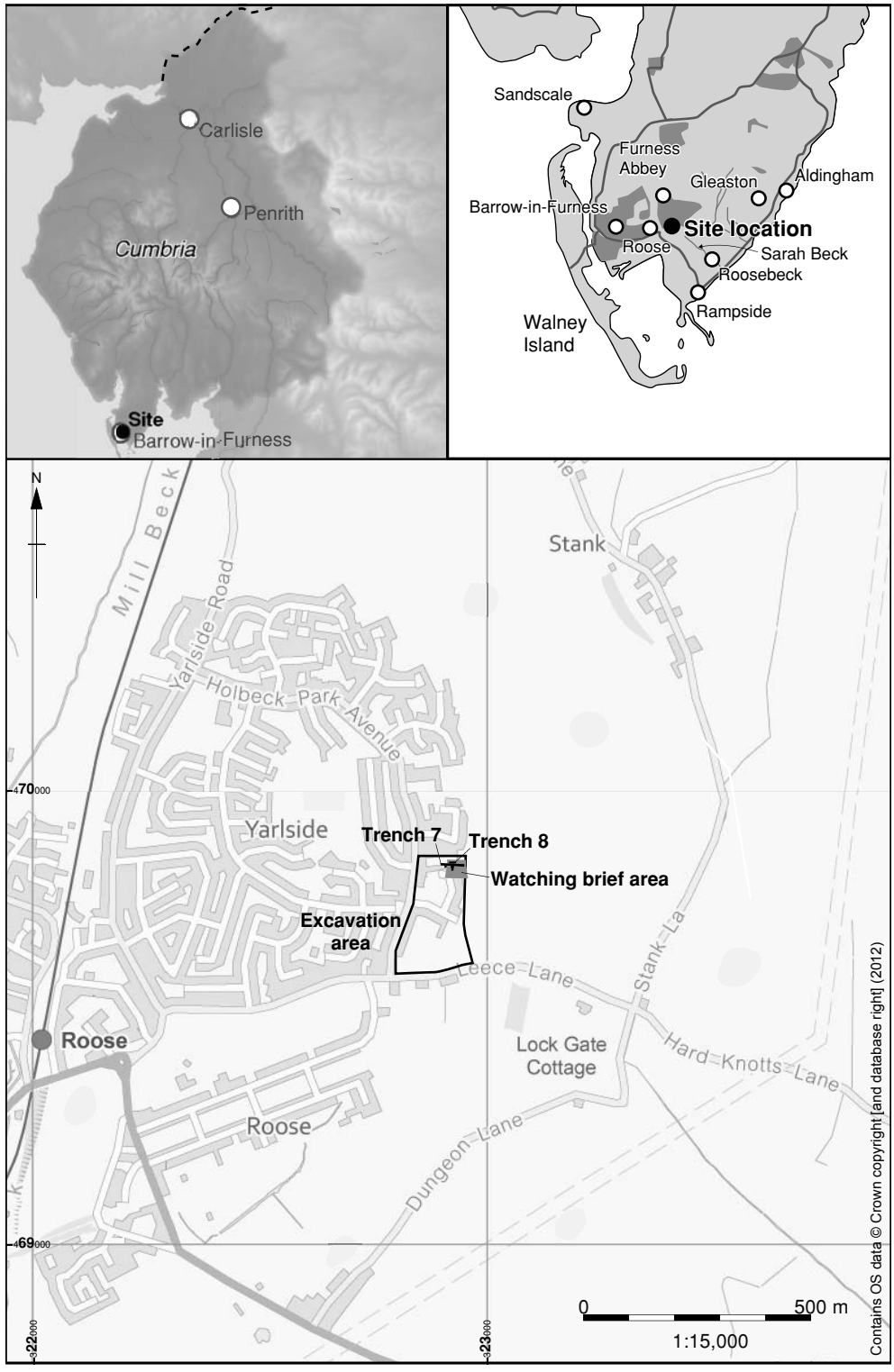

FIG. 1. Site and trench location.

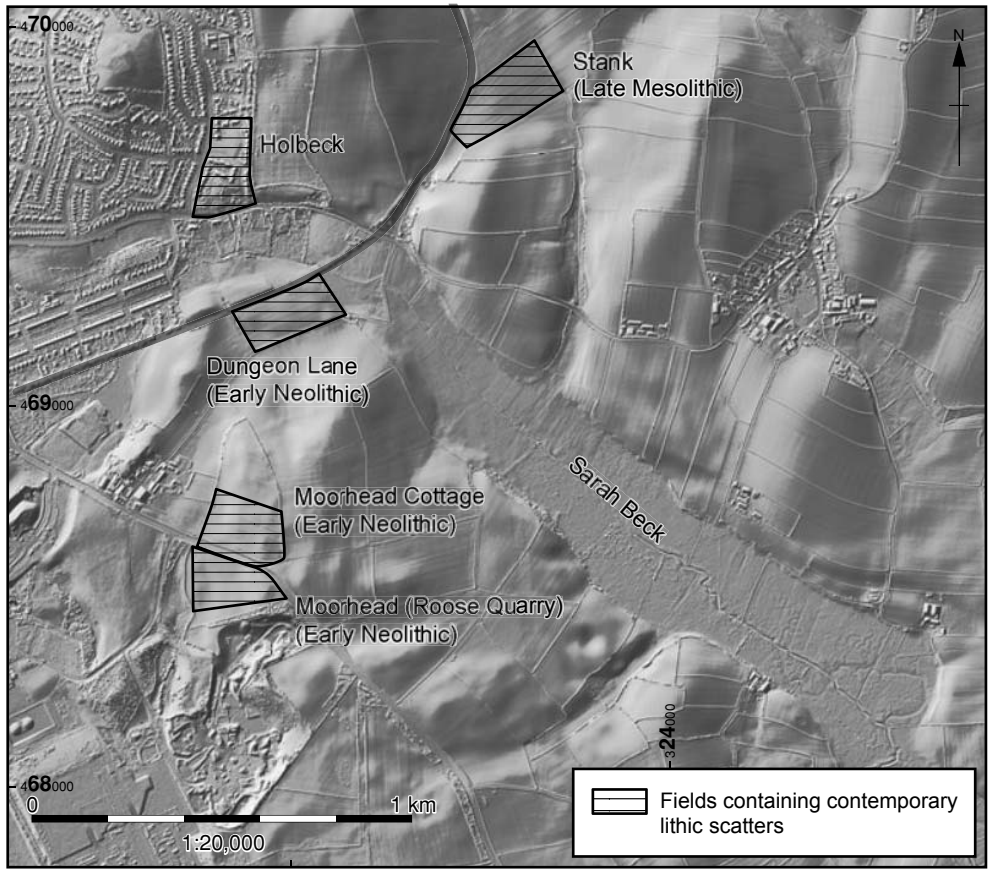

FIG. 2. Lidar plot, showing site location, Sarah Beck, and lithic scatters.

Evidence for marine transgressions affecting the Irish Sea coastline over the course of the Mesolithic and Neolithic periods is relatively well known in the regional literature (Bonsall *et al* 1994; Cherry and Cherry 2002; Hodgkinson *et al* 2000). Palaeoenvironmental research has revealed that the Sarah Beck valley was inundated by the sea *c* 7000 BC (*c* 8500 BP), and again *c* 4650 BC (*c* 6600 BP) until *c* 3900 BC (*c* 5850 BP), when it began to retreat (Appley 2013). This means that during the later Mesolithic and into the early Neolithic, the valley downslope of Holbeck Park would have been characterised by intertidal mudflats, saltmarsh and tidal creeks. During the later Neolithic, sea-levels gradually dropped, with carrs and peatlands forming as tidal influences subsided. The sea had largely retreated from the valley by the early Bronze Age (*ibid.*).

Archaeological background

The Holbeck Park site lies in a landscape rich with evidence for prehistoric occupation; many flint scatters and stone axe finds have been recorded in its environs (Fig. 3; Evans 2008, 118-39). The distribution of Neolithic stone axes is particularly dense across Furness, leading to its oft-quoted association with interpretations of the axe

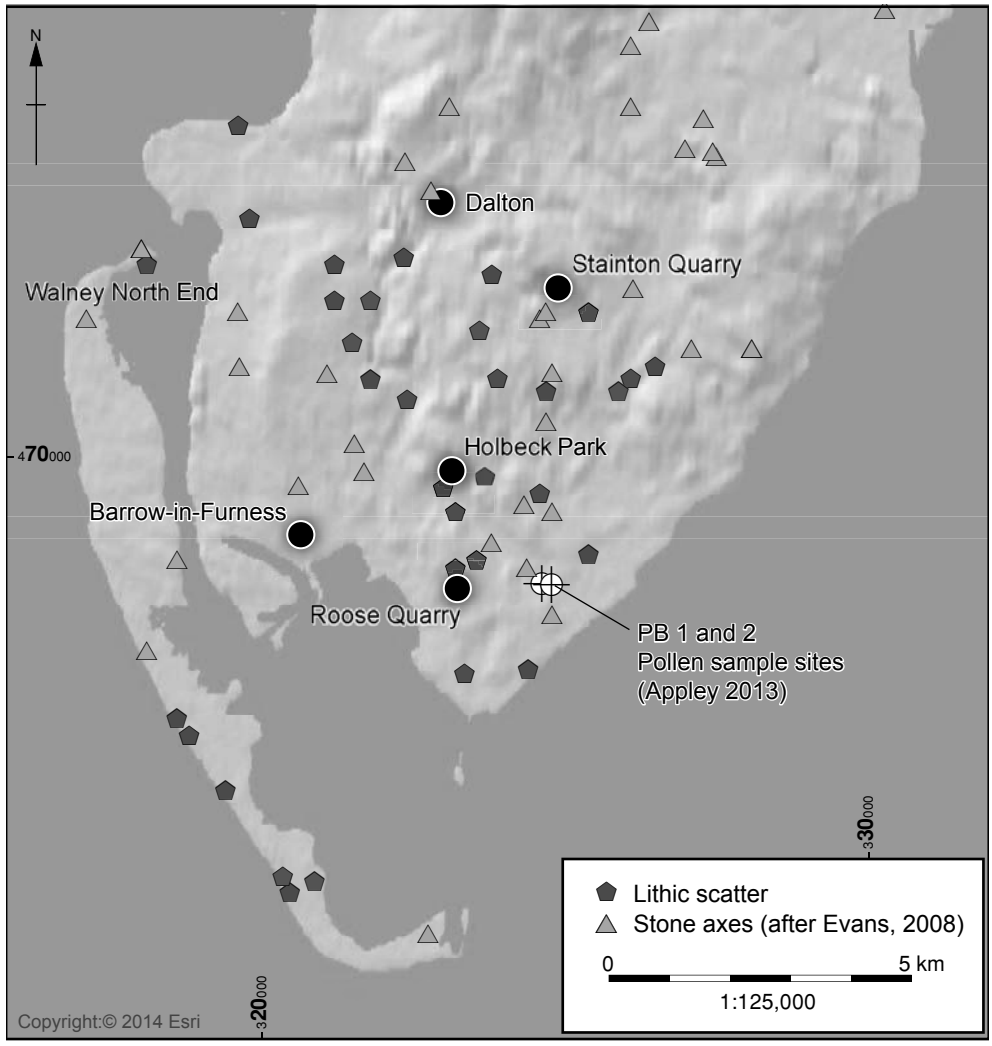

Fig. 3. Site location in relation to lithic scatters, stone axe finds and Appley's (2013) pollen sample sites (after Evans 2008).

trade (Manby 1965; Bradley and Edmonds 1993). Holbeck lies 6km to the south-east of the north end of Walney Island, where concentrations of lithic implements have been identified amongst sand dunes and raised beach deposits, together with stone axes, hearths and middens (Cross 1938; Barnes 1955).

A fieldwalking project in south Furness, undertaken by local archaeologist Dave Coward, extended north/south between Sandscale and Rampside and east/west from the outskirts of Barrow to Gleaston. The survey covered over 90 fields, including coastal sites, inland valleys and localised upland areas (Evans 2008, 118-39). Of the lithic scatters identified, many of those exhibiting late Mesolithic and early Neolithic blade-working technology were focused on low ridges between 10m and 30m AOD, overlooking Sarah Beck and the Walney channel at Stank, Leece and Roose Quarry.

There were much larger accumulations of material close to beck confluences, at Gleaston and near Furness Abbey (*ibid.*).

Archaeological works in advance of the expansion of Stainton Quarry, on the limestone uplands 3.5km to the north-east of Holbeck, revealed a significant assemblage of early Neolithic pottery, two broken polished stone axes and *c* 70 charred cereal grains, dating between *c* 3800 and 3600 cal BC and derived from a tree-throw hollow, a pit and a limestone gryke (Robinson and Town in prep). Archaeological evaluation at Roose Quarry, 1.8km south of Holbeck, identified a scatter of prehistoric features, among which was a pit containing early Neolithic pottery, a fragment of a polished stone axe, two leaf arrowheads and a single wheat grain (Jones 2001).

The excavation

The evaluation of the Holbeck Park site comprised the excavation of 24 linear trenches, with a combined length of 1km, between Leece Lane and Holbeck Park Avenue. At 15-20m AOD, Trenches 7 and 8 revealed six features (Fig. 1), all of which contained evidence for human activity although they appeared to have been naturally formed. Several more clearly natural features were devoid of charcoal or cultural material. Following the evaluation, a watching brief was maintained during topsoil stripping in 2005-6 and subsequent excavation revealed natural features, including two palaeochannels and four tree-throw holes, but no further archaeological material.

The most significant of the features identified was a large, irregular D-shaped depression (*111*) in Trench 7, measuring 3.95 x 1.75m, with a depth of 0.73m, its profile, shape and size characteristic of a tree-throw hole (Fig. 4). The lower two fills of the feature, both redeposited natural material, comprised soft reddish-brown clay silt and contained a cluster of boulders (*110*), overlain by a deposit of pale yellowish-brown clay (*109*). A long shallow curvilinear depression (*108*) was found within the upper horizon of deposit *109*, 2.6m long, 1.5m wide and 0.4m deep. The fill of depression *108* was a thin band of dark brown clay (*107*), which contained *c* 150 sherds of pottery, an assemblage of struck flint, chert and volcanic tuff, a charred wheat grain, hazelnut shells and charcoal. Above this deposit was a charcoal-flecked reddish-brown sandy clay (*106*) which contained several more sherds of pottery, a single flint microlith and a large quartz pebble.

Some 14m to the west of tree-throw *111*, conjoining sub-circular features *113* and *115*, a depression created by tree-root disturbance, had a single fill containing boulders and charcoal flecks. West of this was another tree-throw (*117*), with a single clay-rich fill (*116*) containing charcoal flecks. A pit filled by a reddish-brown silty clay containing occasional charcoal flecks was identified within Trench 8, and another, filled by similar material, was within a larger palaeochannel 2m to its west.

Radiocarbon dating

Four samples from Holbeck Park, from single-entity short-lived charred plant remains (Table 1), were submitted to Scottish Universities Environmental Research Centre

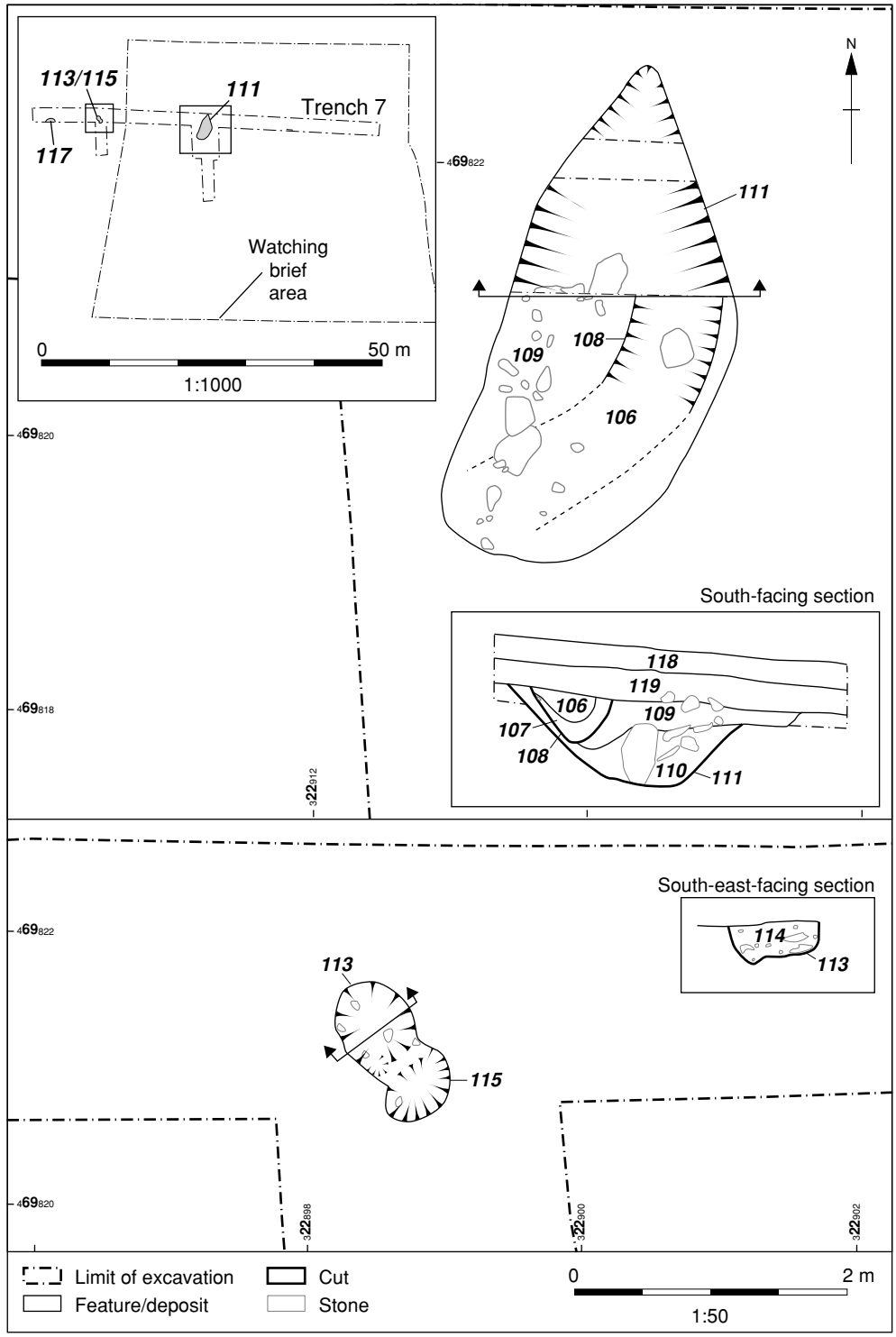

FIG. 4. The excavated tree throws in Trench 7.

(SUERC) for radiocarbon dating. Three were from feature *111* (fill *107*) and the fourth from the upper fill (*116*) of tree-throw *117*. The dates from both tree-throws are statistically consistent, probably indicating a single phase of activity (Table 1; Fig. 5). The dates have been subject to Bayesian statistical analysis as part of a study of the Mesolithic-Neolithic transition in northern England and the Midlands, which sets the Holbeck Park assemblage amongst the earliest demonstrably Neolithic occupation sites on the British mainland (Griffiths 2011). The statistically modelled dates generated from a charred wheat seed estimate that activity at Holbeck occurred at *3950-3800 cal BC* (at *95.4% probability)* or *3930–3810 cal BC (*at *68.2% probability)*. The modelled dates (represented by italics in the text) are shaded on the diagram (Fig. 5). The results have been calibrated using IntCal3 and OxCal v4.3.2 (Bronk Ramsey 2001; 2009; Reimer *et al* 2013). The date ranges have been calculated using the maximum intercept method (Stuiver and Reimer 1986); they are quoted in accordance with Stuiver and Polach (1977), and rounded out by ten years when the error term is greater or equal to 25 years, and by five years when the error term is less than 25 years (Mook 1986).

TABLE 1: List of radiocarbon determinations.

Lab code	**Context**	**Material**	**Age BP**	**$\delta^{13}C$ relative to VPDB**	**Calibrated date (95.4%)**	**Modelled date (95.4%)**	**Modelled date (68.3%)**
SUERC-10772 GU14189	*107*	Charred wheat seed	5065±35	-24.8‰	3960-3790 cal BC	*3950-3800 cal BC*	*3930-3810 cal BC*
SUERC-10773 GU14190	*107*	Charred hazelnut shell	5025±35	-28.6‰	3940-3710 cal BC	*3950-3770 cal BC*	*3940-3790 cal BC*
SUERC-10777 GU14191	*107*	Alder/ hazel charcoal	5060±35	-24.1‰	3960-3780 cal BC	*3950-3790 cal BC*	*3940-3800 cal BC*
SUERC-10778 GU14192	*116*	Alder/ hazel charcoal	5070±35	-26.7‰	3960-3790 cal BC	*3950-3800 cal BC*	*3930-3810 cal BC*

The Pottery

Alison Sheridan, Carol Allen and the late Alan Vince

In total, 159 sherds plus a few fragments, weighing 832g, were recovered from fills *107* and *106* of depression *108* in tree-throw *111*, and from unstratified contexts. All but 13 of the sherds were found in *107*. The assemblage comprises at least 15 vessels, all belonging to the Carinated Bowl (CB) tradition in its earliest, 'traditional CB', form (Sheridan 2007). The sherds are fairly small and while some conjoins/refits were identified, no complete profile is represented; in most cases, less than five per cent of any individual pot is present.

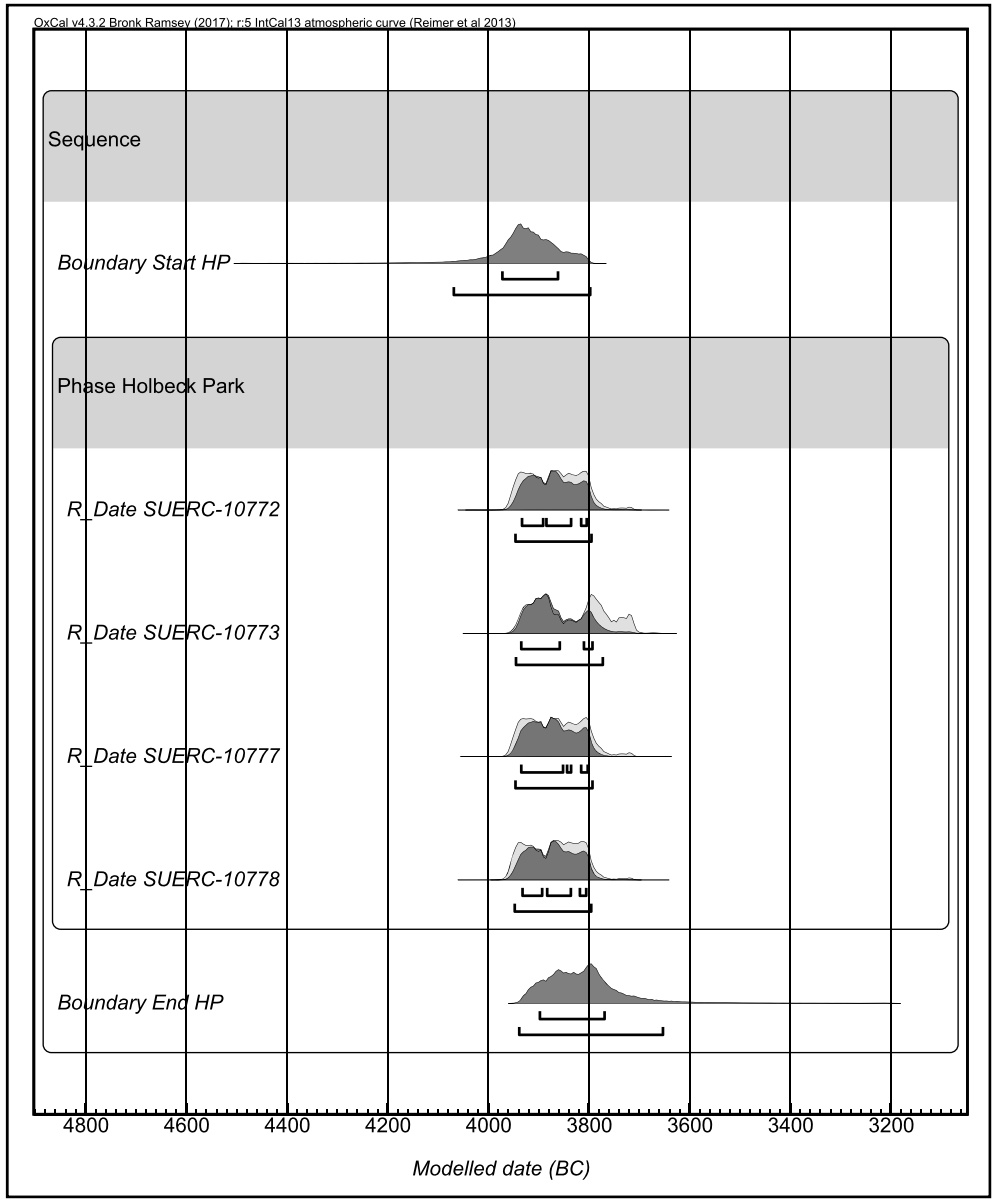

FIG. 5. Radiocarbon model of the determinations from Holbeck Park (listed in Table 1). The dark-shaded areas show the modelled dates.

Despite the fragmentary nature of the pots, it is clear that they will have been round based, and that most had been carinated bowls: even where carination sherds are absent, the forms of the rim and neck are consistent with those found on this shape of vessel in other CB assemblages. One S-profiled bowl is attested (Pot 5, Fig. 6).

The rims are upright or everted and are rounded (Pots 3, 8-10, 12 and 15; Fig. 6), slightly flattened (Pot 6), or gently pointed (Pots 4, 6 and 7; Fig. 7). The rounded

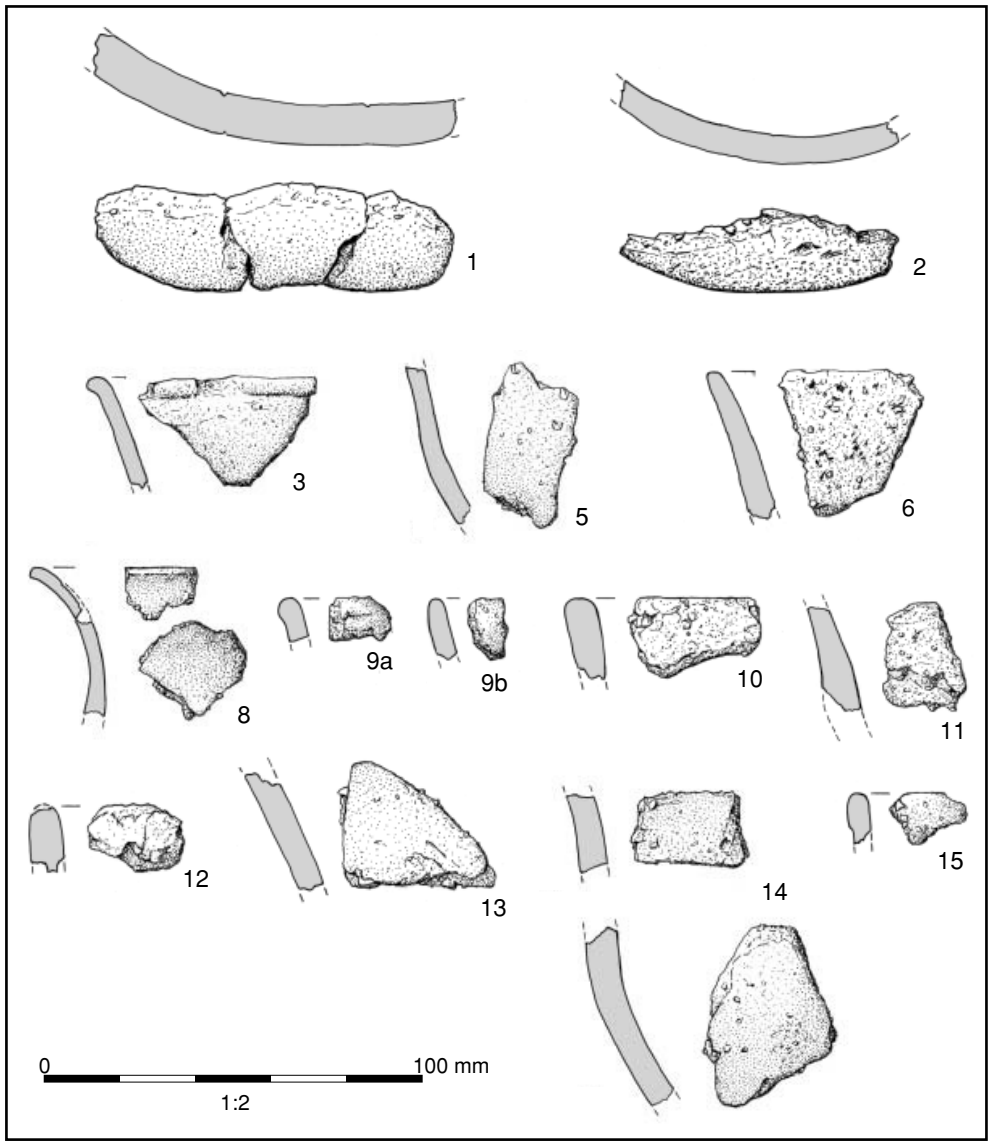

FIG. 6. Pottery (Marion O'Neil).

forms include those formed by rolling the rim outwards and either leaving it as a projecting, beaded form (Pots 3 and 8), or folding it over to leave a slight external thickening (Pots 9a and 10). Necks are straight (Pot 4), slightly curving (Pot 6) or, in one case, more markedly curving (Pot 8), and are either gently everted (Pots 3, 4, 6 and 8) or, in the case of Pot 7, more markedly splaying. Carinations are gentle (Pots 4, 7, 13), and Pot 7 shows a thickening of the neck above the carination, a constructional detail characteristic of some traditional CB carinated bowls. Coil-construction is indicated by several breaks along coil-joint planes (Pot 7).

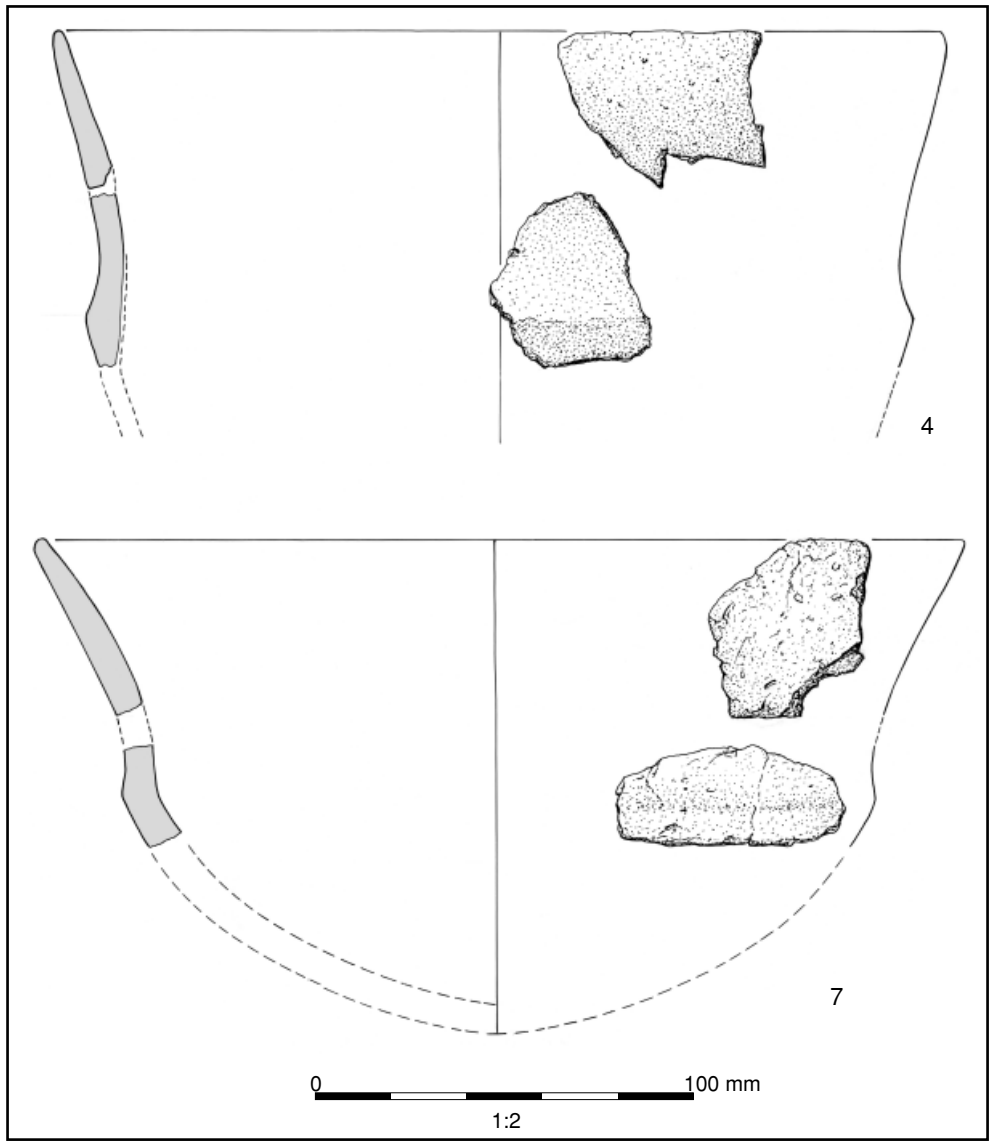

FIG. 7. Reconstructed pottery vessels (Marion O'Neil).

Even though lithic inclusions tend to protrude from, or at least be visible on, the surfaces of most pots, care had been taken to achieve as smooth a surface as possible (especially on the exterior), through wet-smoothing. The exterior of Pots 4 and 5 had been polished to a low sheen, while on Pot 8, the exterior had been burnished to a higher sheen, while the interior had been polished. The golden mica platelets present in some of the pots (e.g. Pot 5) impart a slightly glittery appearance to the surface.

As for vessel size, estimated rim diameters range from *c* 160mm (Pot 3) to possibly over 300mm (Pot 13). Wall thicknesses range from a very thin 4mm (Pot 8) to 14mm (Pot 1), with most sherds falling within the 5-9mm range. While some of the largest

are also the thickest-walled, there is no firm correlation between wall thickness and vessel size.

That some of the pots had been used for cooking is suggested by the patches of thin, black organic encrustation on the exterior surface (Pots 3, 4, 8, 13, 14 and possibly 2) and on the interior of Pot 1. Use as a cooking pot could also account for the scorching to the base of Pot 1, and it may be that the burnt sherds had been left in a hearth after pots had broken during use. It is likely that some vessels had been used for serving and consuming foodstuffs. No vessel seems sufficiently large to have acted as a storage jar for large amounts of material.

Fabrics: The colour of the sherds varies. Some are black and/or blackish-brown throughout (e.g. Pot 5); the burnt sherds are light orange-brown throughout; and sherds from Pots 1 and 2 have a dark core but lighter-coloured exterior, suggesting a rapid firing that had not burnt out all of the carbonaceous material naturally present in the clay.

Examination of the sherds under a binocular microscope, followed by petrological thin-sectioning of four sherds (from Pots 1, 2, 4 and 6), led to the definition of two fabrics on the basis of their groundmass and lithic inclusions (Vince 2006; Table 2). In each case, on the basis of British Geological Survey Mapping (BGS 2017), a local source is likely. Fabric 1 was probably derived from weathered mudstone from the boulder clays immediately to the north of the site, with the granite inclusions, which had been deliberately crushed, from glacial erratics originally from south-west Scotland or Shap, possibly found in a riverine or coastal environment (Vince 2006). Fabric 2 was derived from an alluvial clay, containing finely divided fragments of various origins, including rounded quartz sand (perhaps from the St Bees Sandstone), granitic and possibly igneous rocks; this is likely to have been sourced in the estuarine or marine alluviums to the south of the site (*ibid.*).

TABLE 2: Petrological thin-section pottery analysis.

Fabric	Description	Vessels
1	Groundmass of light brown anisotropic baked clay minerals, with sparse angular quartz and moderate rounded dark brown grains up to 0.1mm across, containing inclusions of biotite granite, microgranite and a two-mica granite	Pots 1, 2, 6, 7, 9, 10, 12–14 and some unallocated sherds
2	Groundmass of brown, optically anisotropic baked clay minerals, abundant angular quartz, moderate muscovite and rounded dark brown and opaque grains, and sparse biotite and accessory minerals up to 0.1mm across	3-5, 8, 11, 15 and six unallocated sherds

Discussion: The assemblage is immediately recognisable as belonging to the Carinated Bowl (CB) tradition, and more specifically to its earliest variant to appear in Britain and Ireland, namely 'traditional CB' pottery (as defined by Sheridan 2007; 2016). The characteristic features include the simple rim forms, the gentle carinations,

the overall vessel forms, the careful surface finishing, the presence of remarkably thin-walled vessels, as well as somewhat thicker-walled vessels, attesting to a high degree of skill by the potters, and the presence of a range of textures. Parallels for all these features, and for the use of crushed granitic rock as a filler, can be found as far away as Aberdeenshire (e.g. Sheridan 2009; 2014). The consistency in design, and in the manufacturing technique, down to the thickening of the neck just above the carination in the case of Pot 7, across large parts of Britain and Ireland suggests the introduction of a well-established potting tradition, in which potters were following norms regarding vessel shape, construction and finish, clay preparation and the selection of fillers. The Continental background to this particular tradition can be found among the regional ceramic groups in northern France and Belgium that emerged during the late fifth millennium BC, their repertoire including elements recognisable from the Chassey and early Michelsberg traditions (Sheridan 2007; 2016). All of this is consistent with the hypothesis that this tradition was introduced by Continental potters belonging to immigrant farming groups arriving from the Nord-Pas de Calais region of northern France between the 41st and 39th centuries BC (Sheridan 2010). The dynamics of this process of immigration have been debated, with Whittle *et al's* (2011) hypothesis of an arrival in Kent and the Thames Estuary during the 41st century BC, followed by a northwards and westwards spread, being critiqued in favour of a broader diaspora up the east coast of Britain (Sheridan 2012). The key point to note in the present context, however, is that CB pottery was a novel and introduced technology.

The dating of the Holbeck Park assemblage to within the first quarter of the fourth millennium BC is consistent with other dates obtained for traditional CB assemblages in Britain, the closest being from Lockerbie Academy, Dumfries and Galloway (Sheridan 2007; 2011; Whittle *et al* 2011). The discovery, and secure dating, of such an early Neolithic assemblage in north-west England is of considerable significance to an understanding of the Neolithic culture of this region.

Local comparanda include a carinated bowl of probable traditional CB type from Roose Quarry, 1.8km to the south of Holbeck (Jones 2001), sherds from at least 20 traditional CB vessels from Stainton Quarry, 3.5km to the north-east (Robinson and Town in prep), and a vessel with a beaded rim in a 'hard thin fabric' from Trough Head, Walney (Barnes 1970, 5–6). On the Westmorland Fells, ten sherds of what appears to be traditional CB pottery were found at Howe Robin 6 (Manby 1985; Cherry and Cherry 1987; Manby 2007, 88), while a single sherd, the description of which is not inconsistent with that of traditional CB pottery, was found at Shap, Kemp Howe 5 (Cherry and Cherry 1987; 1995; Manby 2007, 90). In the Eden Valley, a burnished, markedly everted rim sherd from a large, traditional CB vessel was found at Low Plains (Gibson 2015), and a small assemblage of traditional CB pottery was excavated from a palaeochannel at Stainton West, near Carlisle (Howard-Davis and Tinsley forthcoming).

The famous assemblage of CB pottery from Ehenside Tarn (Manby 2007) appears to be of 'modified CB' type, the markedly concave necks of two of the pots and the well-defined shoulder on a third having very close parallels on the other side of the Irish Sea (Sheridan 1995). Although there are no reliable dates for Ehenside Tarn, a context containing sherds from a 'modified CB' bowl found at Fitz Park, Cockermouth,

produced a determination of 3707-3638 cal BC (4886±29 BP; SUERC-52877; Williams and Holgate 2015).

Several other pottery finds in Cumbria merit re-examination as potential candidates for the CB tradition. Undecorated sherds from Seal Howe 5 and Little Asby Scar 6 in the eastern uplands, found alongside (or close to) Peterborough Ware (Cherry and Cherry 1987; Manby 1995), could represent a variant of 'modified' CB pottery, the use of which extended into the middle Neolithic when Peterborough Ware was in use.

Lithics

Fill *106* of the tree-throw pit (*111*) contained a caramel-coloured rod microlith (Table 3), probably made on pebble flint (Fig. 8). This was of classic form, with a rectangular cross-section and blunted down both parallel lateral edges. The same context contained an unworked white quartz cobble. Fill *107* contained a large flake of mottled light grey flint and two edgeworn flakes, one on pebble flint and the other on a flecked honey-coloured flint. These, plus one piece of unburnt waste on translucent brown flint, and one burnt flake, exhibited dorsal scarring relating to blade-working.

TABLE 3: Constituents of the lithic assemblage.

Context	**Flint**	**Spalls/ chips <5mm**	**Other stone**	**Total**
106	Rod microlith		Quartz pebble	2
107	Two edgeworn flakes, two waste flakes, four pieces of burnt flint waste, including two broken bladelets	33	Two tuff flakes	41
Unstratified (Trench 7)	Two pieces of chert waste, one grey, one white			2
Total				45

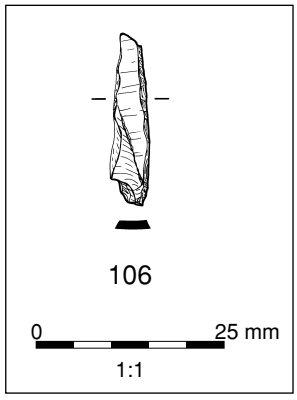

FIG. 8. The rod microlith from fill *106*.

The lithic assemblage is small and comprises a restricted range of forms, the sole diagnostic being the rod microlith, which, together with two tiny burnt broken bladelets, would suggest a date before 4000 BC, in the late Mesolithic period. However, recent radiocarbon models have shown that rod (or at least parallel-sided) microliths remained in use in parts of northern England into the 39th and 38th centuries cal BC (Griffiths 2014), which is in accord with dates from the tree-throw hollow at Holbeck Park.

Pebble flint, chert and tuff, the three main lithic raw materials locally available in Furness, are all present. Pebble flint, derived from shingle-beach deposits, occurs in colours ranging from grey, to honey-coloured, orange

and brown (Cherry 2009; Brown *et al* forthcoming). Chert, from white through grey to black, and of varying quality and colour, outcrops in the Furness limestones, where quartz is also readily available (Cross 1939; Barnes and Hobbs 1952).

There are two pieces not made on locally available flint: an edge-worn flake on a light grey flint, and a waste flake on translucent brown flint. Both are from a Yorkshire chalk or till source (see Cherry 2009). At Stainton West, near Carlisle, scientifically sourced Yorkshire flint has been identified in later Mesolithic contexts, alongside Scottish and Yorkshire cherts and Arran pitchstone (Brown *et al* forthcoming).

Fill *107* in the tree-throw hollow contained two fragments of worked tuff. These were a small waste flake incorporating a thin quartz band, and a larger flake with a sharp, but unworked, long edge; this had a striking platform and bulb of percussion suggesting it had been struck from a larger core. Volcanic tuff, whilst being available from its parent sources in the central Lake District, also occurs in shingle-beach deposits and in the glacial drift (Cross 1939; Barnes and Hobbs 1952; Davis and Edmonds 2011). Tuff implements made on reworked polished or roughout axe fragments are relatively common within lithic collections across Cumbria (Evans 2008). Tuff pebbles were also used to create forms analogous to those made on flint: cores, microliths, blades, flakes and scrapers frequently occur within surface scatters and excavated assemblages from the Mesolithic period onwards (Cherry and Cherry 2000; 2002; 2007; Cherry 2009; Brown *et al* forthcoming). Neither piece from Holbeck Park, however, showed any evidence, in the form of polished surfaces, edge facets, or thinning scars, that they had been struck from stone axes.

The environment

Analysis of pollen sequences from the Sarah Beck valley (Appley 2013), *c.* 2.4km to the south of Holbeck (PB1, PB2, Fig. 2), suggested that during the Late Mesolithic and early Neolithic periods, mixed deciduous woodland colonised the peninsula. Although marine conditions on the valley floor precluded plant colonisation at this time, there were wetland peats and alder along its edges, and the fringes of the inter-tidal zone were characterised by open woodland, with hazel, bracken and grasses (*ibid.*). Site PB1 (SD 24530 68112) provided evidence for short-lived clearance *c* 4000 BC (*c* 6500 BP), with plantains probably indicating human exploitation of natural clearings (*ibid.*). Pollen core PB2 (SD 24693 68095) also suggested a short-lived episode of small-scale clearance in the early Neolithic period, characterised by the brief decline of oak, and the appearance of pasture indicators including grasses, plantains, and small amounts of charcoal. The amount of pine trees was unaffected, which was taken to suggest that clearance was taking place on the boulder clay hills north of the valley, rather than on the fluvioglacial ridges where pine (which prefers sand) may have grown in relative abundance (*ibid.*).

Carbonised Plant Remains

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Bulk sediment samples from the fills of tree-throw *117* and pit *108* contained abundant oak, alder and hazel charcoal, and that from the fill of tree-throw *111* yielded moderate

volumes of the same materials. The fills of *111* included hazelnut shells and a single, sand-encrusted, carbonised emmer or spelt grain from fill *107* (*Triticum* sp.).

Although several pollen sequences from Furness have provided evidence for early Neolithic vegetation disturbances (*above*), none has recorded evidence for cereal agriculture; this has been taken to suggest pastoral clearances resulting from collecting leaves for winter fodder (Oldfield and Statham 1963; Appley 2013; Grosvenor 2014). Direct evidence for Neolithic cultivation in the region has been very limited, comprising a single wheat grain (*Triticum* sp.) from Roose Quarry (Jones 2001), and a single wheat grain, probably emmer (*Triticum dicoccum*) from Fitz Park near Cockermouth, dated to 3710-3640 cal BC (4886±29 BP; SUERC-52877; Williams and Holgate 2015).

Excavations at Stainton Quarry, 3.5km north of Holbeck Park, significantly alter this picture. With radiocarbon determinations between *c* 3800 cal BC and 3600 cal BC, one pit produced 60 charred cereal grains, including 15 of barley, 13 emmer and 11 of wheat (Robinson and Town, in prep). A tree-throw on the site, which contained Carinated Bowl (CB) pottery, also produced four charred cereal grains, charred hazelnut shell, and oak, hazel, rose, willow/poplar and guelder rose, birch and heather charcoal (*ibid.*).

Despite problems in recognising cereal agriculture in the pollen record, and understanding the timings and scale at which it was undertaken, the evidence from Holbeck Park, Roose Quarry (Jones 2001) and Stainton Quarry (Robinson and Town in prep) clearly indicates that cereals were being grown. In addition, lipid analysis on Carinated Bowl (CB) pottery from Stainton Quarry identified dairy fats and plant or beeswax residues (*ibid.*) which, taken together with the cereal assemblage, is clearly suggestive of a mixed farming economy early in the Neolithic.

The landscape

Many later Mesolithic and early Neolithic lithic scatters seem to have been associated with the raised beach deposits and estuarine sand-dune systems of the Cumbrian coast, in particular at Eskmeals (e.g. Nickson and MacDonald 1955; Bonsall *et al* 1989; Bonsall 2007; Cherry and Cherry 1986; 1996; 2002). Whilst lithic scatters identified in Furness have not illustrated the large-scale evidence of later Mesolithic activity identified at Eskmeals, they occur in analogous settings: just above the former coastline; along the margins of former channels and feeder streams leading into the present-day estuary; and further inland, near springs and at the meetings of valley systems (Evans *et al* forthcoming).

Excavated evidence for the dated tree-throws at Holbeck Park, together with the local pollen data (Appley 2013), suggest that the site was a clearing within mixed deciduous woodland. At a height of *c*. 18m AOD, more or less the same as surrounding lithic scatters (Evans 2008, 120), the site sat above and overlooked the area of tidal influence at the head of Sarah Beck. Although the presence of a permanent local water source is uncertain, a small tarn is shown upslope of the site on the first edition Ordnance Survey map of 1851. During the 2006 excavation, it was noted that, during rainy

periods, water run-off, defined by the local topography, collected and flowed through palaeochannels on the site, one of which intersected with tree-throw *111*. Should similar conditions have existed during the early Neolithic period, it is possible that high rainfall, flooding and run-off could have contributed to the creation of a natural clearing. Oak, alder and hazel charcoal was identified from the tree-throws and could represent either domestic fires or the burning of brushwood.

Tree-throws and early Neolithic depositional practice: Similar features to that at Holbeck, with crescent-shaped hollows produced through the kicking up of tree-roots, are well known in river-terrace archaeology (e.g. Moore and Jennings 1992, 13; Evans *et al* 1999, 242; Fig. 9). Across much of Britain, deposition in the negative features created is well established from the later Mesolithic to the later Neolithic (e.g. Evans *et al* 1999; Barclay *et al* 2003; Whittle *et al* 2011).

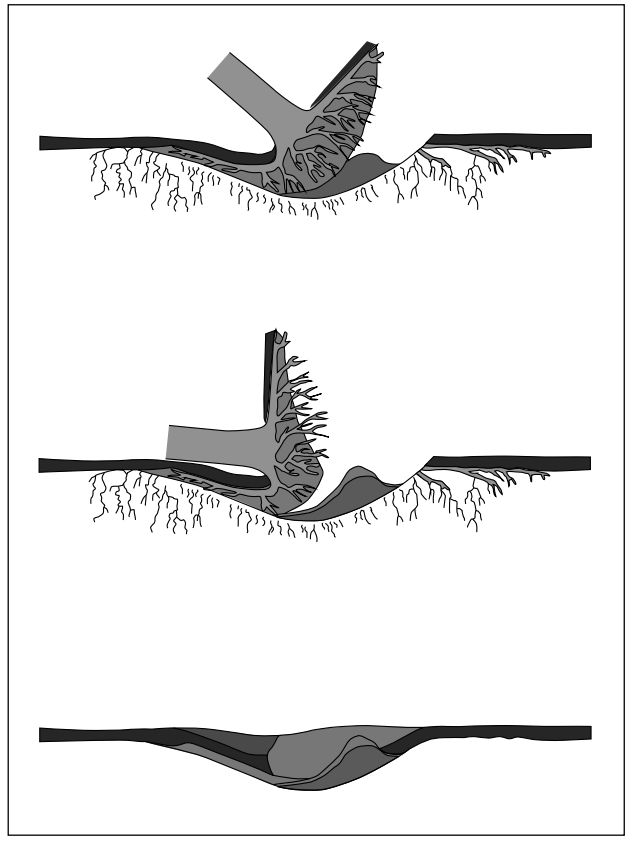

FIG. 9. Tree-throws as archaeological features (after Barclay *et al* 2003).

Material deposited in many early Neolithic tree-throws is comparable to that from Holbeck Park; such features regularly contain Carinated Bowl (CB) pottery, worked flint, including leaf-shaped arrowheads, fragments of stone axes, and deposits of charcoal, hazelnuts and cereal grains (Evans *et al* 1999). Early Neolithic tree-throw assemblages also appear to be similar to those within shallow bowl-shaped pits and hollows, with which they are often closely associated, occurring in pairs or clusters on sites within occupation areas (e.g. Garrow 2007; Anderson-Whymark and Thomas 2012). Dates from tree-throw assemblages within such contexts are often early in these site sequences, which might suggest that tree-throws reflect primary clearance (Evans *et al* 1999, 244).

The excavated evidence and radiocarbon dates from Holbeck Park appear to suggest a single, relatively short-lived activity episode. Whilst this does not preclude more features beyond the excavated areas, there was no evidence to indicate the site was

a place subject to repeated activity. The earliest date from the tree-throw at Stainton Quarry, at 3939–3708 cal BC (5012±26 BP; SUERC-68521), is broadly contemporary with the dates from Holbeck (3960-3780 cal BC; 5065±35 BP; SUERC-10772). The Stainton Quarry site, which seems to have incorporated a spring (Robinson and Town in prep), was returned to on numerous occasions, the archaeology indicating clear evidence for both dairy and cereal agriculture. The choice of some locations over others might be related to the presence of soils suitable for cultivation; fresh water; or changes in environmental conditions at the time (e.g. Tipping 2010). Equally, it may relate to changes in patterns of movement and occupation following the introduction of domesticates. Rearing plants and animals requires a degree of certainty: not only fresh water, but also being in the right places at the right times for grazing and harvesting; and these requirements would need to be incorporated into routines of landscape exploitation (Edmonds 1999; Cummings 2017).

Furness, the Mesolithic-Neolithic transition, and the wider world

The tree-throws at Holbeck Park are significant as, presently, they are amongst the earliest dated episodes of Neolithic occupation on the British mainland (Griffiths 2011). The cereal grain and Carinated Bowl (CB) pottery in the tree-throw hollow illustrate the presence of early Neolithic materials and practices close to the known temporal transition from hunter-gatherer to farmer. At a national scale, microliths usually 'disappear' around the time of the transition (e.g. Thomas 2007, 426) and the presence of a single example at Holbeck provides evidence for an element of continuity between Mesolithic and Neolithic ways of life, which seems to be mirrored east of the Pennines (Griffiths 2014).

The rates and ways in which the adaption of a Neolithic lifestyle happened, at different times in different places across Britain and Ireland between *c* 4000 cal BC and 3700 cal BC, is the subject of intense academic debate (e.g. Thomas 2007; 2013; Sheridan 2007; 2010 (and see *above*); Whittle and Cummings 2007; Whittle *et al* 2011; Cummings and Harris 2011; Whitehouse *et al* 2014). Despite polarised positions in arguments for Neolithic culture being 'introduced' by continental farmers or 'taken on' by indigenous communities, both have currency, and the increasing availability of radiocarbon dates is beginning to indicate that there was both continuity and change across the transition. However, where the evidence exists, the onset of 'Neolithic' practices just after *c* 4000 cal BC seems rapid and substantial, and the following three centuries seem to have been a time of great flux (Cummings 2017).

Whilst existing Mesolithic lifestyles were clearly transformed by the introduction of domesticates, elements of continuity within the archaeological record suggest this occurred within and alongside existing practices (Cummings and Harris 2011). The first monuments were constructed several hundred years after the introduction of pottery and domesticates, which appears, in part, to have been a reaction to changing tenurial concerns and the need to renegotiate inter-community relations (Cummings 2017).

In Cumbria, that there were elements both of continuity and change across the Mesolithic-Neolithic transition is evidenced both by landscape use, as people clearly returned repeatedly to many of the same locations, and by material culture (Evans 2008; Evans *et al* forthcoming). At Stainton West, inland of the present Solway estuary, in a meander of the River Eden, excavation has revealed occupation features and a stratified assemblage of over 300,000 lithics, predominantly from the mid-fifth millennium BC, but also from the early and later Neolithic and into the early Bronze Age (Brown *et al* forthcoming). Analysis of the lithic raw materials from later Mesolithic contexts has clearly established the existence of long-distance exchange networks, stretching across the Pennines and along the Irish seaboard into western Scotland (*ibid.*). Scientific dating and petrographic analysis of axes from Stainton West have also established that the later Mesolithic period saw the beginnings of axe-making on Group VI stone from the Great Langdale area (*ibid.*). This was an aggregation site, close to the Solway, where communities were already coming together, perhaps seasonally, to trade and to exploit the resources available.

It is widely accepted that Mesolithic and Neolithic communities were fully versed in maritime travel (e.g. Garrow and Sturt 2011; Sturt *et al* 2013; Garrow *et al* 2017). On the basis of large collections of prehistoric artefacts, including those made on non-local lithic raw materials, the existence of prehistoric coastal 'havens' (including Walney Island, on Furness, and Luce Bay, north-west of the Solway) have been suggested, where coastal communities traded with seaborne travellers (Bradley *et al* 2016). Furness is defined by Morecambe Bay and the Duddon estuary, and Holbeck Park, like many other sites in the region, was set at the head of a tidal creek. The estuaries, bays and peninsulas which characterise the Irish Sea coast seem likely to have provided points of contact, for people coming from the land and people coming from the sea. The evidence from Holbeck, Stainton Quarry (Robinson and Town in prep), sites with similar dates on the Scottish part of the Irish Sea coast (Becket and MacGregor 2009; 2012), and the islands of the western seaways (Garrow *et al* 2017) is beginning to provide a clearer picture of the Mesolithic-Neolithic transition of the Irish Sea regions.

In addition to evidence derived from occupation contexts, radiocarbon dates from stone axe production sites in the Langdales also clearly suggest a significant burst of activity in the first centuries of the fourth millennium BC (Bradley and Watson forthcoming). Although there is no solid evidence, yet, for late Mesolithic axe working at the known sources, the earliest of these dates, at 3920-3800 cal BC (5042±34 BP; SUERC-68368) from Site 98 on Stickle Pike (*ibid.*), is contemporary with the Holbeck tree-throw. Dates from excavation of the enclosure pre-dating the Long Meg stone circle are very similar, at 3950-3790 cal BC (5034±29 BP; SUERC-64639; ASDU 2016). These three closely correlating Neolithic dates are much earlier than current academic models might suggest, outside south-eastern Britain, for the appearance of the main constituents of the so-called 'Neolithic package': pottery and cereals; monuments; and polished-stone axes (e.g. Whittle *et al* 2011). What these dates might 'mean' in practice remains open to interpretation. Axe production is now believed to have begun, at a small scale at least, in the Later Mesolithic period (Brown *et al* forthcoming) and the strong evidence for mixed agriculture from Stainton West

(Carlisle) and Stainton Quarry (Furness) seems to be only a few generations later than the evidence from Holbeck. What is clear is that those few generations were important ones; contact with communities using domesticates had taken place, cereals were being grown and gatherings at the sites of the first monuments had begun. Although the evidence from Holbeck is equivocal in many ways, the deposition of material culture in the tree-throws there marked an important place, and time, in the transition to farming in western Britain.

Cumbria has often been considered to be a cultural backwater, a poor cousin of the better-known prehistoric regions east of the Pennines and along the Irish seaboard. However, the evidence is beginning to suggest that the historical focus on Neolithic ideas, practices and material culture 'arriving late' to the region can now be discounted. Whilst these new excavations and radiocarbon dates have begun to transform long-held interpretations of the Cumbrian Neolithic, much work remains to be done.

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