

Expanding current understanding of the function, style and chronology of Grooved Ware from the A9 Dualling: Luncarty to Pass of Birnam

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ABSTRACT

In 2018 on behalf of Transport Scotland AOC Archaeology Group undertook archaeological investigations in advance of the construction of the 9.5km A9 Dualling: Luncarty to Pass of Birnam. Six archaeological sites were excavated, revealing evidence of activity spanning the Early Neolithic to the early medieval period. Neolithic activity was confined to four sites, consisting of a palimpsest of pits, post holes and vestigial structures, some of which were associated with assemblages of hand-made ceramics, struck lithics and a small but revealing ecofact record. This paper focuses on the ceramic assemblages and, in particular, the comprehensive group of Late Neolithic Grooved Ware vessel sherds. It considers the form and function of the vessels, investigating aspects of decorative style alongside lipid analysis of surviving organic residues on the surfaces of the sherds and a suite of radiocarbon dates with a view to expanding our current understanding of the function, style and chronology of the later phases of Grooved Ware in the region and eastern mainland Scotland more broadly.

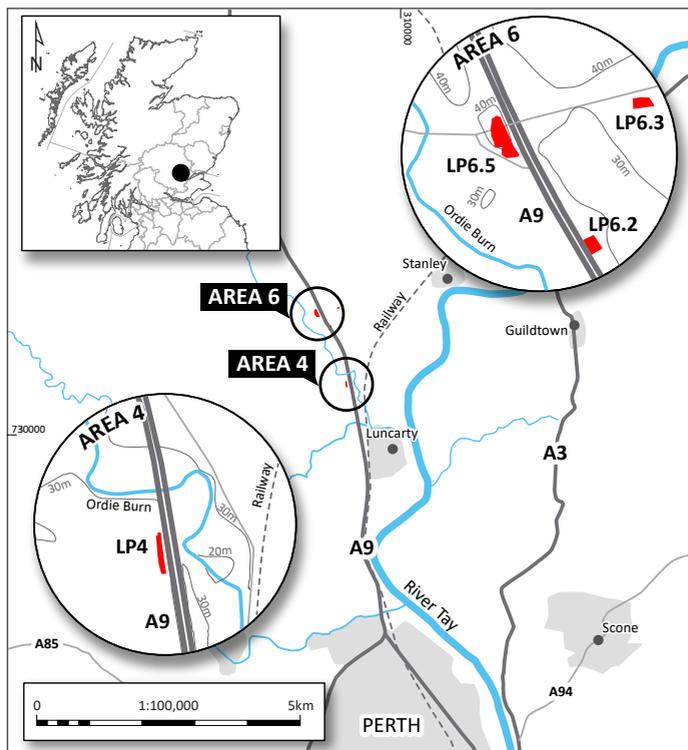
INTRODUCTION

A trial trenching exercise, January to March 2018, and subsequent archaeological excavations, March to June 2018, were undertaken by AOC Archaeology Group on behalf of Transport Scotland as part of the 9.5km A9 Dualling: Luncarty to Pass of Birnam (A9: L to P of B), Perth and Kinross (NGR: NO 0933 2936 – NO

0673 3764). Neolithic activity comprising pits, post holes and structural remains were identified at four sites: LP4, LP6.2, LP6.3 and LP6.5 (Illus 1). These archaeological sites were located along a 1.5km stretch of the scheme (Illus 2) within a geological landscape of sands and gravel substrata, positioned on high ground close to the Ordie Burn, to the south (LP6.5) and south-east (LP6.2 and LP6.3) of Newmill Cottages and

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ILLUS 1 Location of the A9 Dualling: Luncarty to Pass of Birnam excavations. (© AOC Archaeology)

Souterrain (Watkins 1980; Canmore ID 27024), and south-east (LP4) of Gellybanks Standing Stones (Scheduled Monument 1548; Canmore ID 27039).

This paper considers the evidence of Neolithic activity at sites LP4, LP6.2, LP6.3 and LP6.5, focusing on the moderately sized important assemblage of Late Neolithic Grooved Ware pottery and other diagnostic Neolithic ceramics, which were recovered during the excavations and attempts to set these assemblages in their wider context. The artefact and ecofact assemblages are discussed in the light of four key research objectives identified at the outset of the post-excavation programme (Clarke 2019: table 1), which are:

- how much can be said about the diet (and lifestyle) of people in the Neolithic? (Neo Research Objective (RO) 1)

- can any information on the cultivation and herding strategies of the farming groups be ascertained from the ecofact record? (Neo RO 2)
- can any chronological overlap (and/or sharing of design features) between the use of Impressed Ware and Grooved Ware be demonstrated from the ceramic assemblages? (Neo RO 3)
- can the ceramic assemblages provide information to shed light on the date for the beginning and end of Grooved Ware use in mainland Scotland? (Neo RO 4)

Much recent work on Grooved Ware in Scotland has been focused on the evidence from Orkney, where the excavation of sites with several phases of occupation has produced data compatible with detailed sequencing of assemblages (eg Barnhouse: Jones 2005; Pool, Sanday:

MacSween 1992; MacSween et al 2015). Notable exceptions to this include the recent Historic Environment Scotland-funded *Tracing the Lines* project (Copper et al 2021; ScARF 2019),¹ which aimed to improve the dating of Grooved Ware assemblages from Scotland south of Orkney, culminating in the compilation and presentation a detailed gazetteer which is available to access online via the Scottish Archaeological Research Framework (ScARF) website² and is referred to throughout this paper as the Database of Scottish Grooved Ware (DSGW).

The assemblages recovered from the A9: L to P of B excavations provide an opportunity to explore local and regional traditions of the latest phases of Grooved Ware use in mainland Scotland, providing a synthesis which can be used as a starting point for comparative work on Grooved Ware from Perth and Kinross and the surrounding areas.

The later prehistoric and early medieval archaeological remains identified across these same sites will be considered in a separate paper (Wilson in prep).

ARCHAEOLOGICAL BACKGROUND

The area surrounding the A9: L to P of B is rich in archaeological remains dating from prehistoric to modern periods (AOC 2018a, 2018b, 2019). The earliest recognised human activity in the area dates to the Neolithic period (c 4100–2500 BC; ScARF 2012a).

In the simplest of terms, the Neolithic period is defined by a move away from hunting and gathering, and seasonal or semi-temporary structures, to pastoral and arable farming which, although not negating seasonal movement of peoples, communities and livestock, encouraged a more sedentary population. This development, alongside the continued movement of peoples from the Continent by immigrant farming groups (as demonstrated from DNA evidence, Brace et al 2019), stimulated the introduction and adoption of a new economy, lifestyle and technology (eg Sheridan's model of Neolithization, Sheridan 2010). These new technologies, crafts

and materials include the introduction and use of pottery with the modes of production, form and styles of imported Continental pottery being rapidly taken up and copied by local communities before being modified to fit local preferences, observed as subtle shifts in pottery style (Sheridan 2007). Year-round dwelling places appear at the beginning of this period. Larger timber-built halls are very rare but a notable example is present at Claish, Stirling (Barclay et al 2002) and further east, at Carnoustie, Angus (Hunter-Blair 2018). These halls may be communal dwelling places of groups of immigrant farmers, in use until they felt sufficiently well established to form smaller, dispersed, individual farmsteads (Sheridan 2013).

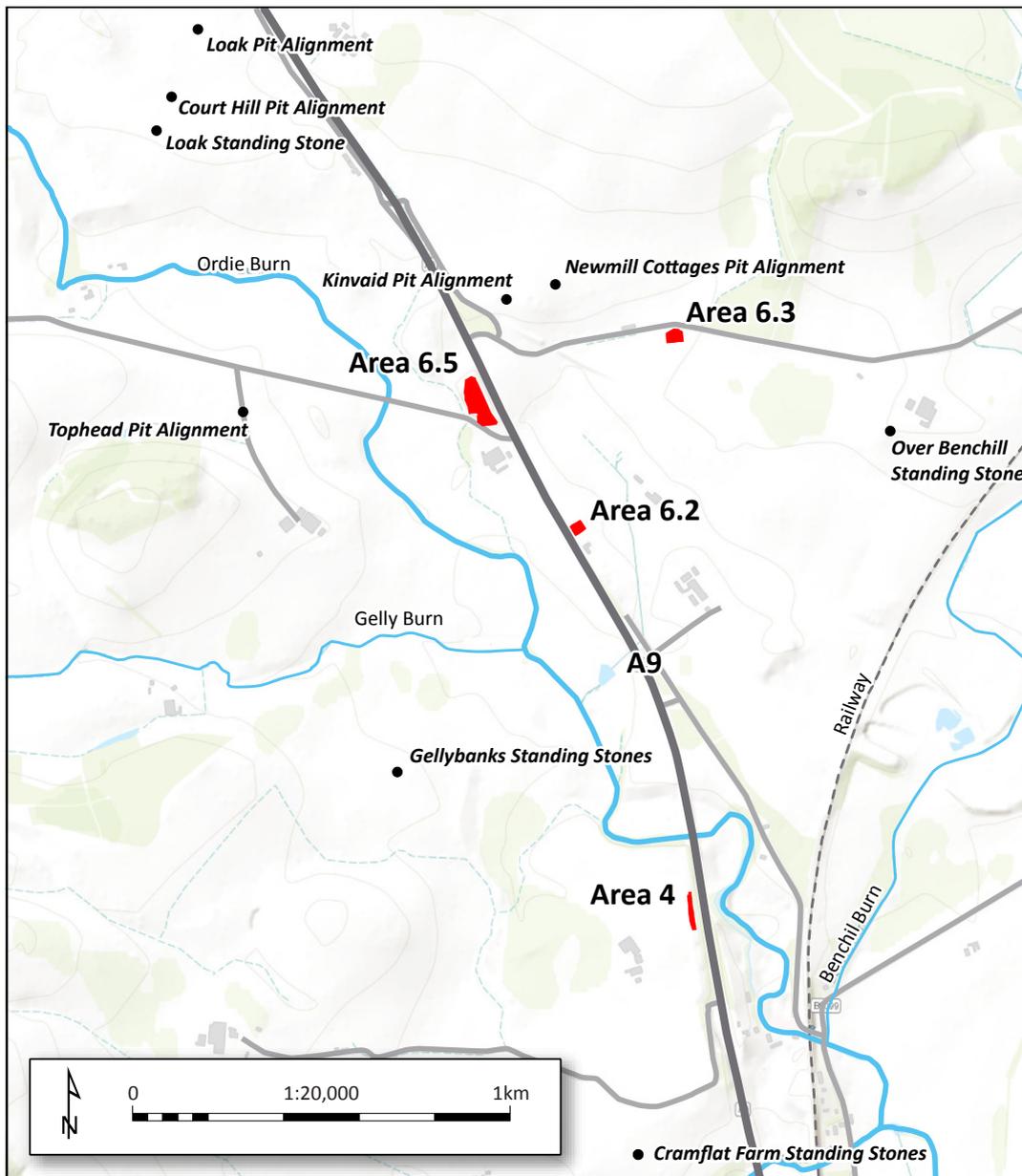
In the vicinity of the A9: L to P of B sites, nine sites of likely or confirmed Neolithic date probably served a ritual or ceremonial function (Illus 2). These include one pair of standing stones near to Cramflat Farm (Canmore ID 27040) and four individual standing stones (Canmore ID 27002, 27014 and 27039).

In addition to the Iron Age and early medieval settlement evidence at Newmill (Watkins 1980), which lies immediately to the east of LP6.5, the area surrounding the A9: L to P of B sites is also dotted with potential Neolithic activity, including cropmark evidence of four pit alignments (Canmore ID 27031, 82082, 82116 and 239560). A very early Beaker grave, probably dating to the 25th century BC, was also discovered at Newmill in the late 1970s (Watkins & Shepherd 1980).

SUMMARY OF RESULTS

LP4

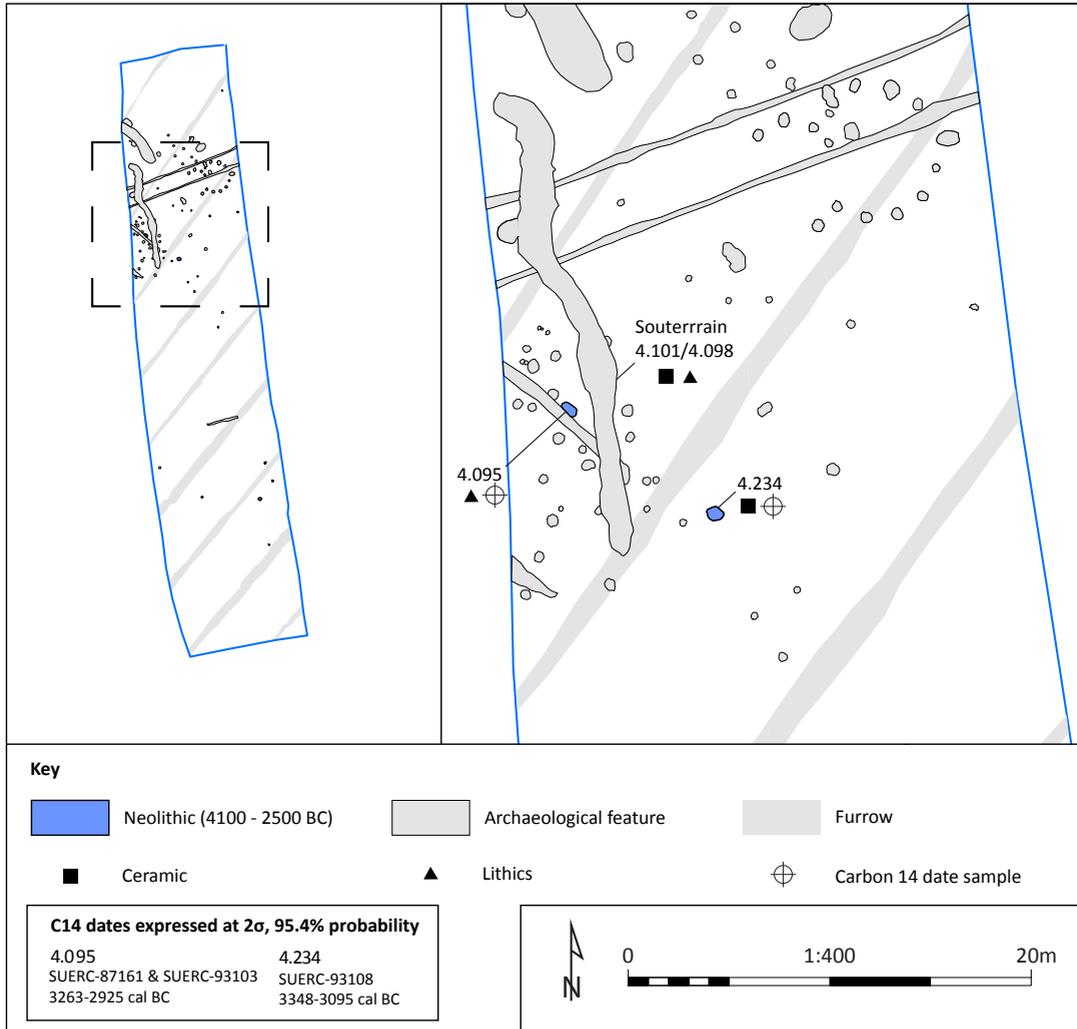
This site (Illus 3 & 4) was dominated by archaeological features and structures relating to the Iron Age including the post rings of two separate timber-built roundhouses, a minimum of two four-post-structures, two souterrains and a scatter of pits (Wilson in prep). However, a number of isolated pits were identified as being Neolithic in date, either because of associated diagnostic artefacts or through radiocarbon dating.



ILLUS 2 Sites LP4 and LP6 set within the distribution of Neolithic sites in the vicinity. (© AOC Archaeology)

Samples of carbonised organics from the fill of two pits, [4.095] and [4.234] (Illus 3), were radiocarbon dated, the former returning two statistically indistinguishable assays of 3263–2916 cal BC (95.4% probability; SUERC-87161 and SUERC-93103; 4414±24 and 4400±31 BP) and

the latter indicating activity within the date range of 3348–3095 cal BC (95.4% probability; SUERC-93108, 4400±31 BP). Pit [4.095] measured 0.8m by 0.83m in diameter and was 0.22m deep; it contained a flint end-scraper and a flint flake. It was also rich in the remains of carbonised

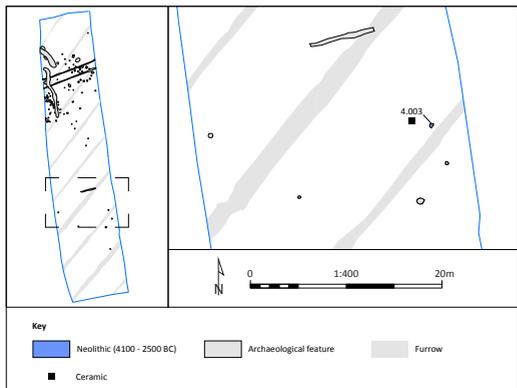


ILLUS 3 Plan of Neolithic excavated features in LP4 (north). (© AOC Archaeology)

hazelnut shell (*Corylus avellana* L) and contained 19 fragments of alder (*Alnus glutinosa* L), hazel (*Corylus avellana* L), birch (*Betula* sp) and rowan (cf *Sorbus* sp) charcoal. Pit [4.234] measured 0.74m by 0.66m in diameter and was 0.16m deep; it was found to contain small quantities of barley grain (*Hordeum* sp) and hazelnut shell, as well as alder, hazel and rowan charcoal.

Small quantities of pottery (47 sherds, representing 11 vessels) were recovered from this

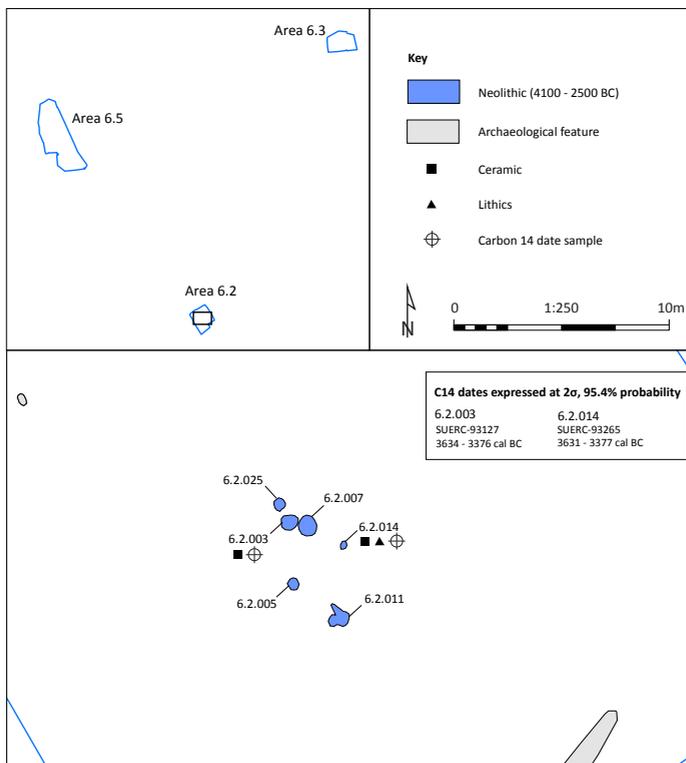
site. Most were small abraded and unclassified sherds, but three sherds of an Early to Early-Middle Neolithic Carinated Bowl (V29; Illus 11) came from pit [4.003] (Illus 4), which was 0.35m by 0.33m in diameter and 0.1m deep, and re-deposited sherds of probable Middle Neolithic Impressed Ware (V35; Illus 12) and an unclassified vessel (V36) were recovered from the various fills of an Iron Age souterrain [4.098/4.101]. The pottery is discussed in more detail below.



ILLUS 4 Plan of Neolithic excavated features in LP4 (south). (© AOC Archaeology)

LP6.2

The Neolithic activity at this site (Illus 5) comprised six pits [6.2.003], [6.2.005], [6.2.007], [6.2.011], [6.2.014], and [6.2.025], which were located at the centre of the excavated area. No structures were identified but two pits, [6.2.003] and [6.2.007], which measured 0.68m by 0.64m and 0.90m by 0.70m in diameter respectively and were 0.24m and 0.4m deep, displayed signs of burning and contained deposits of alder and hazel charcoal and heat-affected stones. Small fragments of unclassified pottery came from [6.2.003], alongside over three hundred fragments of carbonised hazelnut shell, single hulled barley (*Hordeum vulgare* L) and wheat (*Triticum* sp) caryopses and four unclassified cereal caryopses.



ILLUS 5 Plan of Neolithic excavated features in LP6.2. (© AOC Archaeology)

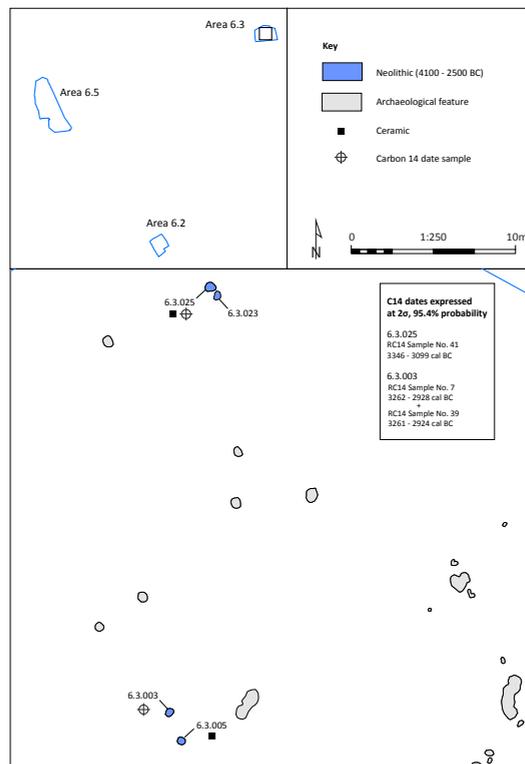
Pits [6.2.011] and [6.2.014] were also found to contain charcoal flecks. Pit [6.2.011] measured 0.98m in diameter and was 0.25m deep, while pit [6.2.014] was 0.30m in diameter and 0.14m deep. Significant quantities of carbonised hazelnut shell, a single black bindweed seed and an unclassified cereal caryopsis were recovered from [6.2.014] alongside a small rim sherd from a Carinated Bowl (V1; Illus 11), sherds from a second, unclassified, vessel (V2) and a finely worked flint kite-shaped arrowhead (SF67; Illus 20), which displayed no evidence of use or wear. Small quantities of alder and oak (*Quercus* sp) charcoal were also recovered. A radiocarbon date suggesting activity within the date range of 3631–3377 cal BC (95.4% probability; SUERC-93265; 4718±22 BP) was obtained from a fragment of carbonised alder from the same pit.

The remaining two pits in the cluster, [6.2.005] and [6.2.025] (0.48m diameter and 0.15m deep,

and 0.56m by 0.49m in diameter and 0.04m deep respectively), were sterile.

LP6.3

The features at LP6.3 (Illus 6) consisted of pits, widely distributed across the excavated area, revealing no patterning or distribution to allow the recognition of structures. The confirmed Neolithic activity was limited to three pits: [6.3.025] in the north (which measured 0.63m by 0.57m in diameter by 0.15m in depth); [6.3.003] (0.48m by 0.4m in diameter and 0.05m in depth) and [6.3.005] (0.55m by 0.4m in diameter and 0.07m in depth) in the south. Small fragments of alder and hazel charcoal came from pit [6.3.003], ten sherds of a Middle Neolithic Impressed Ware pot (V3; Illus 12) came from pit [6.3.005] and four small unclassified pottery sherds (V4) were recovered from pit [6.3.025] alongside small



ILLUS 6 Plan of Neolithic excavated features in LP6.3. (© AOC Archaeology)

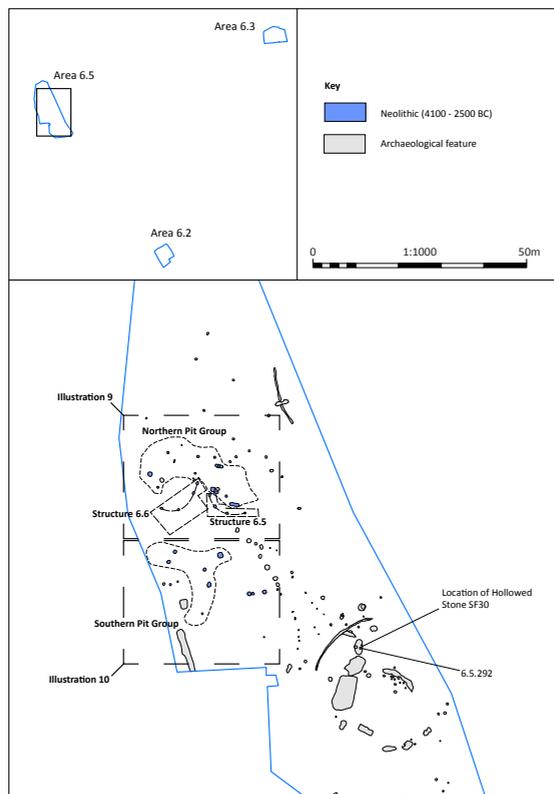
quantities of hazelnut shell and charcoal fragments of alder and hazel. Associated radiocarbon dates obtained from carbonised material from these two pits suggested that activity took place between 3346 cal BC and 3099 cal BC (95.4% probability; SUERC-93271; 4502±24 BP) and 3262 cal BC and 2924 cal BC (95.4% probability; SUERC-87165 and SUERC-93266; 4415±21 and 4410±24 BP) respectively. The proximity of adjacent pits [6.3.023] to [6.3.025] and [6.3.005] to [6.3.003] suggests that they may be of a similar date, but this assertion is conjectural.

LP6.5

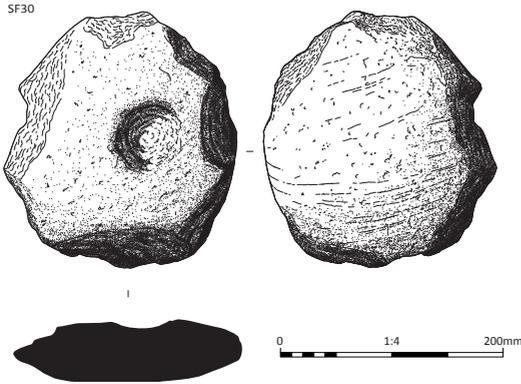
The most significant and concentrated evidence for Neolithic activity was revealed at LP6.5 (Illus 7). This consisted of the vestigial remains of two possible structures, two pit clusters and other more dispersed pits as well as a

moderate-sized assemblage of prehistoric pottery representing a minimum of 26 pots, dominated by sherds of Late Neolithic Grooved Ware vessels, flint debitage and a single ground stone axe-head flake (SF66, Illus 20). A hollowed stone (SF30; Illus 8), probably used as a flint knapping anvil, was unstratified but was found near to a large pit [6.5.292].

The structures were found to comprise two discrete but adjacent arcs of post holes referred to here as Structures 6.5 and 6.6 (Illus 9). Both were situated just north of centre of the excavated area and were surrounded by clusters of pits to the north and the south. Structure 6.6 comprised post holes [6.5.015], [6.5.017], [6.5.019] and [6.5.163] and consisted of a widely spaced curving arc orientated broadly west/north-east. These post holes were circular or sub-circular in plan, measuring from 0.5m to 0.65m in diameter and from 0.16m to 0.36m deep. Post hole [6.5.163]



ILLUS 7 General plan of excavated features in LP6.5. (© AOC Archaeology)

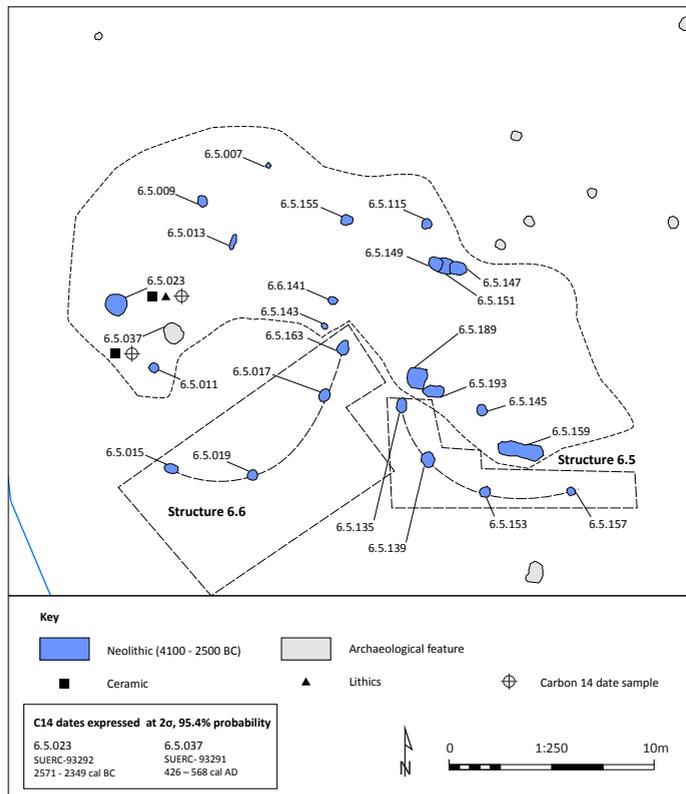


ILLUS 8 Hollowed stone (SF30) from LP6.5. (© AOC Archaeology)

was more oval in plan and measured 0.73m by 0.61m in diameter and was 0.08m deep. Structure 6.5, which also consisted of four post holes, [6.5.135], [6.5.139], [6.5.153] and [6.5.157], was

situated immediately to the east of Structure 6.6. The post holes of Structure 6.5 were either circular or sub-circular in plan, measuring 0.35m to 0.66m in diameter and from 0.14m to 0.27m in depth, and were found to contain varying quantities of packing stones. Very limited quantities of birch, hazel and oak charcoal came from post hole [6.5.157] but these fragments were so poorly preserved they were not suitable candidates for radiocarbon dating. No ceramics were associated with either structure. These two structures have been interpreted as possible windbreaks, or as screens to divide activity areas.

North of these two structures was the Northern Pit Group comprising 18 pits (Illus 9). These included three conjoined pits: to the north of post holes [6.5.153] and [6.5.157] of Structure 6.5 was pit [6.5.159] containing two conjoining pits aligned east/west. It measured 2.3m in length, 0.8m in width and 0.35m in depth. A short



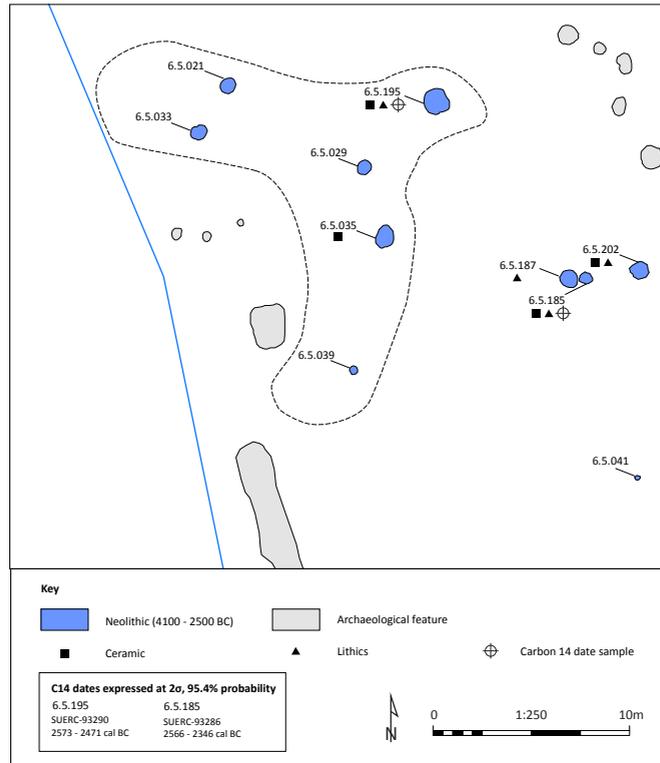
ILLUS 9 Detail of Structures 6.5 and 6.6 and the Northern Pit Group (LP6.5). (© AOC Archaeology)

distance north-west of this lay conjoined pits [6.5.189] and [6.5.193]. Pit [6.5.189] was circular in plan, measuring 0.54m by 0.61m in diameter and 0.32m in depth, while [6.5.193] was oval, measuring 1.1m in length, 0.57m in width and 0.21m in depth. The last of these conjoined pits lay approximately 5m to the north of that just described and consisted of pits [6.5.147], [6.5.149] and [6.5.151]. Pit [6.151] (measuring 0.9m in length, 0.62m in width and 0.21m in depth) had been cut twice by pits [6.5.149] and [6.5.147] (both measuring around 0.6m in length, 0.4m in width and 0.3m in depth), with all three pits being situated in a line orientated east/west.

The other pits in this pit group comprised [6.5.007], [6.5.009], [6.5.011], [6.5.013], [6.5.023], [6.5.037], [6.5.115], [6.5.141], [6.5.143], [6.5.145], [6.5.149], [6.5.155]. These pits varied considerably in size from only 0.22m to 1.3m in diameter and from 0.06m to 0.65m in depth. The artefact assemblage retrieved from this pit group was the largest recovered from the excavations. Ninety-seven sherds of pottery representing eight vessels came from pit [6.5.023]. This group was dominated by Late Neolithic Grooved Ware vessel sherds (V5–6, V8–12 (V12 not illustrated); Illus 13 & 14) and a sherd deriving from an unclassified vessel (V7; Illus 13). Also present were a flint core and chip, small quantities of carbonised hazelnut shell, and alder, hazel and oak charcoal. South-east of this feature lay pit [6.5.037], which contained multiple fragments of burnt bone deriving from an indeterminate mammal, an unclassified cereal caryopsis and a small quantity of carbonised hazelnut shells, alder, hazel and oak charcoal, four fragments of flint and quartz debitage and a flint blade (SF3), and 59 sherds of Late Neolithic pottery. The sherds represented a minimum of eight separate vessels (V5–6, 8–12, 17; Illus 13, 14 & 15) dominated by Grooved Ware and were found to match, and in some instances join with sherds recovered from pit [6.5.023], suggesting that infilling of these two pits [6.5.023] and [6.5.037] was contemporary. Both of these pits were radiocarbon dated. A date range of 2571–2349 cal BC (95.4% probability; SUERC-93292; 3962±26 BP) was returned from carbonised alder from pit

[6.5.023], suggesting Late Neolithic/Chalcolithic activity. Carbonised remains from pit [6.5.037], which contained sherds of the same pottery vessels as those noted in [6.5.023], returned an early medieval date, suggesting activity within the date range of 426–568 cal AD (95.4% probability; SUERC-93291; 1549±25 BP), but due to the presence of diagnostic Late Neolithic pottery, the dated carbonised samples were considered to be intrusive later material.

To the south of Structure 6.6 was the Southern Pit Group, which comprised pits [6.5.021], [6.5.029], [6.5.033], [6.5.035], [6.5.039] and [6.5.195] (Illus 10). Two of these pits were found to contain diagnostic Neolithic artefacts. Pit [6.5.035] was sub-circular in plan, measuring 1.1m by 1m in diameter and 0.75m in depth, and the edge was found to have been lined with several large rounded and flat stones. A total of 75 sherds were recovered from the fill of pit [6.5.035] and were found to derive from a minimum of four vessels (V13–16; Illus 14 & 15). Three of these were certainly Grooved Ware pots (V13, V14, V16), while (V15) was less certain due to the condition of the surviving sherds. The second pit, [6.5.195], was sub-circular in plan, measuring 1.55m in length, 1.25m in width and 0.37m in depth and contained two separate fills. The upper fill contained several lenses of ash with limited deposits of alder, rowan and oak charcoal, burnt bone, small quantities of carbonised hazelnut shell and heat-affected stones found alongside a fragment from a ground stone axehead (SF66; Illus 20) and four pieces of flint debitage. A radiocarbon date was obtained from carbonised material within fill (6.5.196) of pit [6.5.195], which suggested that activity took place within the date range of 2573–2471 cal BC (95.4% probability; SUERC-93290; 3999±26 BP). The lower fill also showed signs of burning, with heat-affected stones and limited quantities of hazel and oak charcoal, which were recovered in association with four fragments of flint debitage, a bladelet and three flakes. A total of 181 sherds of pottery were recovered from these two fills. This group represented one of the largest concentrations of sherds from the site (34% by count; 42% by weight) and at least seven vessels (V22–28;



ILLUS 10 Detail of the Southern Pit Group (LP6.5). (© AOC Archaeology)

Illus 15 & 16) were present, all of which were Grooved Ware. In addition, seven sherds representing a minimum of three Grooved Ware vessels, matching sherds from V23, 24 and 28, were recognised from sherds collected from (181005), the fill of pit [181004 = 6.5.195]. The other pits within this cluster were found to be sterile.

To the south-west of these were further dispersed pits [6.5.185], [6.5.187] and [6.5.202], which measured 0.9m in diameter by 0.26m in depth, 0.65m in diameter and 0.11m in depth, and between 0.9m and 1m in diameter and 0.3m in depth, respectively. Small quantities of ceramics were recovered from all three of these pits. Thirty-three sherds came from pit [6.5.185] and were recognised as representing a minimum of four vessels (V18–21). Three (V18–20, Illus 15) were consistent with Grooved Ware pots; the fourth vessel represented (V21) was of

unclassified form. A horseshoe scraper (SF22) made of imported flint and two pieces of debitage were recovered alongside 21 carbonised hazelnut shells and small fragments of alder, hazel and oak charcoal. Carbonised alder from [6.5.185] was radiocarbon dated and indicated Late Neolithic/Early Chalcolithic activity occurring within the date range of 2566–2346 cal BC (95.4% probability; SUERC-93286; 3949±24 BP). A single sherd from pit [6.5.187] was found to match the form and fabric of (V18), implying that activity concentrated in these pits was contemporary. Finally, 12 sherds representing a very small proportion of a single unclassified vessel (V39) (Illus 16) and a fragment of flint debitage were recovered from the fill (6.5.203) of sub-circular pit [6.5.202] alongside 36 carbonised hazelnut shells and limited quantities of birch and hazel charcoal fragments.

ENVIRONMENTAL EVIDENCE

The preservation of charcoal and carbonised macroplants across all sites was found to be very variable. The assemblages from features and structures of prehistoric date were sparse and therefore limited in the information that they can provide about the agrarian economy. Despite the limited character of the surviving remains, small quantities of charcoal, cereal caryopses and weed taxa were recovered in association with Neolithic features from sites LP4, LP6.2, LP6.3 and LP6.5.

Thirteen cereal caryopses were recovered from five Neolithic pits (Table 1). The species present within this very small assemblage were hulled barley (*Hordeum vulgare* L), barley (*Hordeum* sp), wheat (*Triticum* sp), oat (*Avena* sp) and unclassified cereal remains (*Cerealia* sp). The majority of cereal caryopses could not be classified to a particular species, but where this was possible barley was the most abundant.

Barley is understood to be among the most important cultivated crops in Scotland since the Neolithic (Bishop et al 2009: 77; Dickson & Dickson 2000: 231). This is largely because barley is more tolerant of poor soil conditions, to which other species struggle to adapt successfully (Dickson & Dickson 2000: 233). It is possible that wheat was also cultivated locally as a minor companion crop to barley. Interestingly, no evidence for any crop processing waste survived among the Neolithic assemblage. Instead, the cereal remains from this period appear to represent small accumulations of redeposited domestic food waste.

In contrast to the scarcity of cereal caryopses and weed taxa that survived, a total of 1,077 hazelnut fragments were recovered (Table 1). Hazelnuts are seasonally available, nutritious, and easy to store long-term, which made them a popular food source throughout prehistory. The shells are often deliberately exposed to heat during roasting and are sometimes recycled as a kindling material or disposed of in fires during cleaning (Bishop 2019). They are a common find at many Scottish archaeological sites due to the density of the shell and their ability to survive in most environmental conditions.

A total of 173.5g of charcoal fragments were recovered (Table 2). Due to the poor preservation and limited quantities present, no distinctive or useful distributional patterning could be discerned. The species represented comprise alder (63 fragments; 47.5% of Neolithic charcoal assemblage by count), hazel (35 fragments; 26.5%), oak (26 fragments; 19.5%), rowan (6 fragments; 4.5%) and birch (3 fragments; 2%). The mixture of species recovered from most contexts indicates this material is probably fuel waste.

ARTEFACT EVIDENCE

CERAMIC

A moderate-sized assemblage of early prehistoric vessel sherds was recovered across the sites, comprising 518 sherds (re-joined during conservation into 464 sherds), weighing 9.54kg. A minimum of 38 vessels were identified, dominated by diagnostic Late Neolithic Grooved Ware (Table 3). A variety of other pottery forms and styles were also present, including sherds of Early to Early-Middle Neolithic round-based Carinated Bowls and Middle Neolithic Impressed Wares, and at least one later shouldered vessel of probable Iron Age or later date was also identified, which has not been discussed further here but is considered in Wilson (in prep). As with most assemblages of prehistoric ceramics, there were undiagnostic body sherds which cannot be closely assigned to form or date and are described below as deriving from unclassified vessels.

None of the vessels was intact and most were heavily fragmented. In most instances, individual pots were represented by only small portions of the original vessel. The assemblage was recorded by context with sherds being attributed to 'vessel' (abbreviated here to 'V') based on their similar morphology, size, fabric and decoration and then recorded together. A full description of the methodology is presented alongside the detailed results in the archive ceramic report.

The following discussion of the Neolithic pottery among the assemblage will refer to three subdivisions of the period, following those

TABLE 2

Summary of charcoal assemblage recovered from Neolithic or potentially Neolithic features in LP4, LP6.2, LP6.3 and LP6.5 (PH = post hole)

Land parcel	Structure	Feature type and number	Fill	Species	Name	Fragment	Roundwood	Weight (g)
4	Isolated	Pit [4.003]	4.004	<i>Quercus</i> sp	Oak	10		2.2
	Isolated	Pit [4.095]	4.096	<i>Alnus glutinosa</i> L	Alder	5		
				<i>Corylus avellana</i> L	Hazel	4	1	16.1
			4.097	<i>Alnus glutinosa</i> L	Alder	6		
				<i>Betula</i> sp	Birch	1		
				cf <i>Sorbus</i> sp	Rowan	1		
				<i>Corylus avellana</i> L	Hazel	2		21.6
6.2	Cluster	Pit [6.2.003]	6.2.004	<i>Alnus glutinosa</i> L	Alder	8		
				<i>Corylus avellana</i> L	Hazel	1	1	1.2
	Cluster	Pit [6.2.014]	6.2.015	<i>Alnus glutinosa</i> L	Alder	9		
				<i>Quercus</i> sp	Oak	1		3.9
6.3	Isolated	Pit [6.3.003]	6.3.004	<i>Alnus glutinosa</i> L	Alder	9		
				<i>Corylus avellana</i> L	Hazel	1		1.7
	Isolated	Pit [6.3.025]	6.3.026	<i>Alnus glutinosa</i> L	Alder	5		
				<i>Corylus avellana</i> L	Hazel	3		
				cf <i>Sorbus</i> sp	Rowan	2		1.4
6.5	ST 6.5	PH [6.5.157]	6.5.158	<i>Betula</i> sp	Birch	1		
<i>Corylus avellana</i> L				Hazel		1		
<i>Quercus</i> sp				Oak	3		1.7	
	Isolated	Pit [6.5.185]	6.5.186	<i>Alnus glutinosa</i> L	Alder	4		
<i>Corylus avellana</i> L				Hazel	3			
<i>Quercus</i> sp				Oak	3		32.1	
	Isolated	Pit [6.5.187]	6.5.188	<i>Corylus avellana</i> L	Hazel		1	0.2
	Cluster	Pit [6.5.195]	6.5.196	<i>Alnus glutinosa</i> L	Alder	7		
cf <i>Sorbus</i> sp				Rowan	2			
<i>Quercus</i> sp				Oak		1	31.1	
6.5.197			<i>Corylus avellana</i> L	Hazel	8			
			<i>Quercus</i> sp	Oak	2		15.4	

TABLE 2
Continued

<i>Land parcel</i>	<i>Structure</i>	<i>Feature type and number</i>	<i>Fill</i>	<i>Species</i>	<i>Name</i>	<i>Fragment</i>	<i>Roundwood</i>	<i>Weight (g)</i>
	Cluster	Pit [6.5.023]	6.5.024	<i>Alnus glutinosa</i> L	Alder	4		
<i>Corylus avellana</i> L				Hazel	2			
<i>Quercus</i> sp				Oak	4		26.3	
	Cluster	Pit [6.5.037]	6.5.038	<i>Alnus glutinosa</i> L	Alder	6		
<i>Corylus avellana</i> L				Hazel	3			
<i>Quercus</i> sp				Oak	1		12.7	
	Cluster	Pit [6.5.145]	6.5.146	cf <i>Sorbus</i> sp	Rowan	1		
				<i>Quercus</i> sp	Oak	1		2.9
	Isolated	Pit [6.5.202]	6.5.203	<i>Betula</i> sp	Birch	1		
				<i>Corylus avellana</i> L	Hazel	3	1	3

TABLE 3
Summary of the ceramic assemblage by chronological period and vessel type (V = vessel)

<i>Broad chronological period</i>	<i>Vessel type</i>	<i>Sherds (count)</i>	<i>Number of vessels represented</i>	<i>Vessel numbers</i>
Early to Early-Middle Neolithic	Carinated bowl	4	2	V1, V29
	Unclassified	4	1	V2
Middle to Late Neolithic	Impressed Ware	12	2	V3, V35
Late Neolithic	Grooved Ware	400	23	V5, V6, V8, V9, V10, V11, V12, V13, V14, V15, V16, V17, V18, V19, V20, V22, V23, V24, V25, V26, V27, V28, V34
	Unclassified	8	3	V7, V21, V37
Undiagnostic	Unclassified	28	7	V4, V30, V31, V32, V33, V36, V39
	Unassigned to vessel	62	Unknown	Unassigned
<i>Total</i>		<i>518</i>	<i>38</i>	

defined by Sheridan & Brophy (ScARF 2012b: 43) as Early Neolithic (c 4100–c 3500 BC), Middle Neolithic (c 3500–c 3000 BC) and Late Neolithic (c 3000–c 2500 BC). As noted by Sheridan & Brophy, these subdivisions are arbitrary and do not take cognisance of regional

variations (ibid: 43) but are intended as a useful shorthand to allow consideration of the evidence.

Early to Early-Middle Neolithic pottery

Four sherds derive from round-based Carinated Bowls, a distinctive pottery type characteristic of

the first half of the 4th millennium BC in Britain (c 3900–3300 cal BC; ScARF 2012b: 22, 27, 28; Sheridan 2016). A minimum of two separate bowls (V1 and V29; Illus 11) were identified but in each case only a small proportion of the original vessel profile was represented. A single rim sherd (V1) deriving from an undecorated open-mouthed bowl with a rolled over and overhanging rim came from pit [6.2.014] in LP6.2, and three sherds from a narrower but deeper bowl (V29) came from pit [4.003] in LP4. Along with (V1), four sherds of a separate unclassified vessel (V2) were recovered from the only fill (6.2.015) of pit [6.2.014] in LP6.2

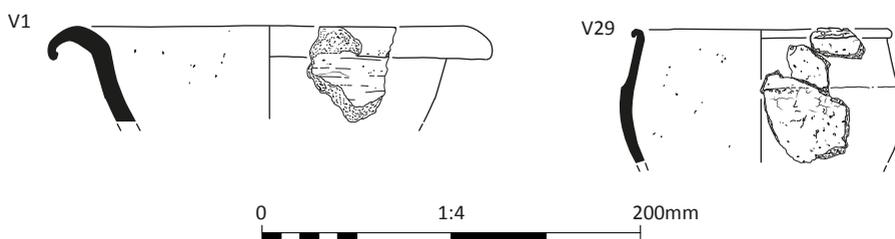
In terms of style, the sinuous profile of (V1) is most consistent with Sheridan's (2007) 'Traditional' form but derives from a context radiocarbon dated within the date range of 3631–3377 cal BC (95.4% probability; SUERC-93265), a date more consistent with Sheridan's 'Modified' form. This supports the evidence from an assemblage from Meadowend Farm, Clackmannanshire of a continuation of 'Traditional' styles alongside those of 'Modified' form a considerable time after their initial introduction (Sheridan 2018a: 20). Vessel (V29) can be seen to display facets

of both styles of Carinated Bowl with its well-made, fine fabric and thin walls, but has a slightly inturned neck and moderately deep belly, both features more typical of Sheridan's 'Modified' group (2018a: 19). Pit [4.003], from which (V29) was recovered, was not radiocarbon dated so this assertion is made on form alone.

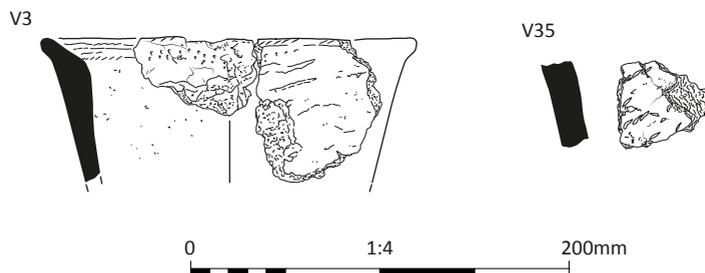
Middle to Late Neolithic

Twelve sherds deriving from one certain Impressed Ware pot (V3) and a second possible example (V35) were recognised (Illus 12). Impressed Ware is characterised by thick-rimmed, heavy, often biconical vessels, which display a range of impressed and stab-and-drag decoration (McInnes 1969: 25; Cowie 1993: 18).

Vessel (V3) consisted of ten sherds from the rim and body of a thick-walled, open-mouthed, vase-shaped or truncconic pot with a thick splayed out-turned rim with an internal bevel. It had decoration on the interior and exterior of the rim consisting of concentric rows of short linear stab marks, possibly intended to mimic twisted cord impressions, and immediately below the rim on the exterior were paired oval impressions and stab-and-drag marks. This came from



ILLUS 11 Early to Early-Middle Neolithic Carinated Bowl ceramics (V1 and V29). (© AOC Archaeology)



ILLUS 12 Middle to Late Neolithic Impressed Ware ceramics (V3 and V35). (© AOC Archaeology)

pit [6.3.005]. The identification of (V35) as Impressed Ware is less certain and relies on the profile of one sherd which comes from immediately below a thick splayed rim – the rim itself has been lost – and the decoration on the exterior surfaces which includes a haphazard series of short impressed or stabbed lines made with the tip of a fingernail or pointed bone/wooden tool, in a similar style to (V3). These sherds were recovered from two fills, one from the upper fill (4.139) and one from the tertiary fill (4.135) within an Iron Age souterrain [4.098]/[4.101] in LP4 and clearly represent earlier redeposited material, accidentally or intentionally incorporated within the fills.

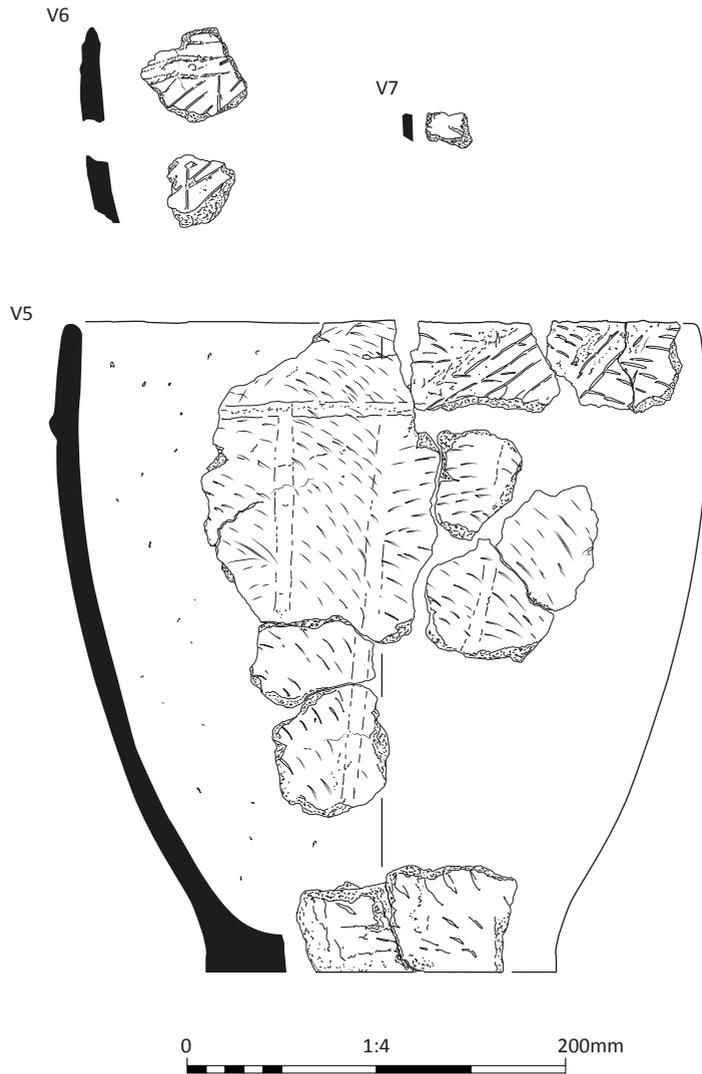
Although the production and use of Scottish Impressed Wares was long believed to date to the early to mid-3rd millennium BC, an increase in the number of associated radiocarbon dates has refined the known currency of use, pushing its inception back into the mid-to-late 4th millennium BC (*c* 3600–3000 BC; Sheridan 1997: 221; Sheridan 2016). The well-dated assemblage from Meadowend Farm, Clackmannanshire was dated to *c* 3350–3000 cal BC based on a series of radiocarbon assays obtained from 11 pottery-bearing contexts (Sheridan 2018b: 31). This assemblage demonstrates and reinforces the evidence that Impressed Wares were in use during the Middle and Late Neolithic periods, preceding Grooved Ware use, but with a short period in the early 3rd millennium when both types were in use concurrently, albeit not necessary in the same parts of Scotland.

Late Neolithic pottery (Illus 13, 14, 15 & 16)

Over 400 sherds, representing 77% of the assemblage (by count), were classified as Late Neolithic wares. These were dominated by sherds deriving from Grooved Ware vessels and came from a minimum of 23 vessels (V5, V6, V8, V9, V10, V11, V12, V13, V14, V15, V16, V17, V18, V19, V20, V22, V23, V24, V25, V26, V27, V28 and V34). A further eight sherds representing three distinct vessels (V7, V21 and V37) were also likely to be Late Neolithic due to their recovery from contexts associated with Grooved Ware but were not closely classified. Grooved

Ware is a distinctive classification of flat-based, tub-, bucket- or barrel-shaped vessels, often with a characteristic geometric decoration which typically covers the exterior surfaces (Wainwright & Longworth 1971; Cleal 1999). This decoration can encompass incised, impressed and applied motifs including bands of parallel transverse lines, chevrons, dots and cordons of various forms (eg Cleal 1999: illus 1.1; Sheridan 1999: illus 12.6; MacSween 1992: table 19.1).

The beginning of production and use of Grooved Ware in Scotland can be dated to some time between *c* 3300/*c* 3200 and *c* 3100 BC (MacSween et al 2015). Based on current evidence, the pottery form and style are thought to have originated and developed in Orkney (ibid) and then spread from there across the Scottish mainland and Western Isles and across Britain and Ireland by the 30th century BC (Sheridan 2004, 2016; Carlin 2017). This spread of influence in pottery design and technology can be seen to develop in step alongside significant social change, new expressions of belief, cosmology and practices, and distinctive items of material culture (Wainwright & Longworth 1971; Thomas 2010; ScARF 2012b: ii, 31; MacSween et al 2015) with particularly strong connections in evidence between the Orkney Islands and the Boyne Valley in east Ireland (Sheridan 2004; Carlin 2017). These critical changes in cultural practices and shared ideas are expressed through similarities in monument styles, design of tombs and decorative motifs employed (ScARF 2012b: 30–1; Sheridan 2014; Carlin 2017: 156). Available radiocarbon dates for mainland Scotland have been usefully summarised by MacSween (2007) and these confirm that the use of Grooved Ware on southern mainland sites is slightly later than those in Orkney, with dates generally confined to the first half of the 3rd millennium BC (MacSween 1992, 2007, 2018) and that its use continued until *c* 2300/*c* 2200 BC in some areas of Britain (Gibson 2010). The latest Grooved Ware examples in mainland Scotland demonstrate a chronological overlap with the earliest Beakers in Scotland (ScARF 2012b: 35). The dates from the A9: L to P of B site confirm this, insofar as the European-style Beaker from nearby Newmill

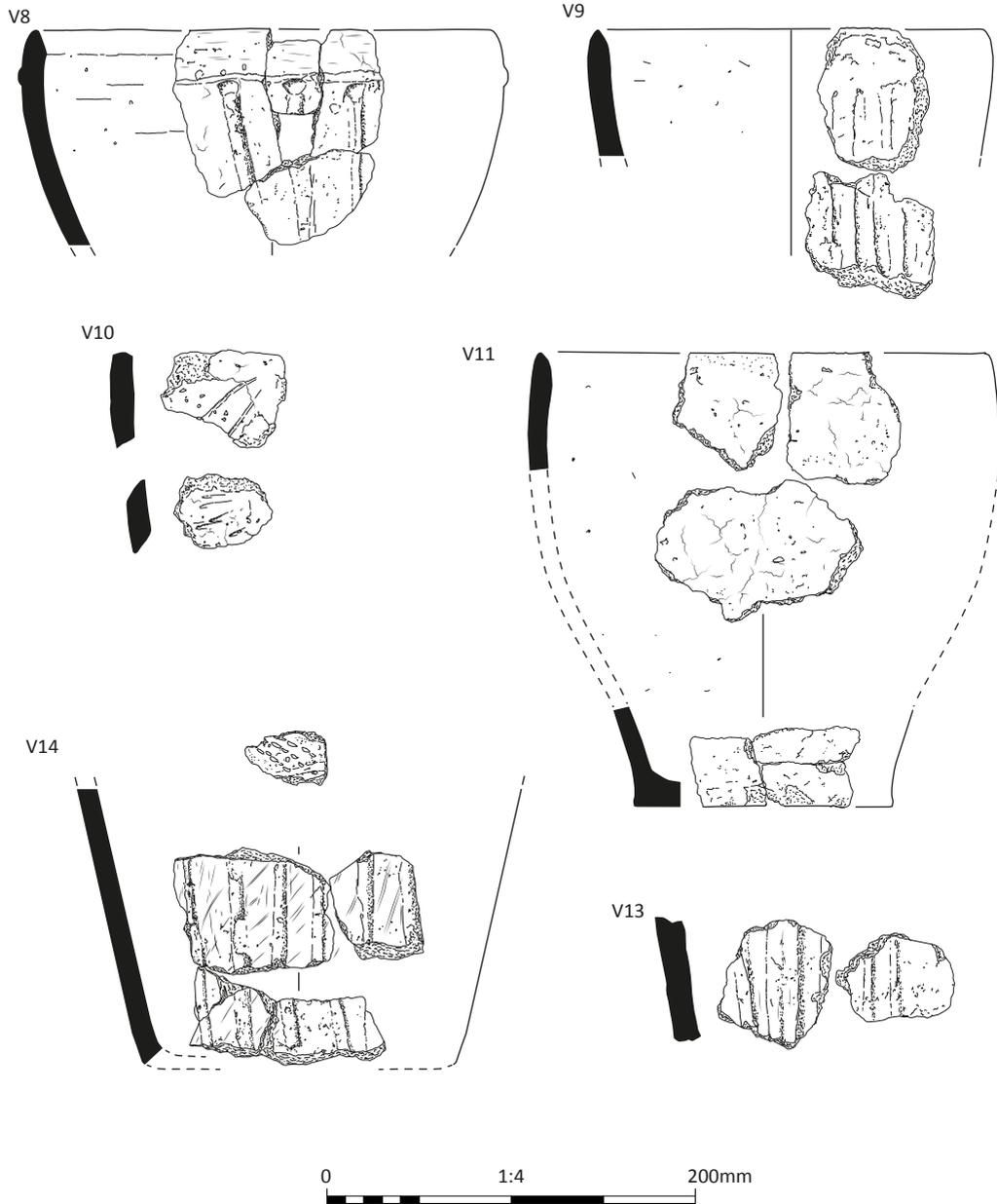


ILLUS 13 Grooved Ware ceramics (V5, V6 and V7). (© AOC Archaeology)

(Watkins & Shepherd 1980), while undated, is likely on stylistic grounds to date to the 25th century BC (Sheridan 2008).

As already noted earlier in this paper, a recent large-scale research project, *Tracing the Lines: Uncovering Grooved Ware Trajectories in Neolithic Scotland*, co-ordinated by Dr Mike Copper and Dr Alex Gibson (formerly of the University of Bradford) has contributed greatly to our understanding of Grooved Ware and its use in mainland Scotland. This project sought

to illuminate the development of Grooved Ware use by amassing both published and unpublished data on Grooved Ware finds in Scotland as the basis of a new synthesis (Copper et al 2021) and the existing corpus of Scottish Grooved Ware has been collated into the Database of Scottish Grooved Ware (available online via ScARF). The DSGW currently records a minimum³ of 623 Grooved Ware vessels from 116 findspots across Scotland. Data relevant to the A9: L to P of B assemblage has been drawn from this database

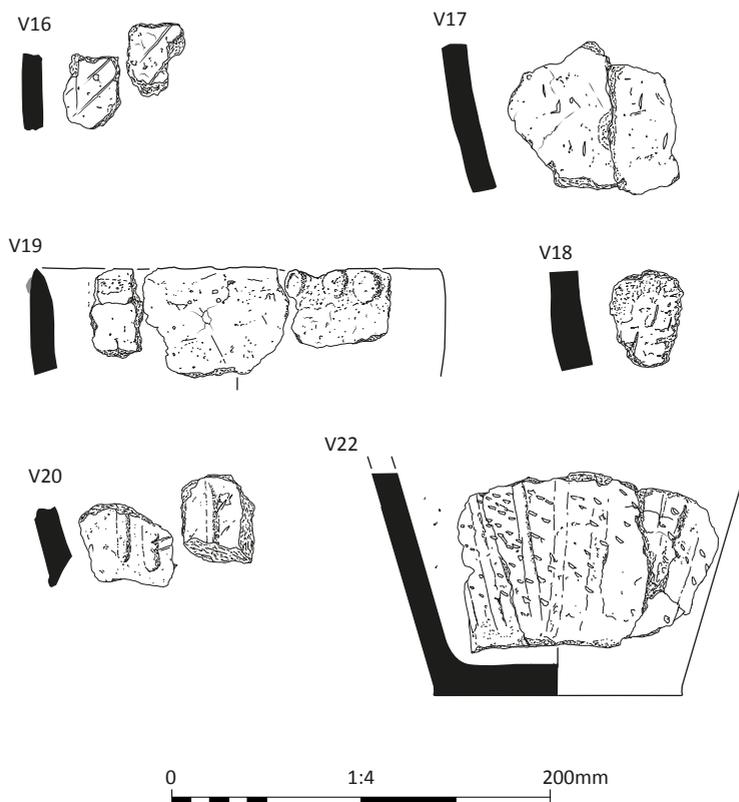


ILLUS 14 Grooved Ware ceramics (V8, V9, V10, V11, V13 and V14). (© AOC Archaeology)

where possible. A map showing the distribution of Grooved Ware sites mentioned in this current paper is presented in Illus 17.

The majority of the Grooved Ware recovered from the A9: L to P of B came from LP6.5 and

was recovered from nine contexts relating to six pits ([6.5.023], [6.5.037], [6.5.035 = 182007], [6.5.185], [6.5.187], [6.5.195 = 181004]). Sherds from a further possible Grooved Ware vessel (V34) came from LP4 from the upper fill (4.096)

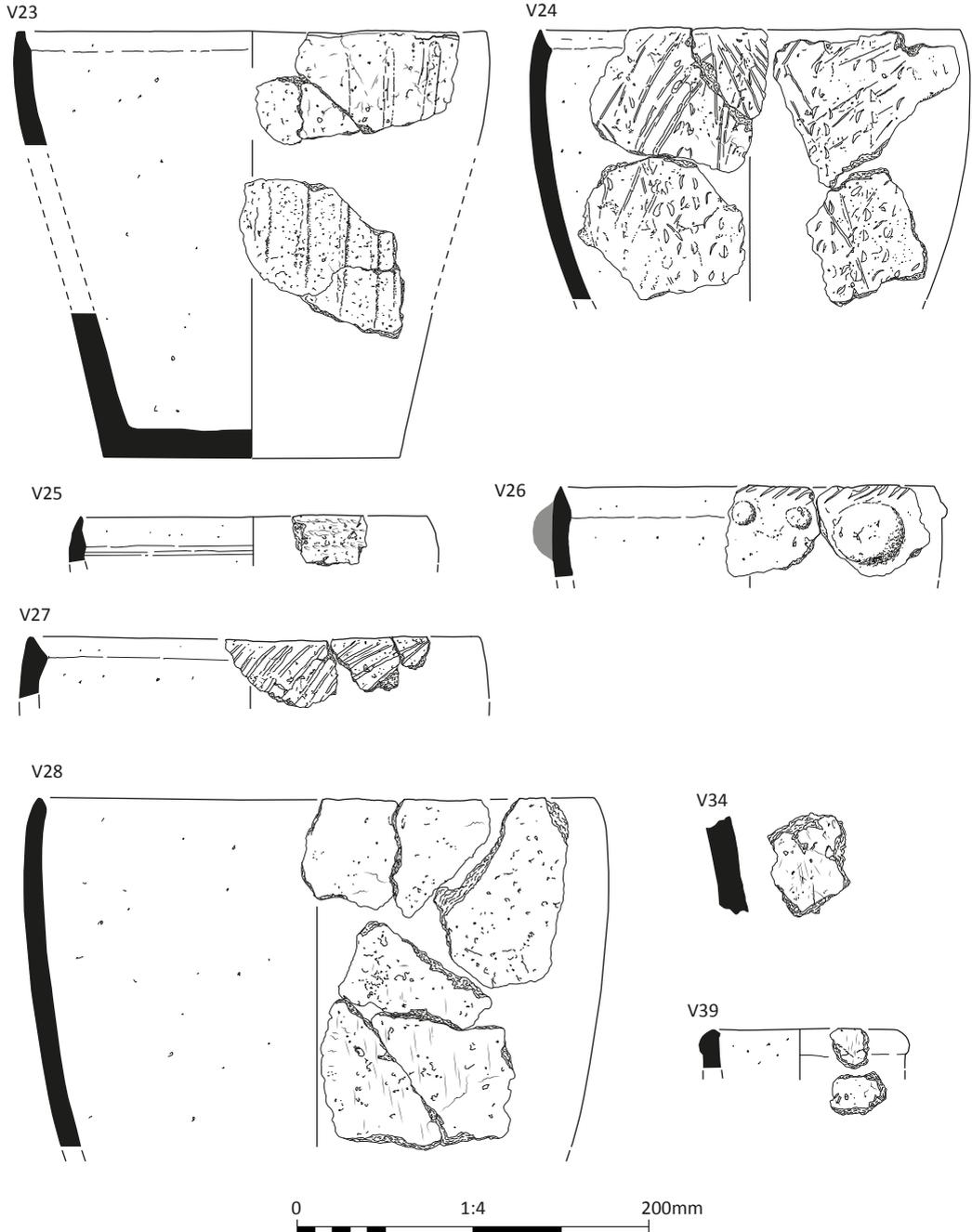


ILLUS 15 Grooved Ware ceramics (V16, V17, V18, V19, V20 and V22). (© AOC Archaeology)

and basal fill (4.097) of pit [4.095], although the possibility that this was an Impressed Ware vessel cannot be ruled out. In LP6.5, two adjacent pits [6.5.023] and [6.5.037] contained 124 sherds relating to nine vessels (V5–12, V17). Each of the vessels was identified as Grooved Ware except for sherds of (V7), which was unclassified. Sherds from each of the vessels (except for (V7), which was only recognised from pit [6.5.023], and (V17), which came solely from pit [6.5.037]) were found in both pits, suggesting that these features were contemporary and relate to the same episode of activity. Similarly, four sherds of Grooved Ware pot (V18) came from pits [6.5.185] and [6.5.187], the former also containing 25 sherds from two further Grooved Ware vessels (V19, V20) and one of unclassified form (V21). Also of note are the 60 sherds from four Grooved Ware pots (V13, V14, V15, V16) that

came from the fill (6.036) of pit [6.5.035] and the 184 sherds from seven Grooved Ware pots (V22, V23, V24, V25, V26, V27, V28) that were recovered from [6.5.195].

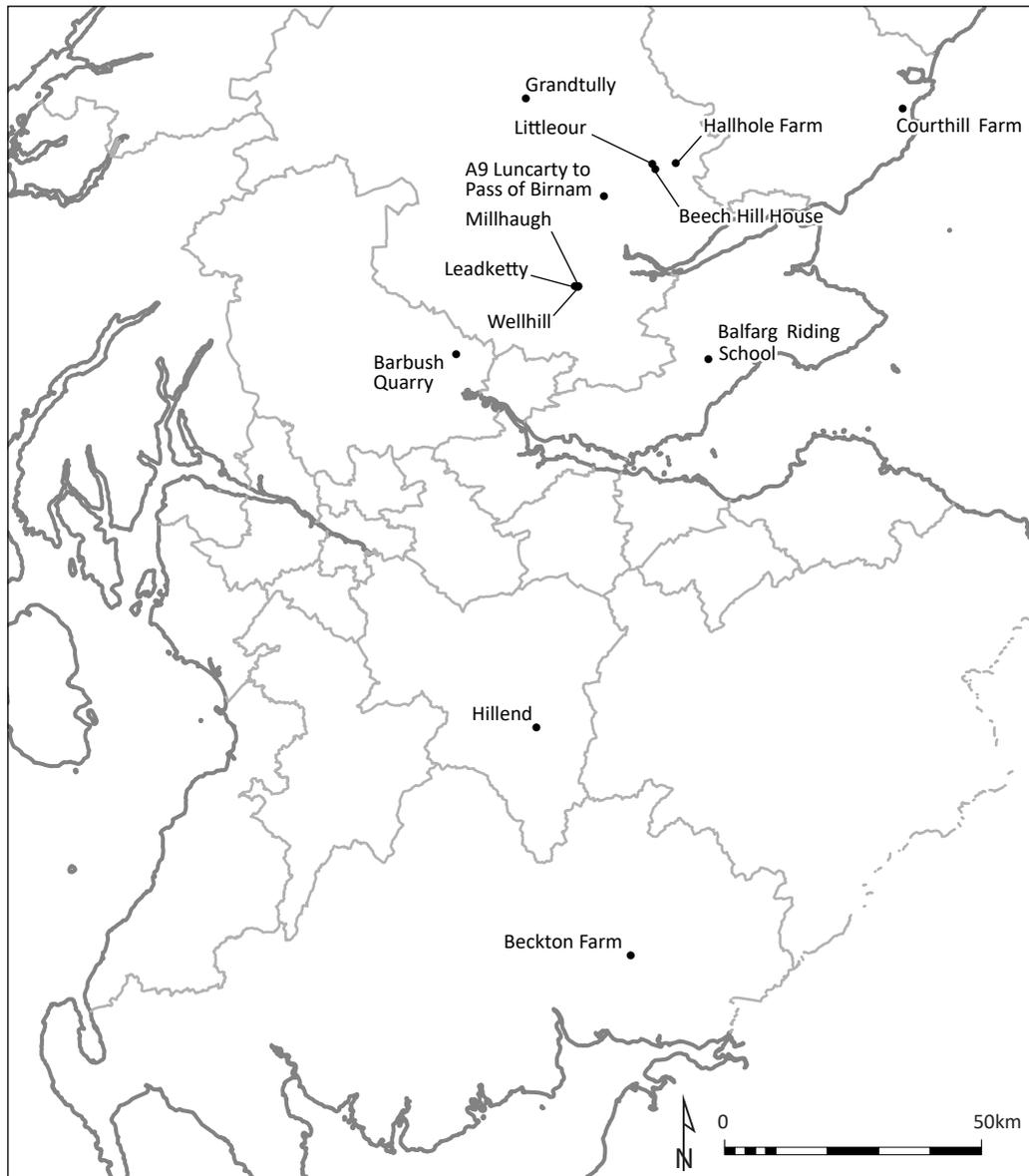
The assemblage is dominated by bucket-shaped pots with inturned rims, bearing incised and/or applied decoration, sometimes with differentiated rim versus body decoration (eg V5, V11 and V23–28 and possibly also V6, V14 and V22). These are similar to vessels recovered at Barbush Quarry, Dunblane (Cowie 1992: 279, fig 20.3, no. 24), Hallhole Farm, Meikleour (MacSween, pers comm; DSGW), Hillend, Clydesdale (Armit et al 1994) and Littleour, Perthshire (Sheridan 1998). Open or neutral profiled bucket-shaped jars, both decorated and plain, are represented by two vessels (V9 and V19) and these are similar to those from Wellhill, Perth and Kinross (Wright 2014; Alexander 2016; DSGW). One vessel has a



ILLUS 16 Grooved Ware ceramics (V23, V24, V25, V26, V27, V28, V34 and V39). (© AOC Archaeology)

more globular form (V8) with a wide mouth, in-turned and internally bevelled rim and distinctly rounded exterior, suggesting that it is squatter

than the others in the group. Owing to the fragmentary condition of the assemblage, the overall shapes of the pots were sometimes uncertain, but



ILLUS 17 Distribution of Grooved Ware sites mentioned in the text. (© AOC Archaeology)

the straight profiles of the body sherds indicate barrel- or bucket/tub-shaped vessels with steeply sloping sides and open mouths. The vessels in this assemblage lack the embellished rims sometimes seen on Grooved Ware pots such as that from Beech Hill House, Coupar Angus which has a pointed scalloped rim (MacSween 1995:

210, illus 9, SF19) or examples from Balfarg Riding School, Fife, which have upstanding lugs (Henshall 1993).

Many of the Grooved Ware vessels are heavily decorated using a combination of incised, impressed, applied and pinched-up decoration but four appeared to be plain (V11, V12, V15 and

V28). Pinched-up or applied transverse cordons with short vertical stops are noted below the rims on two vessels (V5 and V8), similar to examples from Balfarg, Fife (Henshall & Mercer 1981: 131, fig 44), Beech Hill House, Coupar Angus (MacSween 1995: 210, illus 9, SF19), Courthill Farm, Angus (McLaren & MacSween 2016: 7, 9, illus 3), and Hillend, Clydesdale (Armit et al 1994: illus 5). Several vessels (V5, V14, V20 and V22) have a series of pinched-up or applied vertical ribs which extended from the foot of the vessel up the sides towards the rim, similar to examples from Leadketty 'Four-Post' Structure (Brophy et al 2012a; Brophy et al 2012b; DSGW), Millhaugh (Wright 2016; DSGW), both Perth and Kinross; Hillend, Clydesdale (Armit et al 1994: illus 5); and Milton of Leys, Inverness (MacSween 2003: 39, Vessel 1). On some sherds, however, straight-edged tool marks are noted to either side of the ribs, indicating that shaping was undertaken using a hard, straight-edged tool, such as a bone spatula. A series of plain vertical false-relief ribs were also formed on at least three vessels (V9, V13 and V23) by dragging the tips of the fingers through wet clay prior to firing. In some instances, the vertical and/or horizontal cordons appear to be the pot's only decoration (eg V8), but in others the long vertical panels created between the cordons were embellished with swathes of short diagonal stabs or slashes (eg V5, V13 and V22). In the case of (V5), these impressions appear to have been made by the tip of a fingernail. Vessels (V17) and (V24) displayed paired, pinched, crescentic fingernail impressions across the exterior. In the case of (V24) this formed vertical columns overlain by areas of scratched diagonal lines, while the decoration of (V17) appeared rather more haphazard. Similar pinched decoration is noted on Pots 3, 4a and 5 from Littleour, Perth and Kinross (Sheridan 1998: 63, illus 51), Hillhead, Clydesdale (Armit et al 1994: illus 5) and Beckton, Dumfriesshire (Cormack 1963). Fingernail rustication can also be compared to sherds of a vessel from Grandtully, Perthshire (Simpson & Coles 1990: 38, illus 8, pot 10). Interestingly, Littleour Pot 3 combined both the pinched fingernail impressions in off-set columns on the exterior of the

body and parallel transverse rows of cord impressions on both the interior and exterior surface below the rim (Sheridan 1998: 63, illus 51). Rows of cord impressions were noted on the exterior of (V25) which derives from the same context as (V24). Although there were differences in colour and fabric between (V24) and (V25), the Littleour Pot 3 scheme provides an example where both decorative elements were combined in a single vessel. In the absence of thin-section analysis, there remains the possibility that (V24) and (V25) were from the same pot.

More unusual are the two vessels (V19) and (V26) which have applied knobs or pellets immediately below the rim. Lines of applied pellets have been noted on at least one of the five vessels recovered from the post holes of a palisade trench and avenue associated with Leadketty palisaded enclosure (Brophy et al 2012; Brophy et al unpub; DSGW). Yet, this form of decorative motif in east and central Scotland is rare.

The most substantially complete pot among the assemblage was (V5), where almost the full height of the vessel survived, indicating a pot approximately 345mm tall. Only around 25% of the rim survived but this suggested an approximate exterior rim diameter of around 335mm. Sherds from this pot were recovered from pits [6.5.023] and [6.5.027] but no meaningful arrangement of the sherds within the pits could be discerned. Significant proportions of (V11), (V23), (V24) and (V28) also survived, indicating vessels of similar dimensions to that already described. Sherds were also observed to vary in surface condition: most were fresh and unabraded, suggesting deposition shortly after use, while others were lightly abraded (eg V6), moderately abraded (eg V13) or displayed pronounced weathering (eg V12). Some were pitted and friable (eg V18 and V19) or cracked and possibly burnt (eg V9, V10 and V16). Evidence of repair was noted on Grooved Ware vessels (V11) and (V24) in the form of conical repair holes, bored though the thickness of the wall a short distance below the rim.

In order to investigate the use and contents of this pottery, absorbed lipid analysis was undertaken, as described below.

RESIDUE ANALYSIS

Lipids, the organic solvent soluble components of living organisms, i.e fats, waxes and resins, are the most frequently recovered compounds from archaeological contexts. They are resistant to decay and are likely to endure at their site of deposition, often for thousands of years, because of their inherent hydrophobicity, making them excellent candidates for use as biomarkers in archaeological research (Evershed 1993).

Pottery has become one of the most extensively studied materials for organic residue analysis (Mukherjee et al 2005), as ceramics are one of the most, if not the most, common type of artefact recovered from archaeological sites from the Neolithic period onwards (Tite 2008). Survival of these residues occurs in three ways: rarely, actual contents are preserved in situ or, more commonly, as surface residues (Evershed 2008b). The last, most frequent occurrence is that of absorbed residues preserved within the vessel wall, which have been found to survive in >80% of domestic cooking pottery assemblages worldwide (ibid). Previous work on determining the spatial distribution of lipids in pottery vessels suggested that most of the cooking vessels analysed showed a pattern of greater lipid concentrations in the upper parts of the vessels and negligible concentrations in the bases (Charters et al 1993; Charters 1996; Evershed 2008a). Experimental work confirmed that lipid accumulation in vessels resulting from boiling foodstuffs in water resulted in preferential distribution of lipids in the upper parts of the vessels, whereas experimental roasting of meat in vessels demonstrated that, as the cooking progressed, the liquefied fat from the meat accumulated with water, mostly on the base of the vessel, although some was seen to splash up the sides of the vessel.

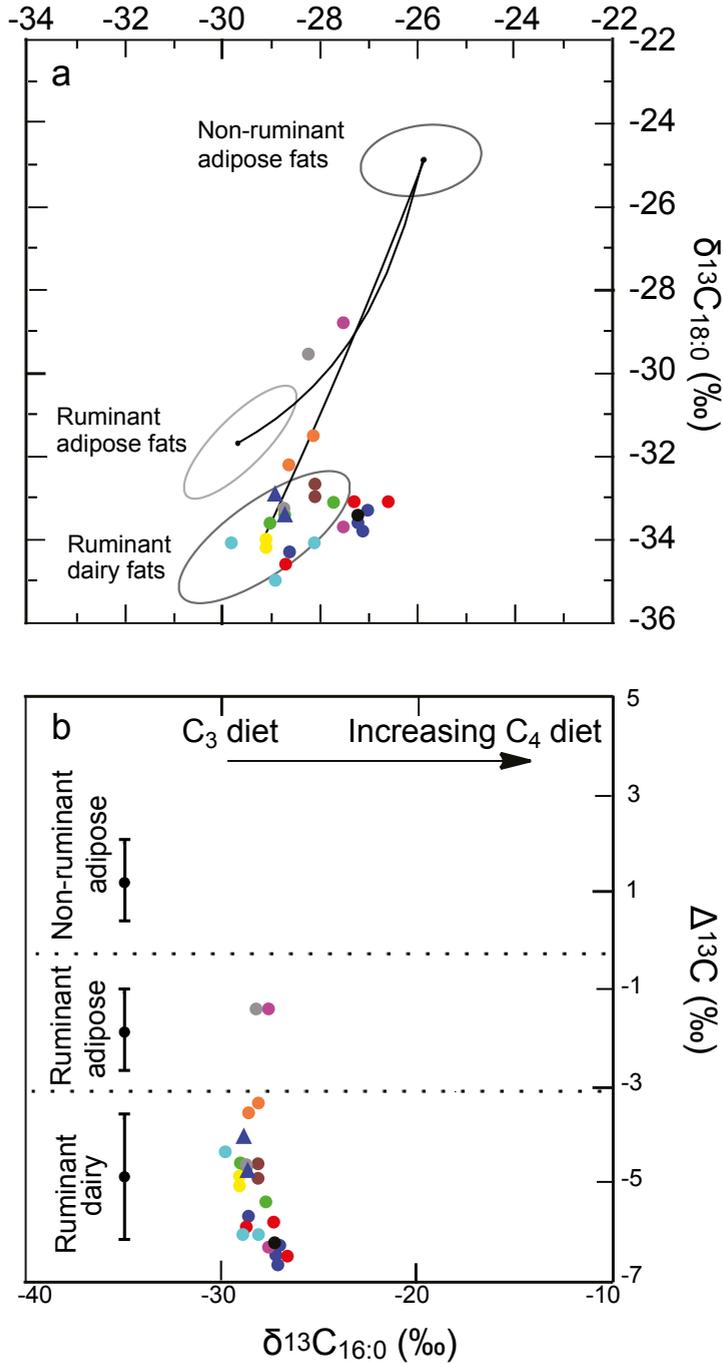
The partial survival of so many ceramic vessels from the A9: L to P of B excavations has provided a valuable opportunity to investigate vessel use and possible relationships between form and function. Consequently, sherds of 12 Grooved Ware vessels (V5, V6, V8, V9, V11, V13, V14, V19, V22, V23, V24, V28) and one of Impressed Ware (V3) were supplied for analysis

and, where possible, rim, body and base sherds were provided. Lipid analysis, consisting of GC, GC-MS and GC-C-IRMS analyses, and subsequent interpretations were performed using established protocols described in detail in earlier publications (eg Dudd & Evershed 1998; Correa-Ascencio & Evershed 2014) and within the archive report (Dunne et al 2021). During analysis, each sherd was assigned an individual laboratory number prefixed with 'LUN', an abbreviation of Luncarty (eg LUN001), and each is referred to by vessel number and lab number.

Sherds from ten Grooved Ware vessels and one of Impressed Ware yielded interpretable lipids from one or more of the sherds analysed (Table 4). Vessels (V13) and (V22) did not yield lipids, suggesting they were not used to process food. The concentration of absorbed lipid has been determined for each sherd sampled, thus allowing the regions of accumulation of the lipid in a vessel to be studied (Table 4 and Illus 18 and & 19).

The mean lipid concentration from the sherds (Table 4) was 1.5mg g⁻¹, with a maximum lipid concentration of 10.3mg g⁻¹ (LUN04). Several of the potsherds contained high concentrations of lipids (eg LUN05, 4.4mg g⁻¹, LUN12, 3.7mg g⁻¹, LUN13, 5.0mg g⁻¹ and LUN20, 1.6mg g⁻¹), demonstrating excellent preservation. This is likely to indicate that these vessels were subjected to sustained use in the processing of high lipid-yielding foodstuffs. The lipid extracts comprised lipid profiles dominated by free palmitic (C16) and stearic (C18) fatty acids typical of a degraded animal fat (Berstan et al 2008). Extracts from the majority of sherds include a series of long-chain fatty acids or LCFAs (in low abundance), containing C20 to C26 carbon atoms. It is thought these LCFAs are likely to originate directly from animal fats, incorporated via routing from the ruminant animal's plant diet (Halmemies-Beauchet-Filleau et al 2014).

Impressed Ware vessel (V3) was probably used to process ruminant dairy products. The lipid concentration was higher in the body sherd (LUN01, 0.55mg g⁻¹) than in the rim sherd (LUN02, 0.28mg g⁻¹), suggesting that the vessel was only part-filled with the dairy product, which



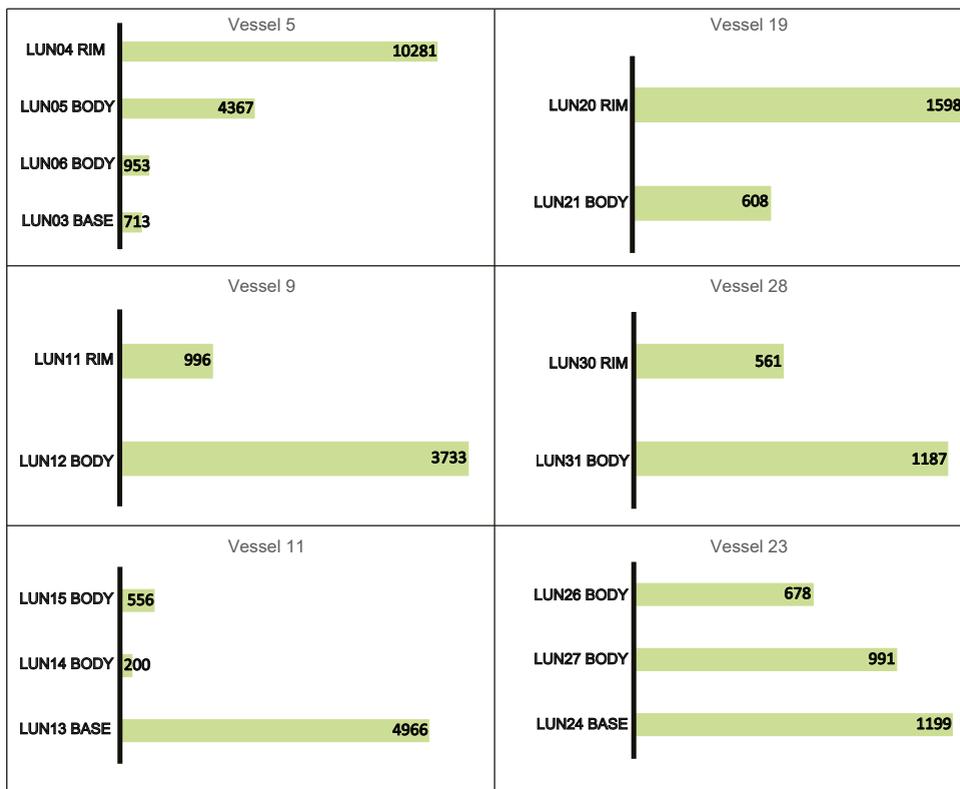
ILLUS 18 Graphs showing: (a) $\delta^{13}\text{C}$ values for the $\text{C}_{16:0}$ and $\text{C}_{18:0}$ fatty acids for archaeological fats extracted from the Neolithic ceramics, vessels colour coded as in Table 4. The three fields correspond to the $P = 0.684$ confidence ellipses for animals raised on a strict C_3 diet in Britain (Copley et al 2003). Each data point represents an individual vessel. (b) shows the $\Delta^{13}\text{C}$ ($\delta^{13}\text{C}_{18:0} - \delta^{13}\text{C}_{16:0}$) values from the same potsherds. (© AOC Archaeology)

TABLE 4
 Summary of the lipid analysis data per sherd recording lipid concentrations ($\mu\text{g g}^{-1}$), total lipid concentration in extract (μg), $\delta^{13}\text{C}$ and $\Delta^{13}\text{C}$ values and attributions. Colour key matches that presented in Illus 18

Sample number	Key for Illus 18	Vessel type	V no.	Feature no.	Part of the pot	Lipid concentration ($\mu\text{g g}^{-1}$)	Total lipid in extract (μg)	$\delta^{13}\text{C}_{16:0}$	$\delta^{13}\text{C}_{18:0}$	$\Delta^{13}\text{C}$	Attribution
LUN01	Blue triangle	Impressed Ware	3	[6.3.005]	Body	554.4	1225.3	-28.9	-32.9	-4.0	Ruminant dairy
LUN02	Blue triangle	Impressed Ware	3	[6.3.005]	Rim	280.7	708.6	-28.7	-33.4	-4.7	Ruminant dairy
LUN03	Blue circle	Grooved Ware	5	[6.5.023]	Base/Body	713.0	2031.3	-28.6	-34.3	-5.7	Ruminant dairy
LUN04	Blue circle	Grooved Ware	5	[6.5.023]	Rim	10281.4	17221.4	-27.1	-33.8	-6.7	Ruminant dairy
LUN05	Blue circle	Grooved Ware	5	[6.5.023]	Body	4367.2	7555.8	-27.0	-33.3	-6.3	Ruminant dairy
LUN06	Blue circle	Grooved Ware	5	[6.5.023]	Body	953.4	2222.2	-27.2	-33.6	-6.5	Ruminant dairy
LUN07	Black circle	Grooved Ware	6	[6.5.023]	Body	642.7	1502.1	-27.2	-33.4	-6.2	Ruminant dairy
LUN08	Green circle	Grooved Ware	8	[6.5.023]	Rim	493.7	1520.8	-29.0	-33.6	-4.6	Ruminant dairy
LUN09	Green circle	Grooved Ware	8	[6.5.023]	Body	159.0	335.2	-27.7	-33.1	-5.4	Ruminant dairy
LUN10	Green circle	Grooved Ware	8	[6.5.023]	Body	937.1	2121.3	-28.7	-33.4	-4.7	Ruminant dairy
LUN11	Grey circle	Grooved Ware	9	[6.5.023]	Rim	996.4	2521.3	-28.2	-29.6	-1.4	Ruminant adipose
LUN12	Grey circle	Grooved Ware	9	[6.5.023]	Body	3733.3	8751.9	-28.7	-33.3	-4.6	Ruminant dairy

TABLE 4
Continued

LUN13	Red circle	Grooved Ware	11	[6.5.023]	Base	4966.4	5535.6	-28.7	-34.6	-5.9	Ruminant dairy
LUN14	Red circle	Grooved Ware	11	[6.5.023]	Body	200.6	464.7	-27.3	-33.1	-5.8	Ruminant dairy
LUN15	Red circle	Grooved Ware	11	[6.5.023]	Body	556.7	1126.8	-26.6	-33.1	-6.5	Ruminant dairy
LUN18	Brown circle	Grooved Ware	14	[6.5.035]	Body	346.1	735.9	-28.1	-33.0	-4.9	Ruminant dairy
LUN19	Brown circle	Grooved Ware	14	[6.5.035]	Body	1149.4	2498.9	-28.1	-32.7	-4.6	Ruminant dairy
LUN20	Pink circle	Grooved Ware	19	[6.5.185]	Rim	1597.8	3416.4	-27.5	-28.8	-1.4	Ruminant adipose
LUN21	Pink circle	Grooved Ware	19	[6.5.185]	Body	667.8	1899.4	-27.5	-33.7	-6.3	Ruminant dairy
LUN24	Turquoise circle	Grooved Ware	23	[6.5.195]	Base	1199.6	3940.4	-28.1	-34.1	-6.1	Ruminant dairy
LUN26	Turquoise circle	Grooved Ware	23	[6.5.195]	Body	678.7	1174.7	-28.9	-35.0	-6.1	Ruminant dairy
LUN27	Turquoise circle	Grooved Ware	23	[6.5.195]	Body	991.2	2297.5	-29.8	-34.1	-4.4	Ruminant dairy
LUN28	Yellow circle	Grooved Ware	24	[6.5.195]	Body	526.7	999.9	-29.1	-34.2	-5.1	Ruminant dairy
LUN29	Yellow circle	Grooved Ware	24	[6.5.195]	Body	600.9	1141.4	-29.1	-34.0	-4.9	Ruminant dairy
LUN30	Orange circle	Grooved Ware	28	[6.5.195]	Rim	561.4	1061.7	-28.6	-32.2	-3.6	Ruminant dairy
LUN31	Orange circle	Grooved Ware	28	[6.5.195]	Body	1187.5	2146.8	-28.1	-31.5	-3.4	Ruminant dairy



ILLUS 19 Comparison of the mean lipid concentrations ($\mu\text{g g}^{-1}$) from rim, body and base areas (where available) from V5, V9, V11, V19, V23 and V28. (© AOC Archaeology)

is more likely to have been heated rather than boiled. Of the remaining vessels, all of which were Grooved Ware, (V5) and (V19) (Illus 19) show a predominance of lipids in the rim area, suggesting that these vessels were used to boil foodstuffs. Vessel (V5) was used to process dairy products, suggesting the boiling of milk, particularly bearing in mind the lipid concentration in the rim sherd (LUN04, $10281\mu\text{g g}^{-1}$), possibly to make cheese. Interestingly, the rim sherd (LUN20) from (V19) yielded a ruminant adipose signal, whereas the body sherd (LUN21) showed a ruminant dairy signal. Similarly, (V9) (LUN11) rim sherd yielded a ruminant adipose signal, with the body sherd (LUN12) showing a dairy signal. For (V9), the concentration was much higher in the body sherd at $3733.3\mu\text{g g}^{-1}$, in contrast to the rim sherd at $996.4\mu\text{g g}^{-1}$, suggesting baking or

roasting of the dairy products processed within the pot, but boiling when it was used to cook meat. The reverse is true of (V19), with a higher lipid concentration in the rim ($1597.8\mu\text{g g}^{-1}$) when the vessel was being used to cook carcass products and of lower lipid abundance when used to process dairy products ($667.8\mu\text{g g}^{-1}$). These different lipid signals from different parts of the pot may relate to the multiple uses of the vessels and possible imprinting of the contents over time.

In (V8) (LUN08, LUN09 and LUN10) and (V28) (LUN30 and LUN31, Illus 19) the highest accumulation of lipids was in the body area, with both vessels being used to process ruminant dairy products, although probably not through boiling of milk.

In (V11) and (V23) (Illus 19), lipids were most abundant in the base of these vessels, both of

which were again used to process dairy products. The lipid concentrations in the base (LUN13) and two body sherds (LUN14 and LUN15) from (V11) were markedly different (4966, 200, and 556 $\mu\text{g g}^{-1}$, respectively), suggesting the vessel was only part-filled with the dairy product being cooked – possibly just covering the base, or to a depth of a few centimetres – and some splashing occurred towards the middle and rim of the vessel as the product was heated. In the absence of a rim sherd for (V23), it is difficult to interpret possible modes of cooking. Similarly, comment cannot be made on the possible cooking practice indicated by the lipids for (V6) (LUN07), (V14) (LUN18 and LUN19) and (V24) (LUN28 and LUN29), as only body sherds were analysed.

The results demonstrate that nine of the eleven lipid-yielding vessels (V3, V5, V6, V8, V11, V14, V23, V24, V28) were routinely used solely for processing dairy products, such as milk, butter and cheese, but no evidence was found to suggest that vessels were used simply to store dairy products. These data provide clear evidence for vessel specialisation and also suggest that dairying was well established at LP6.5. Two of the vessels yielded one sherd each with a ruminant dairy and adipose signal, suggesting that their use was mixed and may have changed throughout their life history.

Lipid analysis suggests that during the earliest Neolithic an overwhelming predominance of dairy products was associated with pottery throughout much of Scotland and northern England, with 80% of sherds analysed returning this signature (Cramp et al 2014). While this pattern was maintained into the Late Neolithic the prevalence of dairy fats dropped by the later part of the 3rd millennium BC (Cramp et al 2014). For example, of eight lipid-yielding Late Neolithic Grooved Ware sherds from Balfarg Riding School, Glenrothes, only three contained dairy lipids (Mukherjee et al 2008). Interestingly, a strong correlation between ceremonial sites, pig-feasting and Grooved Ware in Southern Britain, as demonstrated by a large-scale organic residue study of Later Neolithic ceramic vessels, is not a characteristic of Scottish assemblages. The lack of evidence for the consumption of pig

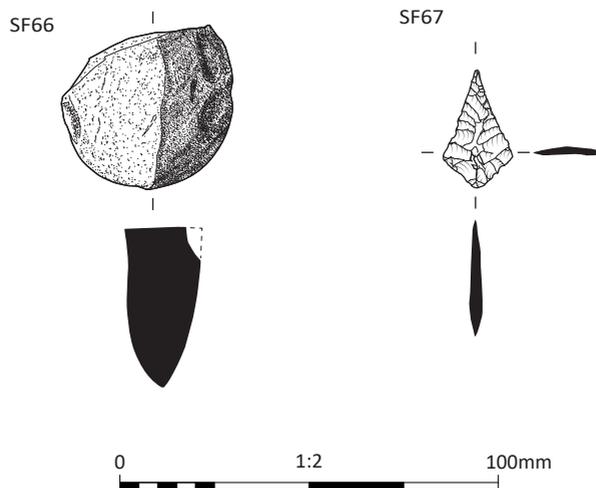
meat among the surviving lipid signatures analysed among the A9: L to P of B assemblage is consistent with this wider Scottish pattern.

STRUCK LITHICS

Of note among the small assemblage of cores, flints and blades recovered were a kite-shaped flint arrowhead (SF67, Illus 20), a horseshoe scraper edge fragment (SF22), an end-scraper fragment (SF63) and a ground stone axehead fragment (SF66, Illus 20) macroscopically identified as being made from Langdale tuff. The assemblage was found to include items of carnelian, quartz and chert as well as flint, using both locally derived east coast or Buchan flint and imported material, with approximately 50% of the flint believed to derive from the Wolds of Eastern Yorkshire. The presence and proportions of Yorkshire flint are common to many lithic assemblages of Eastern Scotland associated with the Mid to Later Neolithic period (Ballin 2011).

Kite-shaped flint arrowheads (SF67) are a distinctive type of arrowhead (Green 1980: 97) which are generally found within contexts associated with the latter part of the Early Neolithic, immediately prior to the Early/Mid Neolithic transition (3600/3500 BC) (Ballin 2021), although very few are from well-dated contexts (eg Freeland's Farm, Strathearn: Nicol & Ballin 2019). SF67 was recovered from the fill (6.2.015) of pit [6.2.014] in LP6.2, alongside a sherd from a Carinated Bowl (V1) and unclassified sherds (V2), and radiocarbon dating of an associated sample of alder indicates activity within the date range of 3631–3377 cal BC (95.4% probability; SUERC-93265; 4718 \pm 22 BP). Work by Devaney (2005) has suggested that these types of arrowhead were largely created for ceremonial purposes and the apparent lack of use of this example and its recovery from the fill of a pit alongside a rim sherd of Carinated Bowl (V1), perhaps the result of purposeful deposition, may support this suggestion.

The ground stone axehead fragment (SF66) appears macroscopically to have been made from tuff from Great Langdale, Cumbria (Group VI; Clough & Cummins 1988: 270, Map 6). Axeheads



ILLUS 20 Fragment of ground stone axehead (SF66) and a kite-shaped flint arrowhead (SF67). (© AOC Archaeology)

of this material were commonly exchanged, moved and circulated within Scotland from northern England and most dated examples come from Early Neolithic contexts (Edinburgh et al 2020) such as Carzield, Dumfries and Galloway (Sheridan 1993). The fragment, which measures only 41.8mm in length, 48.5mm in remaining width and 19.2mm in thickness, derives from the blade of the axehead. The full width of the blade is unknown as only a part of the original edge survives and a large spall has been lost from one face, making reconstruction of the axehead's original form and dimensions impossible to extrapolate with any certainty. However, the presence of the axehead fragment alongside Grooved Ware ceramics within pit [6.5.195], which has been dated to 2573–2471 cal BC (95.4% probability; SUERC-93290; 3999±26 BP), is of interest and may represent the deposition of an heirloom of great antiquity at the time of deposition or a fortuitous inclusion within the pit.

RADIOCARBON DATING

Twelve samples from LP4, LP6.2, LP6.3 and LP6.5 which relate specifically to Neolithic activity were processed for radiocarbon dating by

accelerator mass spectrometry (AMS). These are summarised in Table 5 and discussed below. The samples consisted of single entities of charred grains and charcoal and were submitted to the Scottish Universities Environmental Research Centre (SUERC), East Kilbride, where they were pre-treated and measured as described by Dunbar et al (2016). Bayesian statistical analysis was undertaken on a suite of dates from this project but the limited number of dates relating to the Neolithic prevented analysis focusing on this time period.

Three dates were obtained from two features in LP4. Two statistically indistinguishable dates were obtained from the only fill (4.097) of pit [4.095] indicating Mid to Late Neolithic activity occurring some time within the date range of 3263–2916 cal BC (95.4% probability; SUERC-87161 and SUERC-93103; 4414±24 BP and 4400±31 BP). This pit [4.095] contained a flint end-scraper and a flint flake and was rich in the remains of carbonised hazelnut shell. A single date, 3348–3095 cal BC (95.4% probability; SUERC-93108; 4400±31 BP), came from the fill (4.235) of pit [4.234].

In LP6.2, dates obtained from two pits demonstrate Early to Early-Middle Neolithic activity. A single date of 3634–3376 cal BC

TABLE 5
Summary of AMS radiocarbon dating results relating to Neolithic activity across LP4, LP6.2, LP6.3 and LP6.5

<i>Lab code ref</i>	<i>Site name</i>	<i>Fill and cut context no.</i>	<i>Radiocarbon age BP</i>	<i>Calibrated date (95.4% probability)</i>	<i>Period</i>	<i>Material</i>
SUERC-93103	LP4	Fill (4.097) of [4.095]	4400±31	3263–2916 cal BC	Neolithic	Charcoal: birch
SUERC-87161	LP4	Fill (4.097) of [4.095]	4414±24	3263–2925 cal BC	Neolithic	Charcoal: alder
SUERC-93108	LP4	Fill (4.235) of [4.234]	4400±31	3348–3095 cal BC	Neolithic	Charcoal: hazel
SUERC-93127	LP6.2	Fill (6.2.004) of [6.2.003]	4723±31	3634–3376 cal BC	Neolithic	Cereal: hulled barley caryopses
SUERC-93265	LP6.2	Fill (6.2.015) of [6.2.014]	4718±22	3631–3377 cal BC	Neolithic	Charcoal: alder
SUERC-87165	LP6.3	Fill (6.3.004) of [6.3.003]	4415±21	3262–2928 cal BC	Neolithic	Charcoal: alder
SUERC-93266	LP6.3	Fill (6.3.004) of [6.3.003]	4410±24	3261–2924 cal BC	Neolithic	Charcoal: alder
SUERC-93271	LP6.3	Fill (6.3.026) of [6.3.025]	4502±24	3346–3099 cal BC	Neolithic	Charcoal: apple/pear/hawthorn/ quince/rowan
SUERC-93286	LP6.5	Fill (6.5.186) of [6.5.185]	3949±24	2566–2346 cal BC	Neolithic–Chalcolithic	Charcoal: alder
SUERC-93290	LP6.5	Upper fill (6.5.196) of [6.5.195]	3999±26	2573–2471 cal BC	Neolithic–Chalcolithic	Charcoal: alder
SUERC-93291	LP6.5	Fill (6.5.038) of [6.5.037]	1549±25	426–568 cal AD	Early medieval	Cereal: hulled barley caryopses
SUERC-93292	LP6.5	Fill (6.5.024) of [6.5.023]	3962±26	2571–2349 cal BC	Neolithic–Chalcolithic	Charcoal: alder

(95.4% probability; SUERC-93127; 4723±31 BP) was obtained from the only fill (6.2.004) of pit [6.2.003]. A similar date of 3631–3377 cal BC (95.4% probability; SUERC-93265; 4718±22 BP) was obtained from material within the only fill (6.2.015) of pit [6.2.014], which was associated with a small rim sherd from a Carinated Bowl (V1), sherds from a second unclassified vessel (V2) and a finely worked flint arrowhead (SF67) in apparently fresh condition.

Three dates were obtained from samples from LP6.3. These comprise two statistically indistinguishable dates indicating activity some time within the date range of 3262–2924 cal BC (95.4% probability; SUERC-87165 and SUERC-93266; 4415±21 and 4410±24 BP) from the only fill (6.3.004) of pit [6.3.003], which was associated with quantities of hazelnut shells and charcoal. A further date, suggesting Middle Neolithic activity occurring some time within the date range of 3346–3099 cal BC (95.4% probability; SUERC-93271; 4502±24 BP) was obtained from material within the only fill (6.3.026) of pit [6.3.025], associated with four small unclassified pottery sherds (V4) and small quantities of hazelnut shell.

In LP6.5, three fragments of short-lived charcoal and one sample of charred barley from four pits ([6.5.023], [6.5.037], [6.5.185], [6.5.195]) that contained Grooved Ware pottery were dated. The three charcoal samples provide dates spanning the very latest decades of the Late Neolithic into the Chalcolithic period, 2580–2340 cal BC (outer range of 95% confidence interval for the three dates; SUERC-93286, SUERC-93290 and SUERC-93292; 3949±24, 3999±26 and 3962±26 BP). In contrast, a charred cereal from pit [6.5.037] dated to the early medieval period, 426–568 cal AD (95.4% probability; SUERC-93291; 1549±25 BP). This was associated with diagnostic Late Neolithic pottery, and the material that provided this date is considered to be intrusive later material within an earlier Late Neolithic pit. This is confirmed by the presence of joining sherds from the same vessels present in pits [6.5.023] and [6.5.037], indicating that they are likely to relate to the same episode of Late Neolithic/Chalcolithic activity.

DISCUSSION

The most significant result of the excavations undertaken as part of A9: L to P of B was undoubtedly the Grooved Ware pottery assemblage which was recovered from various pits in LP6.5. This is the largest and most diverse assemblage of Grooved Ware to be recovered from a site in Perth and Kinross in over a decade (eg Littleour: Sheridan 1998) and has the potential to provide valuable insights into Grooved Ware use in this area and eastern lowland Scotland more broadly. Although one of the key questions posed at the outset of this project (Neo RO 3, see Introduction) was to investigate the relationship between Impressed Ware and Grooved Ware, there were no instances of these vessel types being found together and therefore no overlap in their use could be demonstrated among the assemblage.

Understanding the ‘how’ and the ‘why’ of the spread of Grooved Ware use and its associated practices and traditions was identified as a key research question in Scottish Neolithic studies (Cleal 1999; ScARF 2012b: iii). Since the last synthesis of Grooved Ware pottery in Scotland (Cowie & MacSween 1999) our understanding of the development of this style, its chronology and the distribution across the regions has been revolutionised by a wealth of new material uncovered in the years since, with a focus being placed on the evidence from Orkney, where this style of pottery appears to have developed (MacSween 1992; MacSween et al 2015; Sheridan 1999, 2007). Less emphasis has been placed on synthesising the picture of Grooved Ware use in mainland Scotland, particularly the east-central lowlands (although see Cowie 1993 and MacSween 2018), and many aspects of the form and chronology of this pottery style remain open to debate (ScARF 2012b; Copper et al 2021).

The following discussion considers aspects of the chronology of the LP6.5 Grooved Ware assemblage, the circumstances of its deposition and what this can reveal about concepts, traditions and practices, and the possibility of the emergence of a regional style in the east coast mainland in the final stages of Grooved Ware use, contemporary with the earliest Beakers.

Looking to the individual elements of the A9: L to P of B Grooved Ware assemblage – the form, size, style and decoration of the vessels – broad comparisons can be observed with Grooved Ware assemblages spread widely across Britain and Ireland during the Late Neolithic (Wainwright & Longworth 1971; Manby 1974; Cleal & MacSween 1999; Sheridan 2007), and in particular those that fall within Durrington Walls sub-style (Wainwright & Longworth 1971). We can see that the adoption of this pottery style was not developed in isolation but was accompanied by a raft of new practices and traditions which spread far and wide (Sheridan 2007; Carlin 2017), the pottery style forming a pivotal expression of a dialogue between disparate areas Britain and Ireland, and the circulation of designs, wisdoms and cosmologies. Grooved Ware is one of only a handful of tangible expressions of these ideas and concepts (Sheridan 2007; ScARF 2012b).

As MacSween (2018) has discussed, the development of this pottery style was not uniform or static but was interpreted in a variety of ways by communities over time, and probably at different paces – some developing rapidly while others shifted more gradually over generations – leading to changes in form, size and appearance which deviate away from the initial style thought to have developed in Orkney around *c* 3300/*c* 3200 and *c* 3100 BC (ScARF 2012b: 29; MacSween et al 2015; Richards & Jones 2016). Some communities may have been open to wholesale adoption of Grooved Ware style and its associated practices while others perhaps accepted only aspects that resonated most closely with their own individual or group identities, resulting in contemporary but distinct responses manifesting as regional styles (McInnes 1969; Cowie 1993; Sheridan 2007; MacSween 2018), which are best understood as local ‘dialects’ of a national ‘syntax’ (MacSween 2018: 58). This dynamic process would also have changed over time, expressed as gradual style drifts in response to new influences (Brophy 2006: 38; Sheridan 2007) and innovations sparked by apprentices interpreting the work of older generations (Greenfield 2000).

Connections with northern England, particularly Cumbria and Yorkshire, are demonstrated by the presence of imported flint in the A9: L to P of B lithic assemblage, with either the raw materials or the finished tools being transported north from the Wolds of Eastern Yorkshire, and by the flake of the Langdale tuff axehead, sourced from Cumbria. This opens up the possibility that the styles of Grooved Ware seen in the A9: L to P of B assemblage, and eastern lowland Scotland more generally, could have both influenced and been influenced by contemporary Grooved Ware styles in northern England (Manby 1974). An intriguing question ripe for further investigation is whether a north–south influence can be demonstrated between Grooved Ware assemblages in these areas. Rather than looking to Orkney for inspiration and influence, should we instead be looking south, seeing the development of this style as a continuous, gradual and heterogeneous response to various pulses of influence from within mainland Scotland and beyond?

Although certain similarities in pottery style can be recognised among other Grooved Ware assemblages (eg the use of vertical cordons is widely paralleled among Durrington Walls-type vessels encountered across Britain and Ireland: Wainwright & Longworth 1971), the A9: L to P of B Grooved Ware assemblage as a whole is unique. The most similar aspects of both decorative style and individual motifs used come from other very late (Late Neolithic/Early Chalcolithic) assemblages from Perth and Kinross, Tayside and the eastern lowland mainland, comprising combinations of vertical and horizontal applied or pinched-up cordons (see for example Balfarg, Fife (Henshall & Mercer 1981: 131, fig 44); Beech Hill House, Coupar Angus (MacSween 1995: 210, illus 9, SF19); Courthill Farm (McLaren & MacSween 2016: 7, 9, illus 3) and Powmyre Quarry, Angus (Sheridan 2016); Hillend, Clydesdale (Armit et al 1994: illus 5); Leadketty ‘Four-Post’ Structure (Brophy et al 2012; Brophy et al unpub; DSGW) and Millhaugh (Wright 2016; DSGW) among others); swathes of fingernail impressions, including paired pinched impressions (as noted on Pots 3, 4a and 5 from Littleour, Perth and Kinross (Sheridan 1998: 63,

illus 51), Hillhead, Clydesdale (Armit et al 1994: illus 5) and Beckton, Dumfriesshire (Cormack 1963)); and diagonal incised lines. More rarely, applied pellets or knobs (eg Leadketty (Brophy et al 2012)), and cord impressions (eg Littleour (Sheridan 1998: 63, illus 51)) also feature. Future research would hope to address how these late Grooved Ware assemblages compare to much earlier Grooved Ware groups in the same region and determine whether it is possible to observe the development of the style over time in this area. A more nuanced understanding of this progression and development may help us to identify routeways and connections between regions that may have influenced each other over time.

Among the Grooved Ware vessels, 18 out of 23 (78%) pots were stained and had patches of encrusted carbonised organic residues surviving on parts of the interior surfaces. Only four lacked any macroscopic evidence of residues (V8, V12, V15 and V25). These macroscopic traces of surviving carbonised food residues imply that the majority of the vessels, but probably not all, had seen use as cooking vessels, although it should be noted that the absence of visible residues does not preclude their use in cooking. Attempts to characterise the function of these vessels more precisely was undertaken by analysing surviving lipids absorbed into the surfaces of a selection of the vessels. The high level of survival of lipid markers detected (84% of analysed sherds) demonstrated the presence of a mix of ruminant and non-ruminant lipids, indicating that at least six of the vessels (V3, Impressed Ware; V8, V9, V14, V23 and V24, Grooved Ware) were used to process dairy products or suggesting that processed milk was used in cooking (Cramp & Sheridan 2018). This includes Grooved Ware (V8) which had no macroscopic adhering residues but where absorbed lipids were successfully detected. Two vessels (V9 and V19) saw a mixture of lipid values, suggesting the contents included both ruminant meat cooking and ruminant dairy processing. This mix of lipid values implies that these vessels saw multiple and varied use prior to their breakage and deposition. A further three vessels (V5, V6 and V11) have less confidently assigned values but are also suggestive

of a role in dairy processing, while those from (V28) sit between two groups of values, probably demonstrating mixed use with dairy and meat products. Looking at similar analysis conducted elsewhere, analysis of absorbed lipids in the Grooved Ware from Cheviot Quarry (Stern 2008) revealed the presence of degraded animal fat/oil while analysed vessels from Stonehall and Crossiecrown, Orkney demonstrated a mix of ruminant dairy, mixed porcine/ruminant dairy fats, and animal fats and ruminant adipose (Mukherjee & Evershed 2016), and at Balfarg Riding School, Glenrothes only three vessels analysed contained dairy lipids (Mukherjee et al 2008). This implies that the range of foodstuffs being processed or cooked within the vessels among the A9: L to P of B assemblage were more limited than observed in some assemblages elsewhere in Scotland and appear to be more comprehensively dominated by an association with dairy-based products.

The deposition of incomplete vessels in simple pits observed in the A9: L to P of B sites can be paralleled widely (Anderson-Whymark & Thomas 2012). Structured deposition of specially selected sherds of Neolithic pottery has been argued for on many Scottish sites (eg Becket & MacGregor 2012; Brophy & Noble 2012; see Thomas 2012 for more general discussion of Neolithic pit deposits). In some instances, such as at Dubton Farm, Angus, Girvan and Maybole, Ayrshire and Meldon Bridge, Scottish Borders, the potential deliberate selection of sherds and recurring combinations of specific artefacts have been interpreted as purposeful deposition of domestic debris (MacSween 1999; Cameron 2002: 70; Becket & MacGregor 2012). Within the A9: L to P of B site assemblage some significant practices can be recognised. This includes the Early to Early-Middle Neolithic Carinated Bowl sherd deposited alongside a fresh flint arrowhead and flint flake in pit [6.2.014] in LP6.2, a practice directly comparable to that at Maybole, Ayrshire (Becket & MacGregor 2009: 118) for example, and the collection of Grooved Ware sherds found alongside a flake of a Langdale tuff axehead (SF66) and other lithics in pit [6.5.195] in LP6.5. It is also relatively common to encounter large sherds or substantial parts of Grooved

Ware vessels in pits in mainland Scotland (eg at Powmyre Quarry, Glamis; Sheridan 2016: fig 8) as seen in LP6.5.

Of particular interest are the collections of sherds from groups of Grooved Ware and associated vessels found in single pit fills or in pairs of adjacent pits. These include (V5–12, V17) from pits [6.5.023] and [6.5.037], (V13–16) from pit [6.5.037] and (V22–28) from [6.5.195]. In each instance, none of the pots is complete. Some are represented by substantial portions of the rim and/or body and/or base but only in a small number of cases do we have sufficient sherds from all three areas of the pot to allow a full profile to be reconstructed (eg V5) but even when substantial portions survive, rarely is more than 25% present. Many of the sherds in these groups appear freshly broken with minimal abrasion, and yet their incomplete state indicates they were not smashed in situ and then sealed in the pit, unless we accept that the pit or pits may have been revisited after initial deposition with the intent to remove sherds or portions of the vessels. No discernible pattern to their distribution within the pits was noted during excavation.

Although routine disposal of rubbish from activity areas cannot be entirely discounted, the abundance of sherds from groups of vessels within these specific pits and their relatively un-abraded condition implies deposition as discrete events or episodes where sherds of multiple broken pots were disposed together, possibly following or as part of a series of communal events, similar to that argued for the Grooved Ware from Littleour, Perth and Kinross (Sheridan 1998: 67). Whether this was a feast or feasts held to mark special seasonal events such as the beginning or end of the harvest or hunt, or a significant event such as a birth, marriage or death, is impossible to divine from the sherds alone (Brophy & Noble 2012). Some of the pots involved had already seen use prior to these events, evidenced by the presence of repair holes on at least two vessels (V11 and V24) and by the mixed lipid profiles on several vessels, implying various episodes of use and functions.

More difficult to interpret is the low density of sherds found in pits elsewhere across the

excavated sites which individually display no evidence of ‘specialness’ in their location or infill, suggesting, superficially at least, that these may simply be the remains of hearth sweepings and domestic debris. Yet, the act of digging a pit and the placing within that pit handfuls of pottery sherds, other artefacts and ecofacts is undoubtedly a deliberate act which is observed widely across Britain and Ireland during the Neolithic (Anderson-Whymark & Thomas 2012). The motivations behind these behaviours remain ambiguous and are not likely to be explained by a universal hypothesis, particularly when the material culture of the domestic and everyday are set in the context of structured and repeated practice (Brophy & Noble 2012: 66). In the context of the A9: L to P of B assemblage, it is unclear whether it is the pottery, its owner or its contents that were considered special and required a particular deposition strategy (for example, deposition within a specially excavated pit). Alternatively, was ‘specialness’ conferred on these artefacts by the very process of their deposition? The mechanisms that structured the choice of what to bury remain elusive and open to debate (Anderson-Whymark & Thomas 2012). The action of pit digging in the Neolithic is demonstrated to continue across the A9: L to P of B sites from the Early Neolithic (eg LP4, LP6.3) into the Late Neolithic/Chalcolithic (eg LP6.5), attesting to the persistence of traditions and practices, as argued for elsewhere (Chapman 2000), even if the motivations and significance of these practices is likely to have changed over time and the subsequent meaning to have varied among communities in line with local traditions.

Three of the pits from which Grooved Ware was recovered ([6.5.037] SUERC-93292, [6.5.185] SUERC-93286; [6.5.195] SUERC-93290) in LP6.5 have been radiocarbon dated to the Late Neolithic/Chalcolithic. These three dates are statistically indistinguishable, suggesting episodes of activity between 2580–2340 cal BC (outer range of 95.4% confidence interval for the three dates). This sets the Grooved Ware assemblage from LP6.5 within the latest phase of Grooved Ware use in mainland Scotland, alongside Littleour, Perth and Kinross (Sheridan

1998: 67; Copper et al 2018: 223–4; Copper et al 2021; DSGW), Hillend, Clydesdale (Armit et al 1994: 124; Copper et al 2018: 223) and Powmyre Quarry, Fife (Copper et al 2018: 233).

The published radiocarbon date for Hillend was obtained from carbonised organics recovered from the pit associated with the Grooved Ware ceramics (3340–2920 cal BC at 95% confidence (Beta-73955; Armit et al 1994: 118)) but this is no longer considered to be reliable. Two new dates obtained as a result of the *Tracing the Lines* research programme were obtained from organic residues on sherds from two of the vessels: (V2) (2834–2476 cal BC at 95.4% confidence; SUERC-82541) and (V5) (2859–2496 cal BC at 95.4% confidence; SUERC-82540) (Copper et al 2018: 223). The date for the deposition of vessels within a single pit at Littleour was quoted in the excavation report as 2350–2030 cal BC (Sheridan 1998: 67). However, this has also been subject to recent redating (Copper et al 2018: 223–4). The most reliable of these dates, both quoted at 95.4% confidence, are 2872–2631 cal BC (SUERC-77487) from Pot 1 and 2477–2309 cal BC (SUERC-77488) from Pot 2. The date associated with vessel L from Powmyre Quarry, which also demonstrates similarities in style to the A9: L to P of B vessels, is also late in the sequence (2569–2464 cal BC at 95.4%; SUERC-84857) (Copper et al 2019: 233–4), as are those from Grooved Ware pits at Auchlishie, Angus which are associated with date ranges suggesting activity between 2476–2204 cal BC and 2465–2065 cal BC (Dick 2000, 2001; Copper et al 2021: 101).

The radiocarbon date ranges associated with the A9: L to P of B Grooved Ware vessels from LP6.5 demonstrate potential chronological overlap with the assemblages from Hillend, Littleour, Powmyre Quarry and Auchlishie. Bayesian statistical analysis of Grooved Ware associated dates as part of the *Tracing the Lines* project has demonstrated that all Scottish sites outwith Orkney that have produced dates post-dating 2500 cal BC are from the eastern and southern areas of Scotland (Copper et al 2021: 101), demonstrating the persistence of Late Neolithic potting traditions, styles and decoration in these

areas despite the preferences shifting at different paces in other parts of mainland Scotland. The prevalence of Durrington Walls sub-style decoration on these latest Grooved Ware vessels has been noted elsewhere (Copper et al 2021: 101) and aspects of this (eg vertical cordons, often associated with swathes of fingernail impressions) are reflected in the A9: L to P of B assemblage. Although it is still debated exactly when Grooved Ware went out of use in Scotland (see Copper et al 2021: 102) the dates associated with the LP6.5 vessels contribute to the small group of securely dated Grooved Ware findspots in Scotland that demonstrate that this pottery style continued in use alongside the earliest Beakers, which appear in Scotland around 2450/2400 BC (Parker Pearson et al 2019). An overlap in the use of Grooved Ware and the earliest Beakers of between 1 and 145 years (at 95% probability) or between 1 and 60 years (at 68% probability) has been suggested elsewhere by Bayesian modelling (Copper et al 2021: 102). Although we have no definitive evidence for continued activity in LP6.5, the date range of the Grooved Ware discussed here and the very early Beaker from Newmill (Watkins & Shepherd 1980), situated just beyond the LP6.5 excavation area, provides intriguing insights into potential overlap between these two traditions.

CONCLUSION

Analysis of the style and form of the pottery and lithics from the A9 Dualling: Luncarty to Pass of Birnam excavations has provided an important avenue into the consideration of the development of Grooved Ware in mainland Scotland in the latest phase of its use, raising the possibility of shared design ideas between eastern and central mainland Scotland and northern England, and providing possible hints at regional preferences in style during this latest stage of use. Important new information on the use of late Grooved Ware vessels through organic lipid analysis further supports existing evidence of the significance of dairying and cattle husbandry more generally during this period. This important Grooved Ware assemblage is a significant new addition

to the existing corpus of Late Neolithic pottery from Perth and Kinross and eastern lowland Scotland more generally, and provides valuable new information to support the continuation of use of Grooved Ware into the Chalcolithic in this region.

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NOTES

- 1 Also see project blog/website: <http://blogs.brad.ac.uk/tracing-the-lines>
- 2 <https://scarf.scot/national/scarf-neolithic-panel-report/neolithic-case-studies/tracing-the-lines-uncovering-grooved-ware-trajectories-in-neolithic-scotland/tracing-the-lines-grooved-ware-catalogue>

- 3 The number of individual vessels in some instances is not definitive and a range of vessel quantities has been recorded. Also, a number of sites are in the post-excavation phase of works or are unpublished, meaning that full data are not available currently.

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ONLINE RESOURCES CONSULTED

Tracing the Lines Project: Database of Scottish Grooved Ware (abbreviated to DSGW), <https://scarf.scot/national/scarf-neolithic-panel-report/>

neolithic-case-studies/tracing-the-lines-uncovering-grooved-ware-trajectories-in-neolithic-scotland/tracing-the-lines-grooved-ware-catalogue. Accessed 18 November 2020.

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