ArchaeologyReportsOnline

ARO43: Nether Park Quarry, Aberdeenshire: a small Mesolithic and Neolithic site on the banks of the River Dee

By Hilary K Murray and J Charles Murray

with specialist reports by Torben Bjarke Ballin, Derek Hamilton and Scott Timpany

Lithic artefact illustrations by Jan Dunbar

Archaeology Reports Online, 52 Elderpark Workspace, 100 Elderpark Street, Glasgow, G51 3TR
0141 445 8800 | editor@archaeologyreportsonline.co.uk | www.archaeologyreportsonline.com

ARO43: Nether Park Quarry, Aberdeenshire: a small Mesolithic and Neolithic site on the banks of the River Dee

Published by GUARD Archaeology Ltd, www.archaeologyreportsonline.com

Editor Beverley Ballin Smith

Design and desktop publishing Gillian Sneddon

Produced by GUARD Archaeology Ltd 2021.

ISBN: 978-1-9163261-3-2

ISSN: 2052-4064

Contents

List of Figures

List of Figures *(continued)*

List of Plates

List of Tables

List of Tables *(continued)*

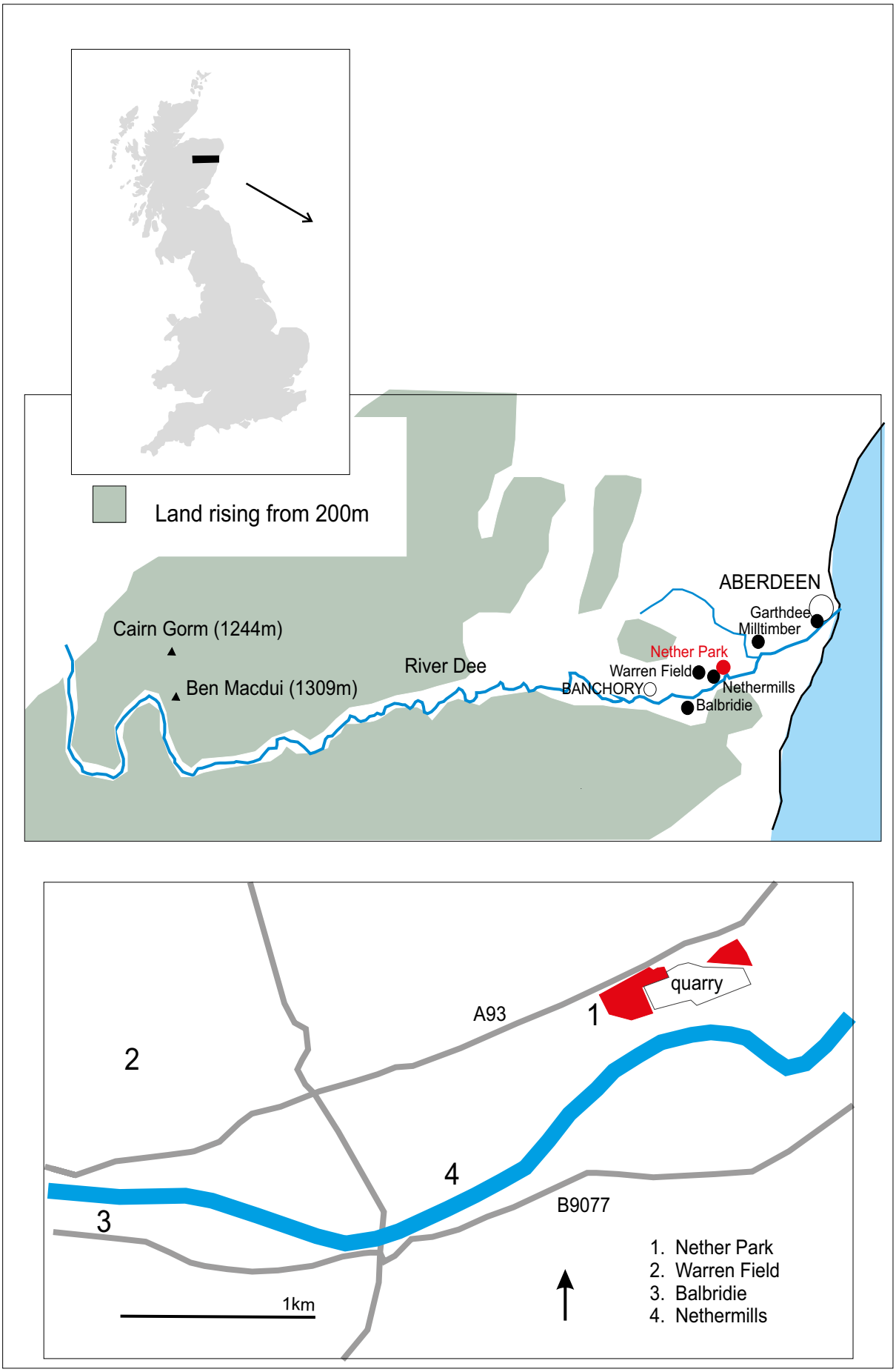

Figure 1: Site location, with reference to other sites mentioned in text.

Abstract

An evaluation prior to quarrying revealed a concentration of features associated with lithics. Excavation and subsequent analyses indicate intermittent visits to the site during the Mesolithic with several knapping sites identified.

In the early Neolithic the site was re-visited and post-pits are interpreted as an ephemeral structure, with hearths and a knapping area suggesting sporadic Neolithic use of the site over several hundred years. Bayesian analysis suggests that while the activity around one hearth may date to around the time of the building of the nearby timber halls at Warren Field and Balbridie, the post-pit structures at Nether Park are earlier.

Introduction

A planning application for an extension of the extraction of sand and gravel and associated infrastructure in three fields to the north of the existing Nether Park Quarry, Drumoak, Banchory, Aberdeenshire, was subject to an archaeological condition in the context of Scottish Planning Policy (PAN 2/2011, SPP, HESPS). Murray Archaeological Services Ltd (MAS) were commissioned by Leiths (Scotland) Ltd to undertake the work.

Following discussion with the Archaeology Service, Aberdeenshire Council, a desktop survey and a walkover survey of all three fields were undertaken to review the potential for archaeological survival and the presence and/or scale of any artefact distribution. As the ground was in grass and rough vegetation, only one flint was observed. However, the topography of the site in relation to the river and its proximity to known Mesolithic and Neolithic sites indicated the strong possibility of prehistoric activity, and a Written Scheme of Investigation (WSI) was submitted to the Archaeology Service, Aberdeenshire Council, and approved by them. The WSI recommended a phased archaeological trial trenching evaluation of 10-15% of each area proposed for quarrying. The outcome of each phase of the evaluations would determine the need for any further archaeological intervention, including the possibility of a monitored soil strip, and stipulate in detail how such interventions were to be carried out. The present publication concerns the evaluation, which took place in two phases in July 2018 and in September 2019, and the excavation of an area of surviving prehistoric features in August and September 2018.

Site Location

The site lies about 6 km east of Banchory, in Drumoak parish at NGR: from NO 7650 9695 to NO 7728 9720. The walkover survey and evaluation extended to 6.8 hectares across three fields lying between c. 100 and 500 m north of a loop of the River Dee, and from the river and existing quarry to the A93 Aberdeen to Banchory road (Figure 1, Plate 1). The ground sloped down to the Dee from between c. 50 and 35 m OD on gravels of the oldest Late Devensian fluvial fill along lower Deeside. The Lochton Sand and Gravel Formation or the Lochton Terrace, lie above the north side of the river at this point, but the Camphill Terrace, between the present river and the Lochton Terrace lay within the floodplain of the River Dee in the Mesolithic, at around 35 m OD (see Milltimber in Tipping 2019, 31-2).

Archaeological Background

Nether Park lies on the gravel terraces on the north bank of the river Dee c. 2 km east of Nethermills Farm (Plate 1), excavated by Kenworthy in 1978-81 and recently reviewed by Wickham-Jones (2017), where similar, although far more extensive, Mesolithic activity was excavated. A little further west lies the Mesolithic pit alignment at Warren Field, Crathes (Murray *et al*. 2009), and the early Neolithic timber halls of Balbridie (Ralston 1982) and Warren Field, Crathes (Murray *et al.* 2009). Extensive field walking has taken place in the Banchory area (Mesolithic Deeside Project www.mesolithicdeeside.org) with the vast majority of known flint scatters along Dee valley recorded within 100 m of the river basin (Kenney 1993, 209), extending from near the river mouth at Aberdeen (Cameron and Stones 2001, 300-1) and Garthdee (Murray *et al.* 2015) to the Cairngorms (Fraser *et al*. 2013).

Plate 1: Aerial view of the site looking south to the river Dee. (© Cabro Aviation Ltd).

The Evaluation

Methodology

Thirty-two evaluation trenches were excavated comprising some 10% of the fields (Figure 2). The cultivated topsoil was removed by a full-slew excavator with a 2.2 m wide, toothless ditching bucket. The topsoil was c. 0.3 mm deep over the gravel on the north of the site, deepening to between 0.35 and 0.4 m over the sand to the south of the site. Any identified features were cleaned and excavated by hand.

Results

No archaeological features or lithics were found in any of the trenches in Fields 2 and 3, which were in grass at the time of the evaluation; but all trenches were reviewed to allow weathering to expose possible lithics. However, recent field walking by the Mesolithic Deeside Project and the recording of lithics in fields to the west of Nether Park at Mills of Drum and to the east at Hawk Hillock, suggest that Mesolithic activity extended all along this side of the river in this area (www.mesolithicdeeside.org).The apparent absence of lithics in Fields 2 and 3 may be due to it not having been possible to walk these as ploughed ground.

A small concentration of lithics was found in Field 1, near several small features cut into natural, centred at NGR: NO 7722 9717. This area of activity was focussed on a band of sand that ran north-east/south-west across the east end of Field 1 and which appears to have accumulated in a shallow sandy dip, with a slightly higher, harder gravel ridge forming the north-west side of the hollow. A full excavation was carried out around this area (Plate 2).

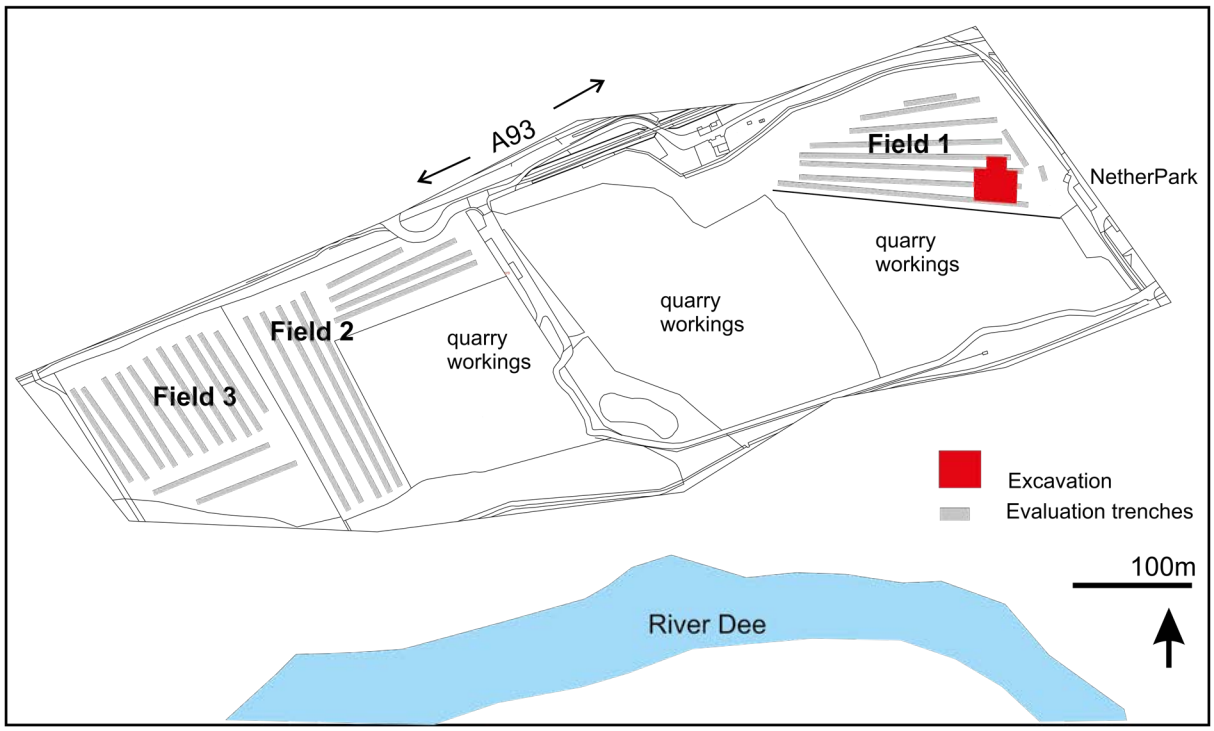

Figure 2: Site plan showing evaluation trenches and excavated area.

Plate 2: Aerial view of the site looking north.(© Cabro Aviation Ltd).

The Excavation

Methodology

Initially the topsoil was stripped from an area 30 by 30 m, centred on the observed anomalies. After hand cleaning it became apparent that a series of features were clustered in an area 20 by 15 m which was excavated in detail (Figure 3). The site was extended a further 10 m to the north to ensure there was no further archaeological evidence in that direction.

The vulnerability of the site was underlined by a few modern plough marks across the top of the natural sand, and by a nineteenth-century stone drain, which crossed part of the site. Many features had been very truncated by ploughing. Animal activity such as mole/vole burrows and worm activity were also evident.

All features were sectioned and then fully excavated; those that were difficult to see in the very dry conditions were box-sectioned for clarity. Details of all contexts are in Appendix 1. Samples for radiocarbon dating and environmental analysis were taken from those features where there was no evident disturbance. Three contexts which appeared during excavation to be possible knapping sites were bulk sampled and wet sieved for maximum retrieval of small lithic fragments. Five-litre samples from two of these contexts (13 and 21) yielded two flakes or less. Seven 5-litre samples from a third (context 16) yielded 25 lithics from sieving in addition to those found during excavation; lithic analysis (Ballin below) also identifies this as a probable knapping site.

Results

Old ground surfaces (OGS)

Three contexts (13, 16 and 21) formed an irregular east/west band measuring up to 15 m east to west and up to 4.5 m north to south (Figure 3).

All three areas comprised fine light grey silty sand lying directly on the clean natural sand at the base of the plough soil with 16 extending on to the east edge of the low gravel ridge which lay across the north side of the site. Although planned and treated as separate contexts, they merged into each other and no stratigraphic sequence could be established. The maximum surviving depth was c. 50 mm. Modern ploughing had extended down to the surviving top of this surface, with two sherds of nineteenth or early twentieth-century china present (one each in 16 and 21).

Small patches of very similar light grey silty sand initially appeared to be discrete features (Figures 3 and 5) but on sectioning may have been survivals of the OGS in shallow hollows (7/25 and 26), in some cases (8/2, 8/3, 9/1 and10/2) these appear to have been cut by stake-holes (Plate 3).

Interpretation

These contexts are interpreted as the degraded remnants of the old ground surface, possibly fortuitously surviving in slight dips in the underlying natural sand.

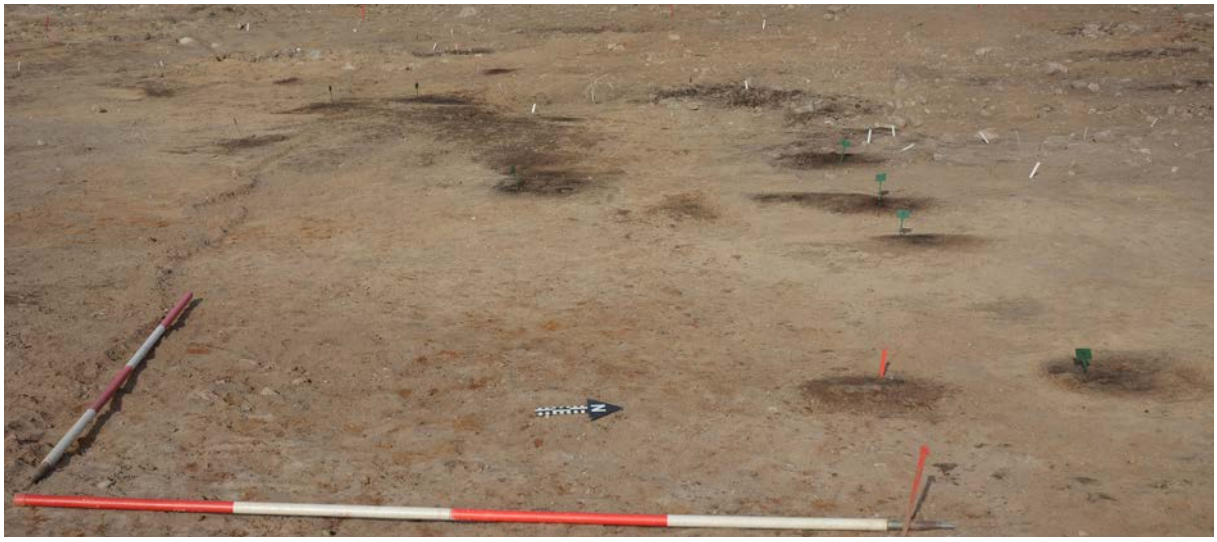

Plate 3: Main features before excavation, looking west. Contexts 7 and 8 in foreground, 17 in middle background.

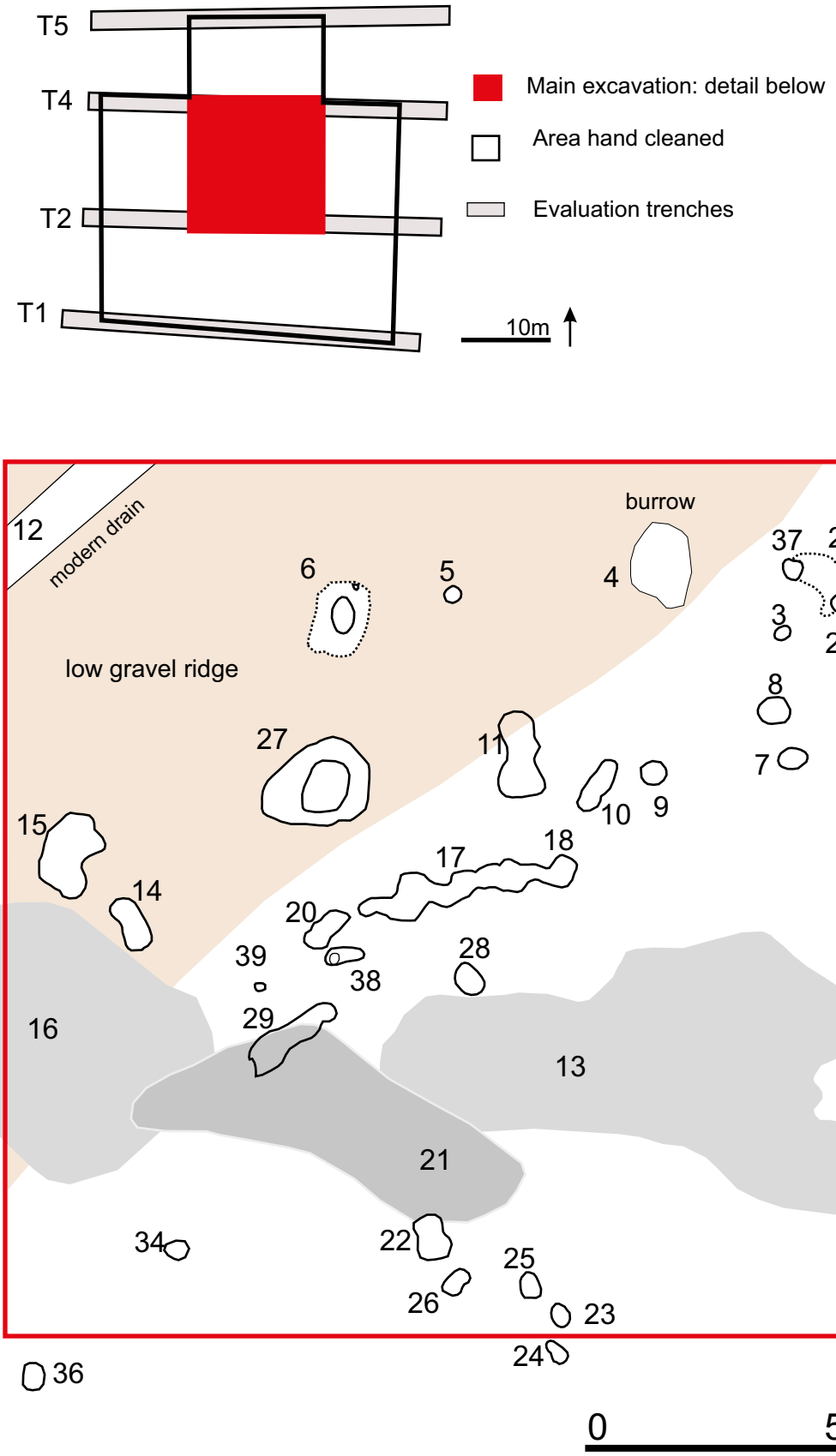

Figure 3: Plan of excavated features.

Hearths

Four possible hearths were identified (6, 14, 15 and 27). All four were on the low gravel ridge, some 2-4 m north of the linear features. None of them had any form of kerb, being charcoal spreads up to 1.4 by 0.9 m (15) in diameter but with a central core of around 0.4 to 0.5 m in extent and between 40 and 90 mm deep. Two heat-cracked stones at the edge of hearth 6 are likely to have been incidental. Both oak and non-oak charcoal was identified, suggesting a range of fuel was used (see Timpany below). One of the hearths (6) was dated to the early Neolithic (SUERC 84115, GU 49997) but there is no implication that they were contemporary. Ballin (below) notes burnt lithics associated with possible hearth 27 and with features 24 and 25, which contained some charcoal but are less convincing as hearths. The only identified food debris associated with these hearths was burnt fish bone from hearth 6 and a possible ray tooth from hearth 15.

Linear features

A series of features (17, 18, 29, 38 and 20) formed a shallow arc extending roughly east to west, cut into sand natural along the southern edge of a gravel ridge which rose to c. 0.50 m above the sand (Figure 4). Several possible hearths lay on the gravel ridge (14, 15 and 6). Patches of fine grey silt, interpreted as an old ground surface (OGS), survived in a slight hollow in the sand to the south of the linear features. The majority of the lithics located on the site were found to the south of the linear features (see, Ballin below, and Figures 13-16).

The main linear feature (contexts 17 and 18) was initially visible as dark grey slightly humic sandy silt with some charcoal (Plate 3). It extended for 3.8 m. The sections (Figure 4) indicated that, although the surface spread was up to 0.7 m wide (e.g. Section 2: 17/1), below this there were a series of at least nine identified post-pits with diameters ranging between c. 0.35 m and 0.4 m, and surviving depths of 0.21-0.25 m. The fills were darker and more apparently charcoal-rich than the overlying spread (Figure 4, Plates 4 and 5).

A structurally similar feature (29) lay to the west; this was 1.72 m long and had similar stratigraphy with a wider shallow surface layer (29/1) over a line of five contiguous post-pits, which ranged in diameter between 0.3 and 0.45 m, and in depth from 170 to 200 mm.

Two smaller post-pits (20 and 38) lay between the two main groups, and features 9 and 10 may have continued the line to the north-east. Features 8 and 37 are potentially also stake-holes along this line.

Plate 4: Context 17, section 1.

Plate 5: Context 17, section 2.

Interpretation

There appears to have been two short, irregular trenches in each of which there was a series of post-pits for posts up to a diameter of c. 200 mm; the size of the post-pits in 17/18/29 indicated posts of some size, however smaller features such as 8, 9, 10, 37 and 38 are of a diameter which could indicate smaller roundwood stakes that could have been hammered into the soft sand. On site it was considered that this series of features were a single, contemporary entity, and although two radiocarbon dates from the fills are Mesolithic, it is argued that these are from accidental incorporation of residual material during the construction of these features and that the two early Neolithic dates from contexts 17 and 18 give a more probable date for that construction.

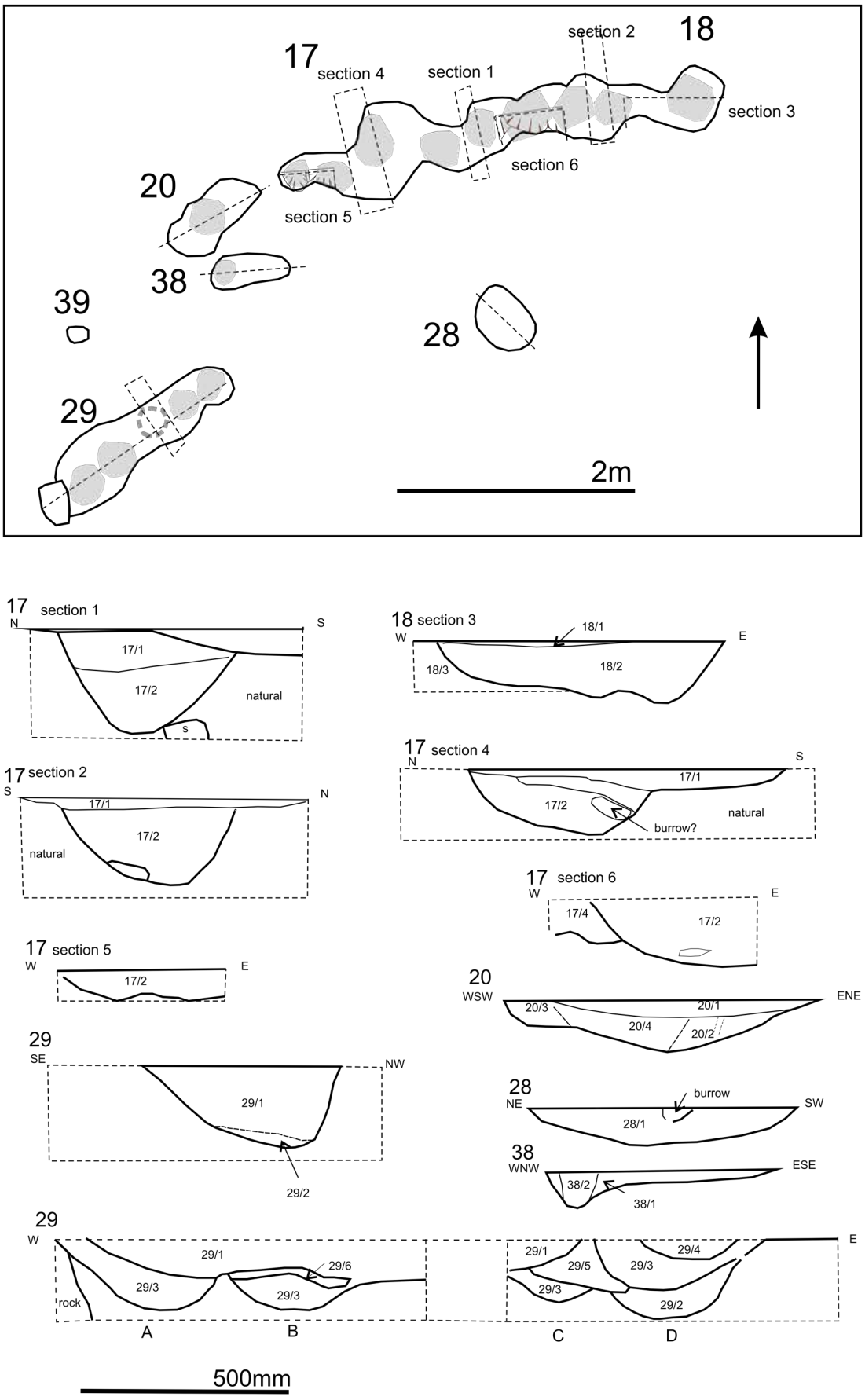

Figure 4: Detailed plan of features 17, 18 and 29 with sections. Post-pits from sections shown in grey.

These features represent a structural form, but they cannot be described as any form of roofed structure, the most likely interpretation is that they represent one or a succession of windbreaks. The method of construction, with contiguous posts apparently set in sections of a continuous trench, is superficially similar to the construction of the walls of the early Neolithic timber hall at Warren Field, Crathes (Murray *et al.* 2009, 30-32). This should not be overemphasised as this is the most effective way to erect contiguous posts. It should also be noted that the probable post diameters at Nether Park are very considerably smaller than those at Warren Field, Crathes. It is nevertheless a structure that has involved moderate time spent in felling and erecting stakes and posts, and certainly more effort than using branch wood to build a light windbreak of wattle.

The Mesolithic windbreak identified at Fife Ness (Wickham-Jones 1998, figure 2), which comprised post-pits forming an arc some 2 m in diameter, appears to have been a small enclosed shelter but similar in possible function to the features from Nether Park.

The post-pits from the nearby Mesolithic site at Nethermills, which were originally interpreted as representing a circular building 4.5 m in diameter, are now regarded as the surviving evidence of a palimpsest of unrelated structural features that may derive from visits over a considerable period (Wickham-Jones 2017, 20). There is slight evidence that some of the pits may have contained several posts (Wickham-Jones 2017, 14-15, features DA, DC), comparable to the linear features at Nether Park, but this does not imply that they were similar or contemporary structures.

Possible stake-holes

Five possible stake-holes were identified (8/1, 9/2, 10/3, 10/4 and 37/1), two other features (2A and 5) may also have been stake-holes but are less clear, 5 being a hollow in the gravel ridge and 2A being disturbed by a vole hole. Stake-holes are here defined as holes created by the removal or rotting of small diameter timbers which had been thrust or hammered into the ground, rather than larger timbers placed in excavated post-pits.

With the exception of context 5, these features were visible as darker fills piercing shallow hollows in the sand where greyish silt, comparable to the old ground surface, had survived. They ranged between 70 and 100 mm in diameter and 40 to 60 mm in surviving depth. The fills were dark brown, slightly humic earth, with both oak and non-oak charcoal present in three contexts that were sampled (5/1, 8/1 and 37/1, see Timpany below). They formed a north-east to south-west line, roughly extending the line of linear feature 17 (Figure 3).

Interpretation

It is tempting so see these as remnants of a windbreak, but there is no stratigraphic link to prove they were contemporary and they could equally well represent individual posts stuck in the ground temporarily for such purposes as hanging skins or meat above ground level.

Other pits

Five features (11, 22, 34, 36 and 39) appeared to have been small pits or post-pits cut into the natural sand.

Pit 11 (Figures 3 and 5, Plate 6), which was 1.38 m by 0.4-0.65 m and 0.15 m deep, had been clearly cut into the sand natural. The earliest fill (11/2) was a thin layer of dark iron-rich earth with visible charcoal, subsequently identified as oak and non-oak (see Timpany below) and which was radiocarbon dated to 4229-–3989 cal BC (SUERC 84109). The remainder of the pit appears to have very gradually filled with a dark slightly humic soil (11/3) interleaved with lenses of clean sand (11/4), hazel charcoal from 11/3 being dated to 1877–1685 cal BC (SUERC 84116).

Plate 6: Pit 11, south-facing section.

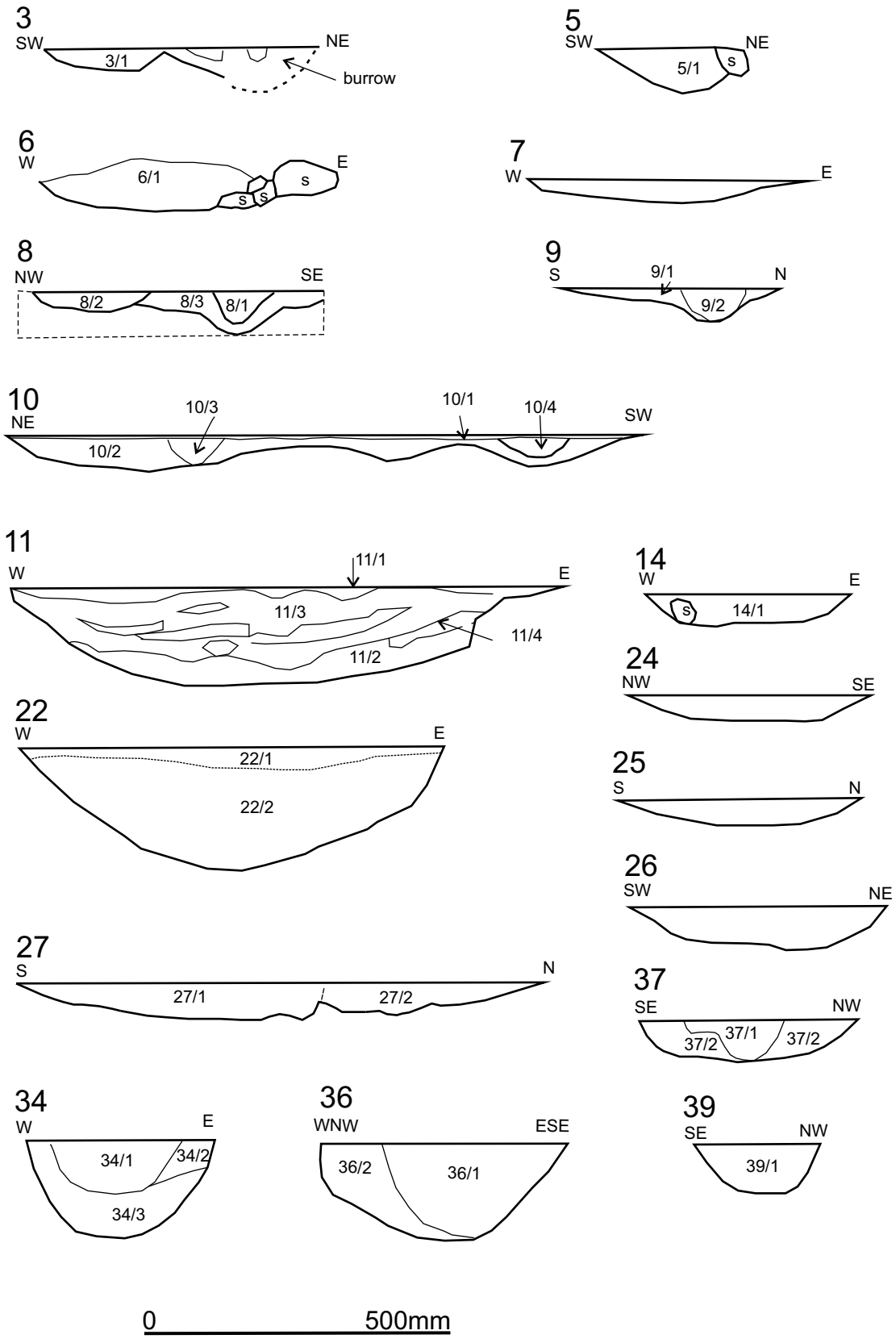

Figure 5: Sections of outlying features.

Interpretation

Both the stratigraphy and the radiocarbon dates indicate that pit 11 was dug in the early Neolithic for an unknown function, which appears to have resulted in it being left open with a minimal fill that may be an incidental accumulation of surrounding material, rather than a deliberate deposit. The pit appears to have remained open for a considerable time, with lenses of clean sand suggesting that later activity in the area had disturbed nearby vegetation sufficiently that the underlying natural sand was exposed with patches blowing into the pit, though not apparently eroding from the pit sides. The humic element of the later fill may also represent natural processes such as leaves blowing in and rotting, and weeds establishing; there is nothing to indicate a deliberate infilling. The early Bronze Age date from its upper fill indicates that there was activity on the site at that period, but it does not necessarily imply a functional use of the pit, which at that stage would have been a fairly insignificant hollow in the ground surface.

Pit 22 (Figures 3 and 5), which was 0.7 by 0.72 m and 0.19 m in surviving depth, had a fairly uniform dark humic fill but no visible charcoal, and was not dated, although the lithics indicate Mesolithic activity in this area.

Three much smaller features (34, 36 and 39) may have been post-pits; they ranged in diameter between 0.2 and 0.47 m and in surviving depth between 80 and 160 mm. Both 34 and 36 had secondary silty fills (34/1, 36/1), which may represent accumulation after the removal of a post. Oak and non-oak charcoal was identified from 36 and 39 (see Timpany below).

Interpretation

Feature 39 may have been related to the linear features (17 and 29). Possible post-pits 34 and 36 lay to the south-west of the site in an area where knapping took place, probably in the early Neolithic (Ballin below).

The Lithic Assemblage

by Torben Bjarke Ballin

Introduction

The work at Nether Park resulted in the recovery of a lithic assemblage comprising 503 pieces of mainly flint artefacts. The assemblage is clearly dominated by early Neolithic material, but with a small late Mesolithic component.

The purpose of the present report is to characterize the lithic artefacts in detail, with special reference to raw-materials, typological composition and technology. From this characterization, it is sought to date and interpret the finds to the degree this is possible. The evaluation of the lithic material is based upon a detailed catalogue of all the lithic finds from Nether Park (in the site archive), and the artefacts are referred to by their original SF number.

The assemblage

General overview

From the excavation at Nether Park, 503 lithic artefacts were recovered, which are listed in Table 1. In total, 89% of this assemblage is debitage, whereas 3% is cores and 8% tools.

The definitions of the main lithic categories are as follows:

Chips: All flakes and indeterminate pieces the greatest dimension (GD) of which is ≤ 10mm.

Flakes: All lithic artefacts with one identifiable ventral (positive or convex) surface, GD > 10mm and L < 2W (L = length; W = width).

Indeterminate pieces: Lithic artefacts which cannot be unequivocally identified as either flakes or cores. Generally the problem of identification is due to irregular breaks, frost-shattering or fire-crazing. *Chunks* are larger indeterminate pieces, and in, for example, the case of quartz, the problem of identification usually originates from a piece flaking along natural planes of weakness rather than flaking in the usual conchoidal way.

Blades and microblades: Flakes where L ≥ 2W. In the case of blades W > 8 mm, in the case of microblades W ≤ 8 mm.

Cores: Artefacts with only dorsal (negative or concave) surfaces – if three or more flakes have been detached, the piece is a core, if fewer than three flakes have been detached, the piece is a split or flaked pebble.

Tools: Artefacts with secondary retouch (modification).

Av. dim.: Average dimensions

GD: Greatest dimension.

Debitage	Number
Chips	81
Flakes	225
Blades	65
Microblades	30
Indeterminate pieces	35
Crested pieces	8
Platform rejuvenation flakes	2
Total debitage	446
Cores	
Single-platform cores	10
Cores with two platforms at an angle	2
Core fragments	2
Total cores	14
Tools	
Crescents	3
Edge-blunted microliths	1
Frags of microliths/backed bladelets	2
Microburins	3
Short end-scrapers	9
Side-scrapers	1
End-/side-scrapers	1
Scale-flaked knives	1
Truncated pieces	1
Polished-edge implements	1
Notched pieces	1
Pieces with edge-retouch	19
Total tools	43
Total	503

Table 1: General artefact list of lithics.

Raw materials – types, sources and condition

Apart from seven pieces of quartz or quartzite (1.4% of the assemblage), all lithic artefacts from Nether Park are of flint (98.6%). One flake (SF 126) is of a raw material with a greasy sheen, possibly a chert. This composition corresponds to the composition of other Mesolithic/early Neolithic assemblages along the Dee, such as Nethermills Farm (99.5% flint; Ballin 2017), the Grieve Collection (99.9%; Ballin forthcoming) and Garthdee Road in Aberdeen (94.0%; Ballin 2014a).

The flint includes a multitude of varieties, with the two largest groups being fine-grained, reddish-brown homogeneous flints, and fine- to medium-grained, grey, mottled flints. In addition, the assemblage includes some fine-grained, cream flints and small numbers of fine-grained, dark-grey and black flints. Flint from eastern Scotland has frequently been associated with reddish-brown colours (Stevenson 1948), but it appears that flint types and colours vary greatly throughout the region. It seems that sites along the Don and the Dee and further south in Aberdeenshire (including sites in Angus, such as Fordhouse Barrow; Ballin 2004a) may include less flint of the reddish-brown forms than those further north, with the border between the two groups of sites running immediately north of Aberdeen, with the Kingfisher site on the northern outskirts of Aberdeen (Ballin 2008), Culduthel at Inverness (Ballin 2006a), and sites from Moray (Ballin 2014b) belonging to the group of sites dominated by reddish-brown pieces.

Generally, all cortical pieces have abraded cortex, indicating procurement from a pebble source, rather than from primary sources. As shown in Table 2, 50% of the flakes are cortical but only 24% of the blades. The curvature of the outer cortical surface suggests that the procured pebbles were relatively small and probably derive from coastal deposits rather than from, for example, the deposits of somewhat larger pebbles and cobbles in the Buchan Ridge area near Peterhead (Saville 1995). The sizes of the lithic artefacts, not least the cores, imply that most of the pebbles may have had greatest dimensions of 40-60 mm. However, if the Nether Park cores were prepared the way some cores were prepared at

	Quantity			Per cent		
	Flakes	Blades/ microblades	Total	Flakes	Blades/ microblades	Total
Primary pieces	23	0	23	10	0	7
Secondary pieces	90	23	113	40	24	35
Tertiary pieces	112	72	184	50	76	58
Total	225	95	320	100	100	100

Table 2: Reduction sequence of all unmodified flakes and blades.

the late Mesolithic site of Standingstones on the Don (Ballin forthcoming b), where pebbles were split into two cores (in one case two cores were refitted platform to platform), some pebbles might have been considerably larger with greatest dimensions of up to 80-100 mm. Most likely, flint pebbles were collected from beach walls along the North Sea coast and transported up the River Dee by boat.

A total of 167 pieces of worked flint are fire-crazed (33%). It is thought that these pieces represent work taking place near a hearth, and that they fell into the fire during the production or use of lithic tools around a central hearth.

Debitage[1]

In total, 446 pieces of debitage were recovered from the site (Table 1). The debitage (Tables 1 and 3) includes 81 chips, 225 flakes, 65 blades, 30 microblades, 35 indeterminate pieces, and 10 preparation flakes (eight crested pieces and two platform rejuvenation flakes).

	Number	%
Chips	81	18
Flakes	225	50
Blades	65	15
Microblades	30	7
Indeterminate pieces	35	8
Preparation flakes	10	2
Total debitage	446	100

Table 3: Relative composition of the debitage.

Although large numbers of flakes were recovered at Nether Park (225 pieces), the high percentage of blades and microblades suggests that knapping techniques were directed towards blade production. The flakes and blades are likely to be tool blanks, with chips and indeterminate pieces obviously representing production waste, and the blanks' flake:blade ratio is 70:30. As shown in Figure 6, most of the flakes form a curve between 9-23 mm, with a group of larger flakes concentrating between 24-42 mm. The assemblage does not include any specialised flake cores, and it is thought that the flakes were produced in connection with the preparation and correction of blade-cores, as well as in connection with the final exhaustion of these cores. The larger flakes were probably detached in connection with the removal of core-sides (for example, when blades with hinge and step terminations ruined the shape of the cores), whereas the smaller flakes may have been detached in connection with the finer adjustment of the cores.

Figure 7 shows the length:width of all intact blades and microblades from Nether Park, with the blades (27 pieces) having average dimensions of 27.8 by 11.4 by 3.7 mm and the microblades (nine pieces) 15.2 by 5.6 by 1.8 mm, (a selection of blades and microblades are shown in Figure 13). It should be borne in mind that Mesolithic blades and microblades are quite delicate objects which break easily, and that intact pieces probably represent a site's more robust pieces. As a control of this assumption, the analyst tested the blades from the Norwegian site Lundevågen R21/22, and the total blade material and the intact blades (12%) were compared. This examination showed that the intact blades were simpler at all levels. The intact blades were broader and thicker, and they had fewer dorsal ridges, more cortex, more acute angles of percussion, more direct-percussion indicators, and simpler preparation of platform edge and surface. Based on these results, it must be assumed that the intact blades were also the shortest (Ballin 2004b). With this background, it is suggested that the original blades produced at the site were generally longer, narrower and thinner than indicated by the average dimensions above.

1 This is 'a term which applies to all removals resulting from the knapping of a core…' (Inizan *et al.* 1992, 84)

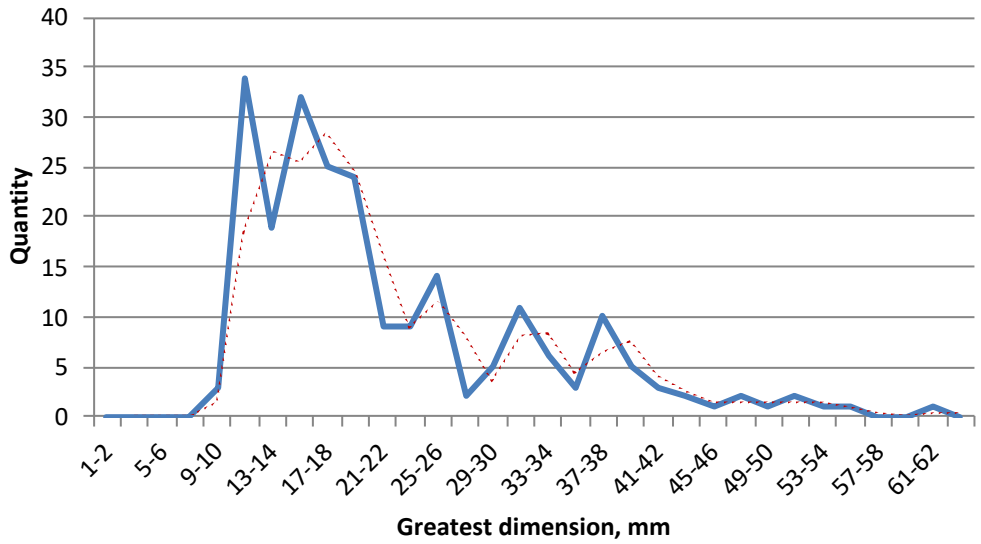

Figure 6: Greatest dimension of the intact flakes. A trendline has been inserted (moving average).

There is a weak separation of the blades in Figure 7 into smaller and larger pieces with a gap at c. LW 15 by 7-8 mm. This trend is considerably stronger in Figure 8, which only shows the blades' width. This diagram forms a clear dual-peaked curve, with a peak at 5-6 mm and another at 11-12 mm, and with a gap at 8 mm. Typo-technological analysis of the assemblage (see Technology and Dating sections below) suggests that these two concentrations may represent visits to the site during the late Mesolithic and early Neolithic period.

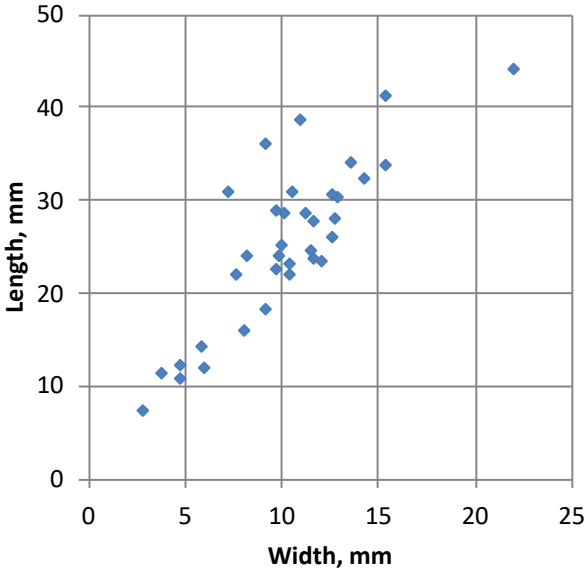

Figure 7: The main dimensions of all intact blades and microblades.

An unmixed single-occupation site (like Late Mesolithic Standingstones on the Don; Ballin 2019) would usually produce a single-peaked, approximately bell-shaped curve (in statistical terms showing a 'normal distribution'). Figure 9 shows the blades from late Mesolithic Standingstones on the Don and the peak in Figure 9 is located roughly where the suggested late Mesolithic peak is in Figure 8, namely at 6 mm. The blades from early Neolithic Garthdee Road in Aberdeen form a similar single-peaked curve (Ballin 2014a, 33).

As shown in Table 4, the industries responsible for this assemblage clearly focused on the production of blade and microblade blanks by the application of soft percussion (soft:hard ratio 87:13%), whereas the flakes were mainly produced by hard percussion (soft:hard ratio 36:64%). The fact that the difference between the two groups is not more distinct, may largely be due to prehistoric 'production errors', with some intended blades turning out shorter than planned. Most soft percussion flakes from Nether Park have regular, parallel dorsal arrises and parallel lateral sides, and they can be defined as failed blade blanks.

The table also shows that bipolar technique was not applied at this site. Other East of Scotland Mesolithic and early Neolithic assemblages show the same trend, and at late Mesolithic Standingstones only 2% of the flakes and blades were manufactured in bipolar technique, and at early Neolithic Garthdee Road c. 5%. This is in stark contrast to contemporary sites on the Scottish west coast, where bipolar technique formed an integral part of the region's Mesolithic-early Neolithic operational schema. Practically all Mercer's assemblages from Jura are characterised by high numbers of bipolar cores (at the time erroneously referred to as 'chisels'; e.g. Mercer 1968, 1970, 1971, 1974).

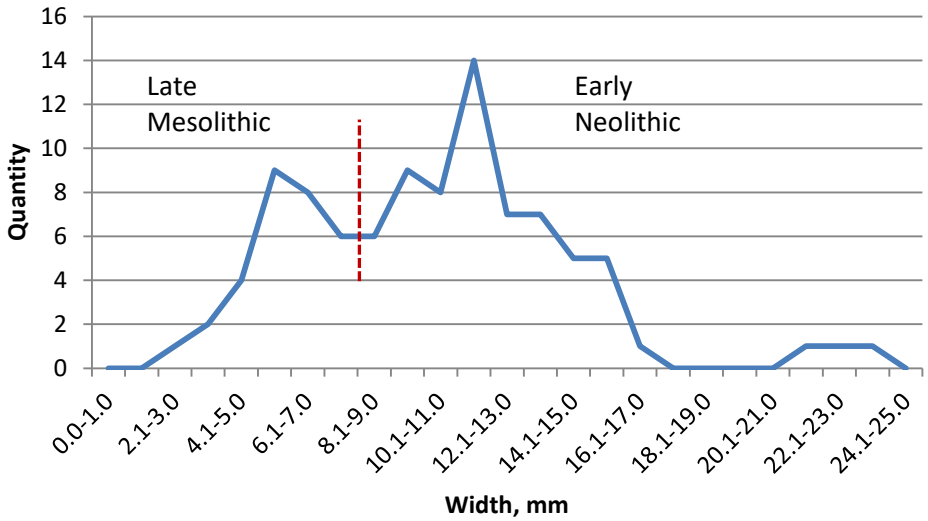

Figure 8: The width of all unmodified blades and microblades.

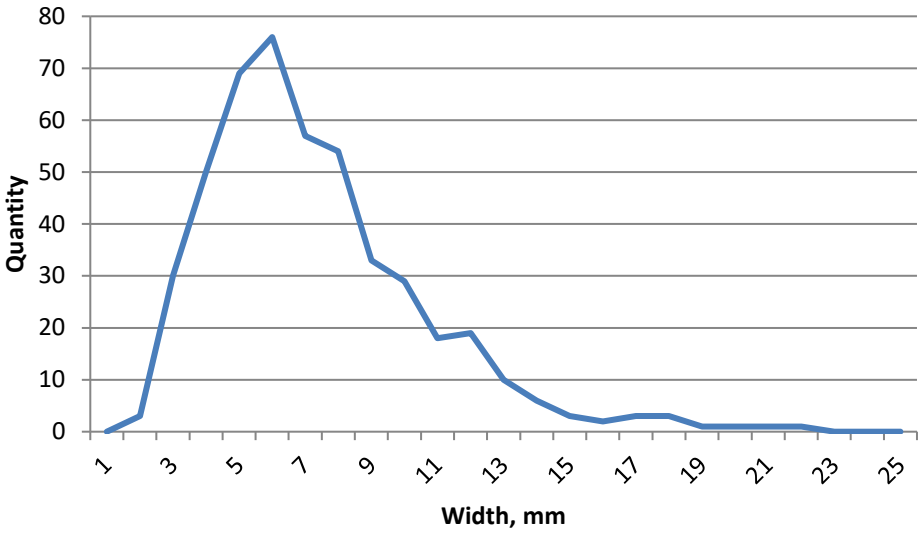

Figure 9: The width of all unmodified blades and microblades from Standingstones on the Don (Ballin forthcoming b).

	Quantity			Per cent		
	Flakes	Blades/ microblades	Total	Flakes	Blades/ microblades	Total
Soft percussion	30	41	71	25	72	40
Hard percussion	53	6	59	43	10	33
Indeterminate platform technique	24	5	29	20	9	16
Platform collapse	15	5	20	12	9	11
Bipolar technique	0	0	0	0	0	0
Total	122	57	179	100	100	100

Table 4: Applied percussion techniques: definable unmodified flakes and blades.

The assemblage includes 35 indeterminate pieces, and the fact that two-thirds of them are burnt suggests that most were formed when pieces fell into a hearth and disintegrated. In total, burnt pieces make up 33% of the entire assemblage, which is a very high ratio. The densest concentration of burnt lithics was discovered in context 16, which is thought to represent a knapping floor. Although an obvious hearth was not found at this location, the burnt pieces and some dark patches (e.g. contexts 14 and 15) suggest that one was present in prehistory and that the knapping was carried out around or near a hearth (see distribution section).

Ten core preparation flakes were also recovered from Nether Park, including eight crested flakes and blades (e.g. CAT 19; Figure 13) and two platform rejuvenation flakes (e.g. CAT 174; Figure 13). Five intact crested pieces measure on average 39 by 23 by 11 mm, varying in length from 53 mm to 27 mm. The pieces tend to be hard percussion specimens, indicating that more robust approaches were applied in connection with the shaping of the cores. As shown in connection with the analysis of the assemblage from the late Mesolithic site Standingstones (Ballin 2019), the preparation flakes as well as the large early blades struck off a core tend to have been manufactured by robust approaches, whereas the later smaller blades (the actual intended blanks) were produced by the application of soft percussion. The two platform rejuvenation flakes, SF 72 and 174 (Figure 13) have greatest dimensions of 31 mm and 34 mm, and both were clearly detached from conical blade-cores.

Cores

In total, 14 cores were recovered during the excavation at Nether Park. They include 10 single-platform cores, two cores with two platforms at an angle, and two core fragments.

The dimensions (L by W by T) of cores are measured in the following ways: in the case of platform cores, the length is measured from platform to apex, the width is measured perpendicular to the length with the main flaking-front orientated towards the analyst, and the thickness is measured from flaking-front to the often unworked/cortical 'back-side' of the core. In the case of bipolar cores, the length is measured from terminal to terminal, the width is measured perpendicular to the length with one of the two flaking-fronts orientated towards the analyst, and the thickness is measured from flaking-front to flaking-front. More 'cubic' cores, like cores with two platforms at an angle and irregular cores, are simply measured in the following manner: largest dimension by second-largest dimension by smallest dimension.

Single-platform cores: With 10 pieces (Figure 10), this category dominates the site's cores (71%). Although some small flakes were occasionally detached from these cores, particularly in the later stages of their 'lives', they were clearly intended for the production of blades and microblades. Apart from SF 320, which is an irregular specimen, all single-platform cores have been defined as regular conical specimens.

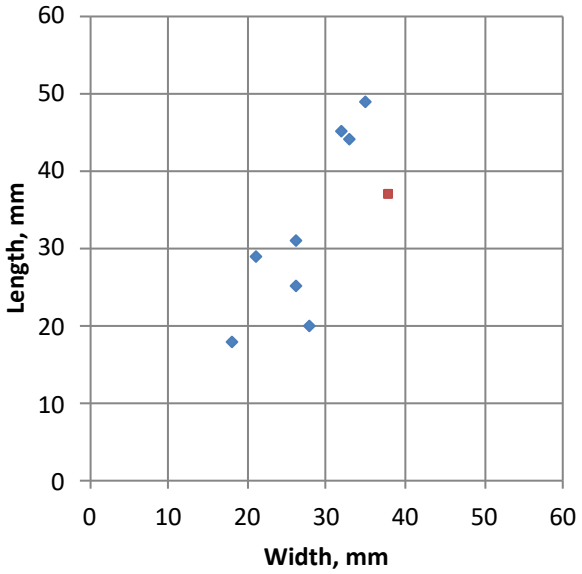

Figure 10: The main dimensions of all intact cores. blue = single-platform cores; red = cores with two platforms at an angle.

The single-platform cores measure on average 33 by 27 by 22 mm, but they vary in length between c. 20 mm and c. 50 mm (CAT 405 is a relatively large specimen and CAT 398 a relatively small specimen; Figures 14 and 15). They all have plain, trimmed or abraded platforms. Two pieces (SF 157 Figure 15; SF 271) were knapped along their entire circumference, whereas the remainder were knapped along most or half of their circumference, leaving partially cortical 'back-sides'. SF 308 (Figure 14) has a fully intact crest on its 'back-side', whereas part of a crest survives at the apex of SF 41 (Figure 14). SF 422 is the oval platform of a single-platform core which was detached due to exposure to fire.

Most of the single-platform cores had their main flaking-front ruined when one or more blades developed hinge or step terminations, which dug up to half a centimetre into the piece. This made further reduction impossible without major adjustment of the cores' shape, such as the detachment of a full core-side, and the cores were subsequently abandoned.

Cores with two platforms at an angle: Two dual-platform cores, SF 33 and 447, are both re-orientated conical blade cores (GD = 35-38 mm). SF 33 has a secondary platform at a perpendicular angle to the primary platform, whereas SF 447 (Figure 15) has a secondary platform at an oblique angle to the primary platform. All platforms are plain and trimmed. The primary platform of SF 33 is quite large (GD = 43 mm), suggesting that the original core was considerably larger than any of the surviving conical cores.

Core fragments: The appearance of the two core fragments (SF 143 and 322) differ notably. SF 143 is the fragment of a relatively large core's platform edge, and the regularity of this platform and its edge suggests that (although this is not certain) this is probably the fragment of a conical blade-core. The original core disintegrated due to exposure to fire. SF 322 is the fragmented remains of an indeterminate core, which disintegrated due to internal impurities (chalk balls) (Figure 17).

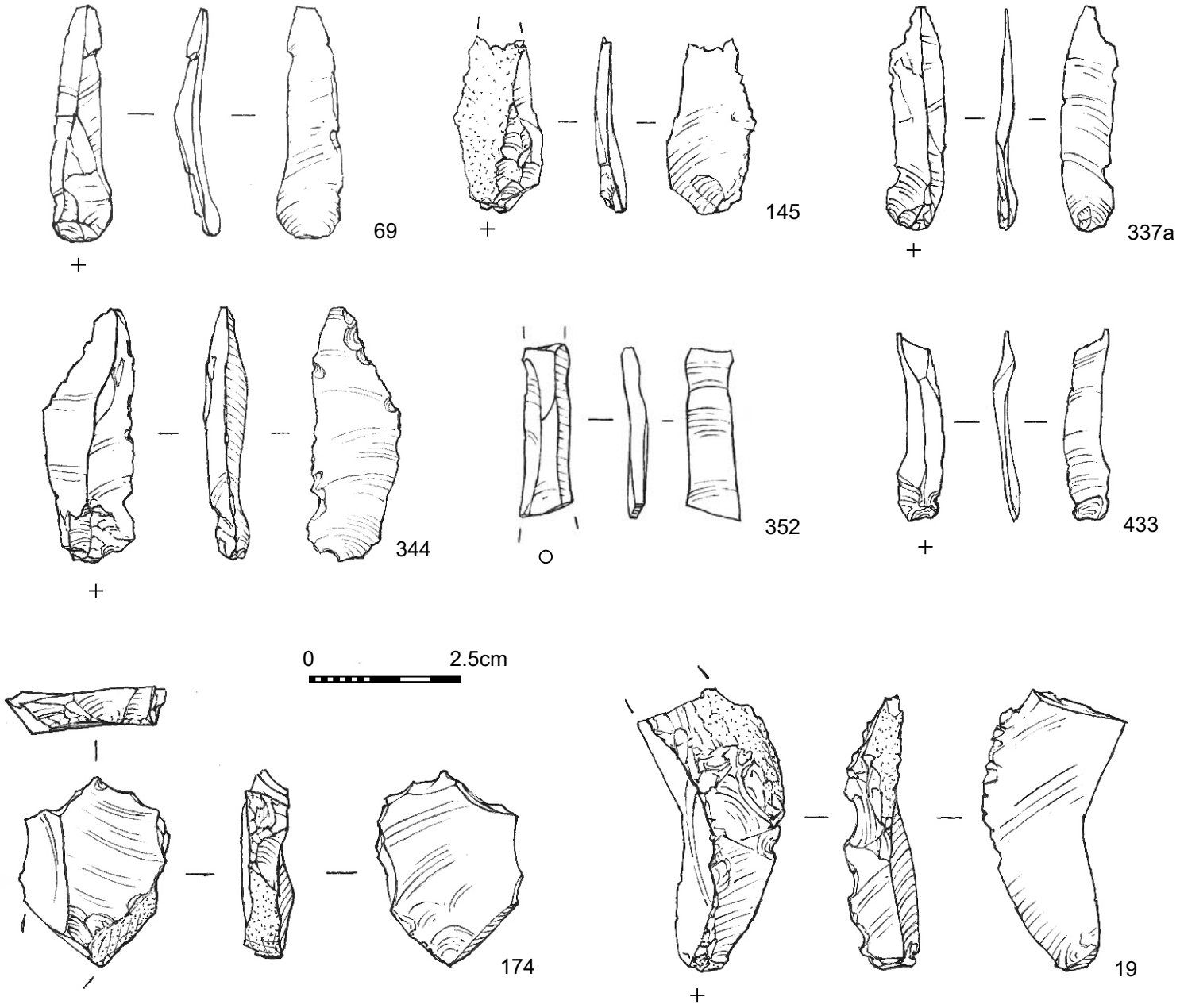

Figure 13: Lithic finds SF 19, 69, 145, 174, 337a, 344, 352 and 433 (drawn by Jan Dunbar).

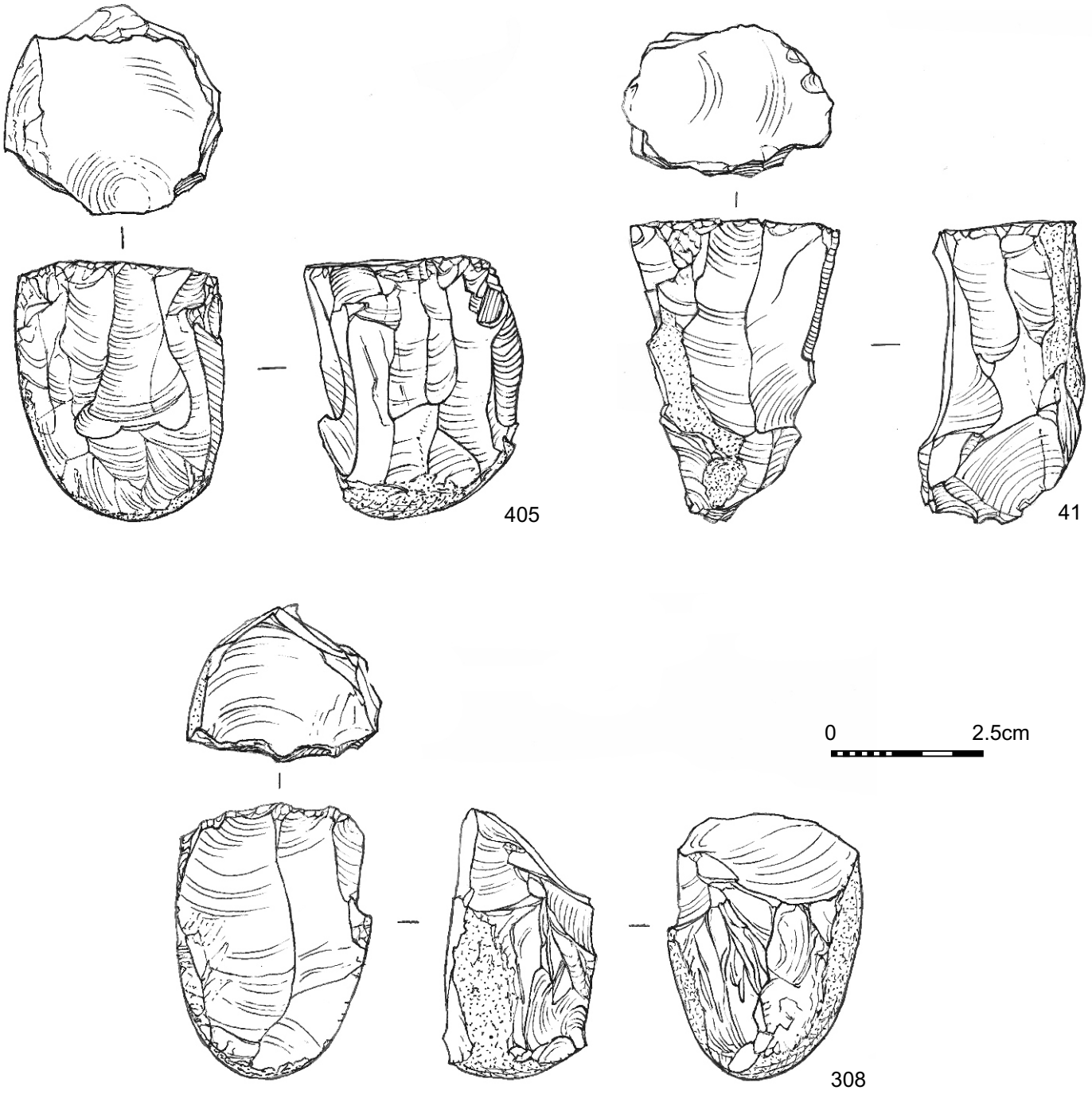

Figure 14: Lithic finds SF 41, 308 and 405 (drawn by Jan Dunbar).

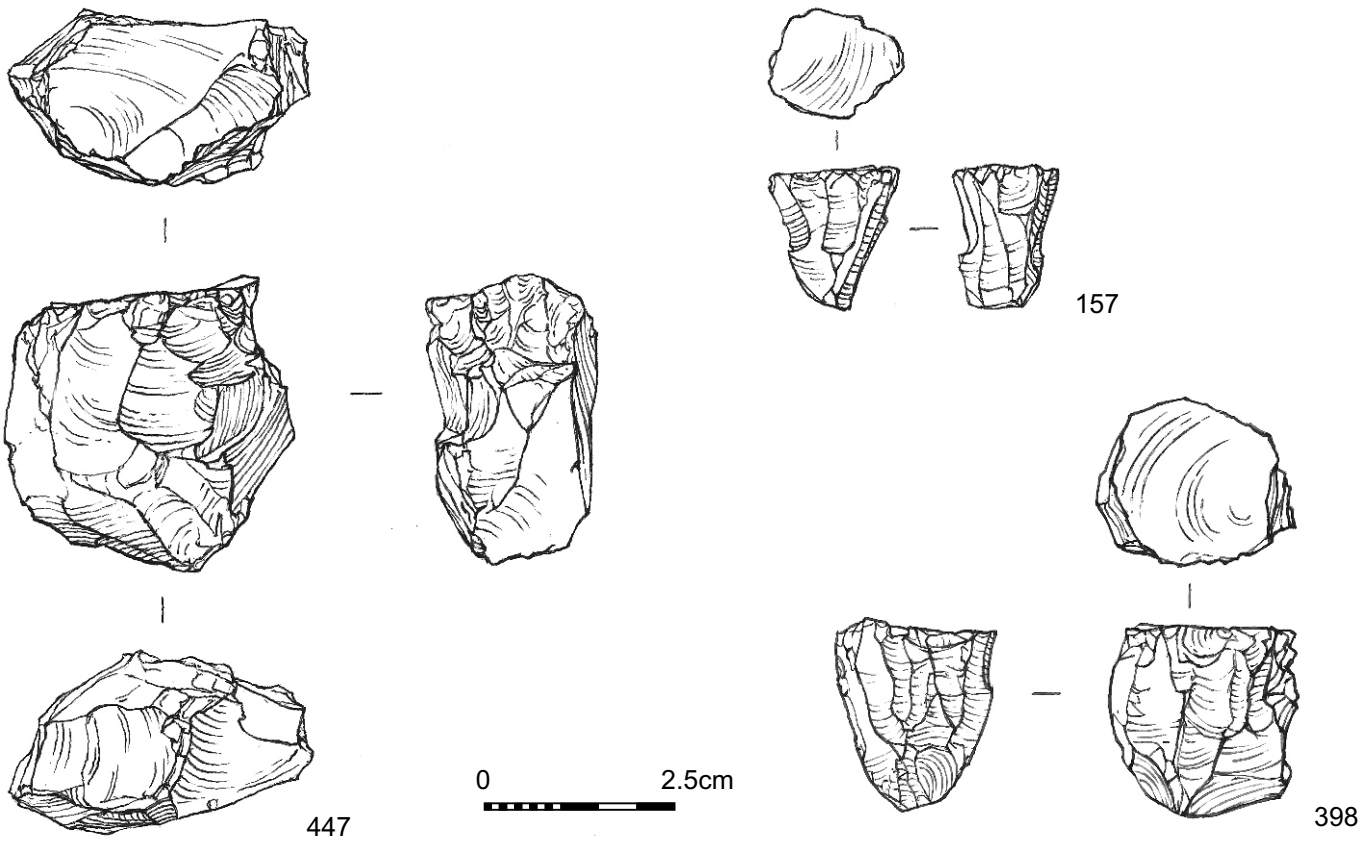

Figure 15: Lithic finds SF 157, 398 and 447 (drawn by Jan Dunbar).

Tools

The 43 tools (Table 1) include a small number of separate implement categories, such as nine microliths and microlith-related implements (including microburins) (21%), 11 scrapers (26%), one scale-flaked knife, one truncated piece, one polished-edge implement, one notched piece, and 19 pieces with edge-retouch (44%). The three main tool categories are the microliths, the scrapers, and pieces with edge-retouch.

Microliths and 'microlith-related implements': This category embraces a number of formal types, including three crescents, one edge-blunted microlith, two fragments of microliths or backed bladelets, and three microburins.

In the archaeological literature, the term microlith is defined in a number of different ways, adding some confusion to the discussion of the category and its dating. In the present report, 'microlith' is defined as in the analyst's previous reports on early prehistoric assemblages:

> *Microliths are small lithic implements manufactured to form part of composite tools, either as tips or as edges/barbs, and which conform to a restricted number of well-known forms, which have had their (usually) proximal ends removed (Clark 1934, 55). This definition secures the microlith as a diagnostic (pre Neolithic) type. Below, microliths* sensu stricto *(i.e. pieces which have had their usually proximal ends removed) and backed microblades (with surviving proximal ends) are treated as a group, as these types are thought to have had the same general function.* (Ballin 2017).

It has been attempted to keep the microlith typology basic, and in Table 1, only general formal types are included (following Saville 1981). The most frequently used microlith typologies, such as those of Clark (1934) and Jacobi (1978), include numerous sub-types, characterized by various forms of fine ancillary edge-retouch (also see Butler 2005). It is, however, the analyst's view that most of these forms of additional modification represent the finer shaping of

the pieces, determined by the specific original shape of the individual microlith blanks, and that this fine retouch has little relevance to the understanding of the category, the assemblage or the site. The main formal types, on the other hand, may generally represent mental templates of the flint-knapper, and they may be chronologically or regionally diagnostic.

The orientation and subsequently the use of terms like 'left' and 'right' of the microliths and microlith-related implements follow general consensus (e.g. Martingell and Saville 1988, 10) with the bulbar end consistently down (Figure 11).

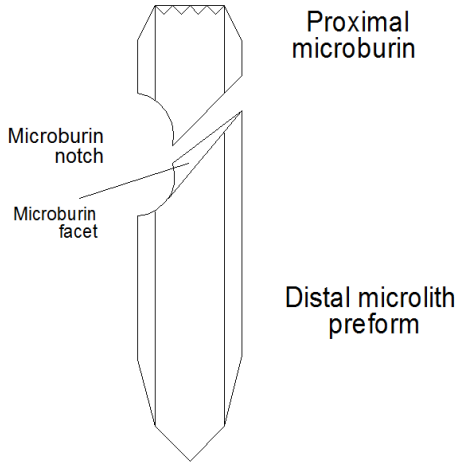

Figure 11: 'Standard' approach for the production of a microlith by microburin technique. A scalene triangle, for example, would be shaped by modifying the shortest lateral side of the distal part (in this case the left hand side) and parts of the oblique proximal facet.

- A microlith is generally orientated with its tip up, and, as a microlith is defined as having been produced by removing its proximal end to form its tip, this usually means with the proximal end up.
- A backed bladelet is orientated with its distal end up, as this end is supposed to have formed its tip.
- A microburin is orientated with its proximal end up, to fit the consensus regarding the orientation of a microlith.

The assemblage only includes four formal microliths, namely three crescents, SF 186, 440and 496, and one edge-blunted microlith, SF 421 (all Figure 16). As some edge-blunted microliths do have slightly convex lateral modifications, it was decided to define the crescents as microliths with *highly* regular curvatures, where it is obvious that the knapper *deliberately* aimed at producing this geometric shape, i.e. a mental template rather than random morphology. The three crescents form a relatively homogeneous group with average dimensions of 19.5 by 4.9 by 1.6 mm, and they all have their convex retouch along the left lateral side. SF 186 also has a short stretch of basal retouch along the opposed lateral side, and SF 496 has a surviving microburin facet at the proximal end. SF 421 is an edge-blunted piece with straight retouch along its right lateral side; it measures 20.0 by 7.5 by 2.1 mm. The tip has been damaged. SF 364 and 420 are fragments of either microliths or backed bladelets. They are both medial segments, with retouch along either the left or the right lateral side.

The microburins, SF 265, 284 and 292 (Figure 16), are all proximal specimens, with a notch in the left lateral side i.e. orientated like the three crescents. SF 265 and SF 284 both broke successfully, forming an oblique facet, which would have produced two microliths with an acutely pointed tip, a so-called *piquant triédre*, '*… [with] a sharp extremity [which] cannot be obtained by simple retouch*' (De Wilde and De Bie 2011, 730). SF 292 broke in a less successful manner and simply snapped straight across.

Scrapers: In total, 11 scrapers were recovered from the site, namely nine short end-scrapers, one side-scraper, and one end-/side-scraper. Ten of the scrapers are based on hard percussion flakes, whereas SF 217 (Figure 17) is based on an indeterminate core. The size of the intact scrapers is shown in Figure 12.

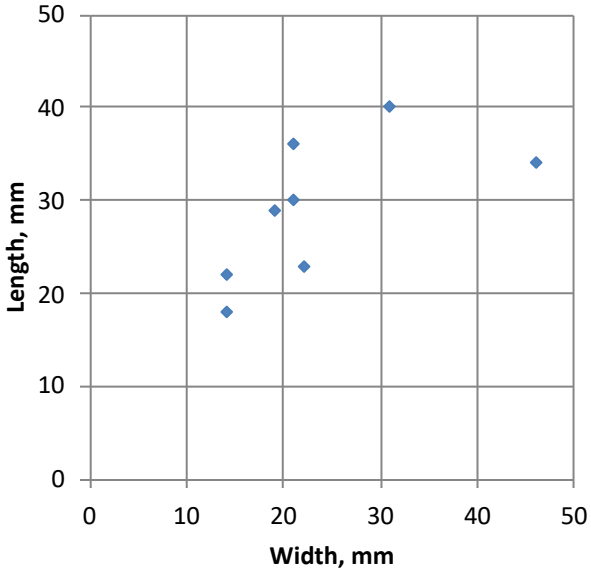

Figure 12: The main dimensions of all intact scrapers.

Only one of the end-scrapers is regular, namely SF 86 (Figure 16). This piece is a 'standard' oval flake with a convex, steep working-edge at the distal end measuring 23 by 22 by 5 mm. All other end-scrapers are expedient pieces with a straight to slightly convex working-edge at one end. Some of these pieces are relatively small, e.g. SF 149: 14 by 10 by 4 mm, whereas others are relatively large, e.g. SF 317: 46 by 34 by 20 mm. In some cases, the working-edge is decidedly 'flimsy', e.g. SF 79 (Figure 16), whereas others have robust working-edges with notable overhangs, e.g. SF 217 (Figure 17). SF 332 is an elongated piece measuring 36 by 21 by 8 mm, with a slightly convex, oblique, steep working-edge (Figure 17).

The side-scraper SF 51 is an expedient crested flake measuring 30 by 21 by 13 mm, with a straight, uneven, steep working-edge along the left lateral side. The end-/side-scraper SF 216, is a highly regular piece based on a proximal blade segment measuring 22 by 14 by 5 mm, and it has a straight, steep working-edge along both lateral sides, and a similar working-edge at the distal end (Figure 17).

Scale-flaked knives: The assemblage includes one scale-flaked knife, namely SF 429 (Figure 429). It is based on a robust crested blade measuring 32 by 18 by 9 mm, and it is missing its distal end and the bulbar area of the blank. It has a scale-flaked cutting-edge along both lateral sides, and these edges appear to have been used. It differs from the so-called early Bronze Age plano-convex 'slug knives' (Finlayson 1997), partly by its general shape (based on a blade blank with parallel lateral sides rather than an elongated oval flake blank), and partly by the extent of the retouch. This piece has semi-invasive retouch, whereas plano-convex knives have more extensive invasive retouch, giving the pieces their plano-convex cross-section (Clark 1932).

Truncated pieces: SF 70 is a small blade with an oblique truncation at its proximal end, and measures 24 by 10 by 2 mm (Figure 17). It was considered whether this could be a large scalene triangle without lateral retouch, but the fact that it retains cortex at its distal end makes this unlikely. The piece has very faint use-wear along its longest lateral side (only visible in x10 magnification), suggesting that it is a small knife.

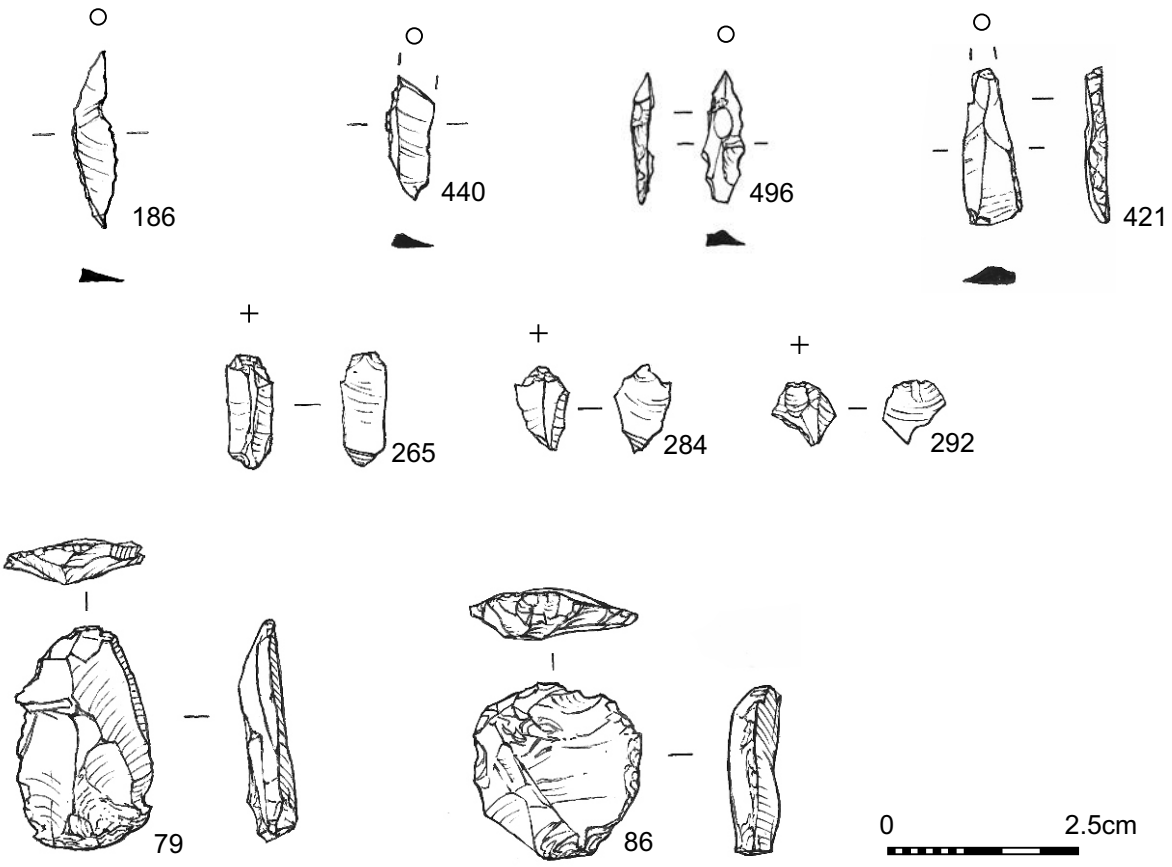

Figure 16: Lithic finds SF 79, 86, 186, 265, 284, 292, 421, 440 and 496 (drawn by Jan Dunbar).

Polished-edge implements: SF 144b is the proximal end of a blade with measurements of 14 by 15 by 2 mm with one abraded/rounded lateral side. Either, pieces like this are quite rare, or they simply have not been noticed before. In 2016, a concentration of polished-edge implements was discovered on a late Mesolithic site (Milltimber Zone 5) in connection with Headland Archaeology's work along the route of the Aberdeen Ring Road (Ballin 2019). The name of this category was chosen due to similarities between these heavily used pieces from Milltimber and a particular group of tools commonly recovered from Scottish later Neolithic sites (Ballin 2011b, 27, Figs 19-20). However, where the later Neolithic pieces have been used to an extent, and in a manner, which provided them with almost mirror-like polish, the pieces from Milltimber are coarsely abraded, rather than polished, and it is in many cases possible to see in light magnification (x8) that the used edges have striations running at a perpendicular angle to the edge. The later Neolithic implements, as well as many of the ones from Milltimber, have clearly rounded edges, although a large number of pieces from that site also display well-developed edge-facets e.g. CAT 10665, as well as rounded and faceted tips (used pointed ends and corners). The association of the pieces from Milltimber with narrow microliths suggests that they date to the late Mesolithic period, but whether SF 144b is late Mesolithic or early Neolithic is uncertain.

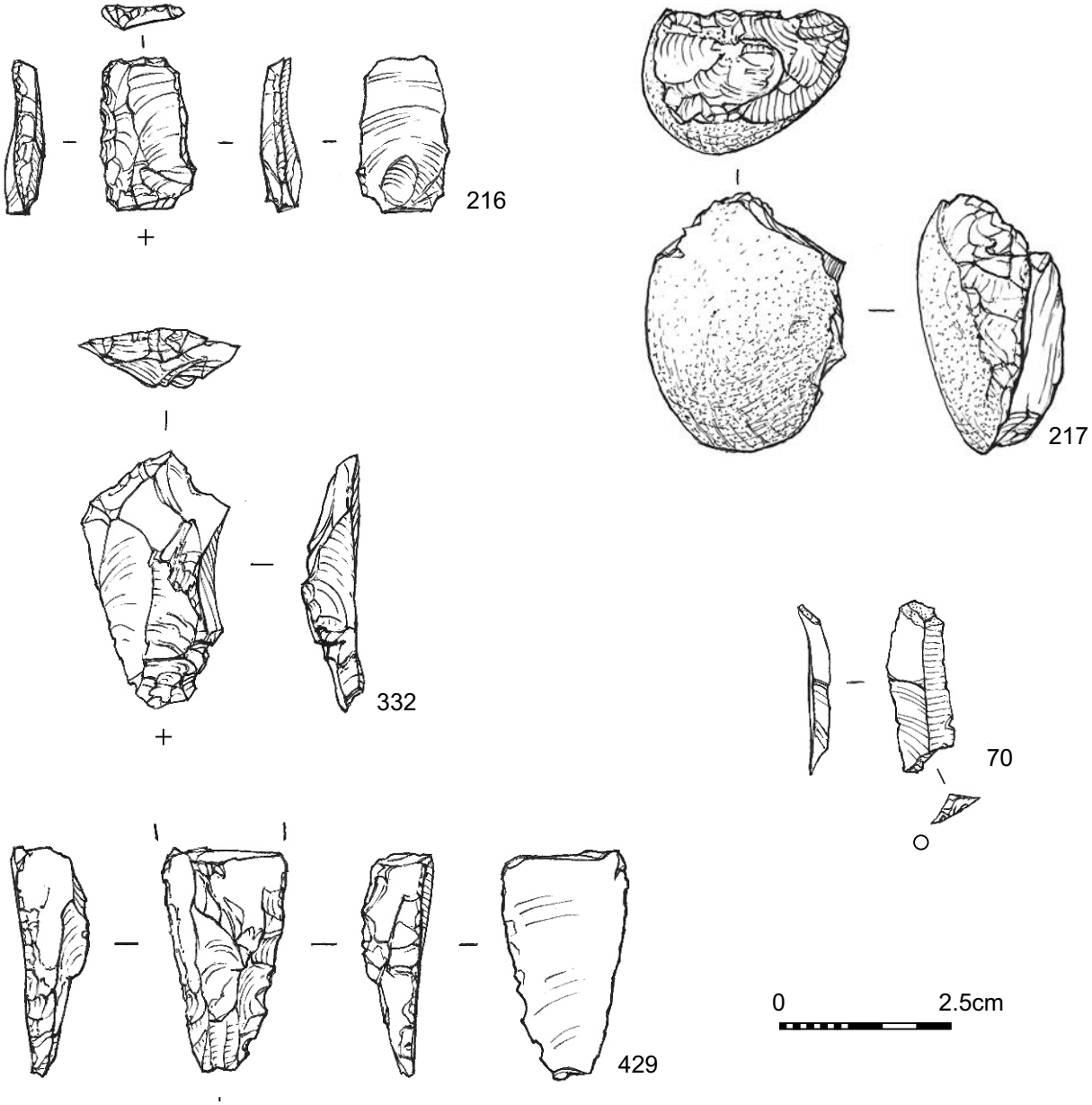

Figure 17: Lithic finds SF 70, 216, 217, 332 and 429 (drawn by Jan Dunbar).

Notched pieces: SF 298 is the proximal fragment of a broad blade measuring 13 by 14 by 2 mm) with a retouched notch in its right lateral side; it snapped through this notch. It may be a microburin, but it is so much bigger than the other microburins from the site (see above) that it would have to be an early Mesolithic microburin, rather than a late Mesolithic one (c.f. the microburins from Morton Site A, Coles 1971). In terms of size, the small microburins from Nether Park correspond to the site's narrow microliths, but there are no other indications of an early Mesolithic presence at Nether Park. Subsequently, it was decided to define the piece simply as a notched piece.

Pieces with edge-retouch: Nineteen lithic artefacts display various forms of lateral modification. Ten are based on blades, eight are flakes, and one is a microblade. These pieces differ considerably in shape and size (GD 15-45mm), and it is thought that this tool group includes artefacts, or fragments of artefacts, with different functions.

Technological Summary

This technological summary is based on information presented in the raw material, debitage, core and tool sections above. Figure 8 suggests that the assemblage includes material from two different periods, namely the late Mesolithic (narrow microliths and microburins as well as narrow blades) and a period characterised by the production of broad blades. The nature of the broad blades (most are soft-hammer blades) suggests that this period is the early Neolithic, and the narrow blades and broad blades were produced by the application of the same general approach or operational schema. Table 5 gives an overview of the Techno-complexes identified in eastern Scotland so far: and the approaches of the late Mesolithic and early Neolithic periods both form part of Techno-complex 2.

As suggested by Figure 9, broad blades were produced by several prehistoric industries, such as during the early Mesolithic, the later part of the early Neolithic and the middle/late Neolithic periods. The blades produced during the early Mesolithic (e.g. those from Morton Site A; Coles 1971) tend to be more irregular than the ones produced during the early Neolithic (e.g. Garthdee Road; Ballin 2014a) and middle/late Neolithic period (e.g. Airhouse and Overhowden; Ballin 2011b), and the blades from the middle/late Neolithic period tend to have been produced by hard percussion, where those of the early Mesolithic and early Neolithic were produced by the application of soft percussion. Also, some of the blades from the middle/late Neolithic period have finely faceted platform remnants, as Levallois-like technique formed part of the approach applied during this period (Ballin 2011a). In short, the broad blades from Nether Park most likely date to the early Neolithic period.

Techno-complex	Period	Raw material	Target blanks	Percussion technique	Diagnostic microliths/ arrowheads	Aberdeenshire sites
1	Early Mesolithic	Local grey / red-brown flint	Broad blades	Soft	Broad microliths	Nethermills, Banchory
2	Late Mesolithic	Local grey / red-brown flint	Microblades	Soft	Narrow microliths	Nethermills, Banchory
	Early Neolithic	Local grey / red-brown flint	Microblades/ broad blades	Soft	Leaf-shaped points	Garthdee Road, Aberdeen
3	Middle Neolithic	Exotic light-grey and local grey / red-brown flint	Broad blades	Hard (Levallois-like)	Chisel-shaped points	Stoneyhill, Peterhead
	Late Neolithic	Exotic dark-grey and local grey / red-brown flint	Broad blades	Hard (Levallois-like)	Oblique points	Midmill, Kintore
4	Early Bronze Age	Local grey / red-brown flint	Flakes (schematic operational schema)	Hard/bipolar	Barbed-and-tanged points	Kingfisher Est., Aberdeen
5	Later Bronze Age	Local grey / red-brown flint	Flakes (unschematic operational schema)	Hard/bipolar	None	Blackdog, Aberdeen

Table 5: Preliminary model presenting the techno-complexes of East of Scotland and their diagnostic lithic elements (after Ballin 2014b).

The microblades from the present site represent a microblade industry, and the broad blades represent a broad blade industry, but in general terms these two industries followed the same operational schema, which may be characterised in the following manner:

- The procured nodules probably mainly had GDs of c. 40-60 mm, although it is highly likely that larger nodules were also collected. It is thought that the flint was procured from beach walls along the North Sea coast.
- The knappers generally aimed to produce microblades and broad blades from conical single-platform cores, and the flakes were probably mainly produced in connection with the initial core preparation, as well as from the final stages of cores which had been adjusted and had secondary platforms added when the cores became too small or misshapen to retain their status as single-platform cores.
- Most of the microblades and blades were manufactured by the application of soft percussion, and most of the flakes by hard percussion. However, some early-stage blades were struck off their parent cores by the application of hard percussion, and some soft-percussion flakes may be unsuccessful blades which simply turned out shorter than intended. Bipolar technique was not used at Nether Park.
- Cresting was probably rarely carried out as part of the initial core preparation, with most crests representing adjustment of the core shape during the reduction process. Occasionally, platforms were detached during the reduction process to adjust platform-edges which had developed too acute or obtuse edge-angles.
- When blades or flakes developed hinge or step termination and created irregular flaking-fronts, the flaking-front was detached, or new platforms were added. If this was not possible, the core was abandoned. Apparently, bipolar technique was not used to exhaust the raw material of the cores, as would have been the case along the Scottish west coast.
- Tools were generally produced by edge-retouch, although one scale-flaked knife was manufactured by the application of invasive retouch.

Distribution and on-site activities

The site is complex, and the distribution of the lithic artefacts is difficult to interpret. Several areas of old ground surfaces (OGS), with contexts 13, 16 and 21 forming an elongated figure with a length of approximately 15 m running through the main excavation area from east to west. Most of the lithics are associated with these OGS, which are not necessarily of the same date. In addition, the area east and south-east of the main excavation areas also yielded some lithics, indicating activity in these parts, and small concentrations of lithics were also encountered north and south of the OGS.

Several potential hearths were discovered (6, 14 and 15), and some areas with dark sand and some charcoal were also recorded (24, 25 and 27), indicating the use of fire. A series of linear features (17, 20 and 29) held post-pits for substantial timbers. In addition, a number of other features (pits) were identified (11, 22, 34 and 36).

Inspection of the lithics suggests that the site was visited on a number of occasions during prehistory, with several narrow microliths indicative of late Mesolithic activity and broad soft-hammer blades indicating early Neolithic activity. It cannot be ruled out that a robust scale-flaked blade knife is of later Neolithic date. One of the main aims of the distribution analysis is therefore to attempt to define concentrations dating to the various prehistoric periods we know left a mark at Nether Park. Below, only contexted pieces are dealt with, whereas uncontexted pieces are ignored.

Blades and microblades: These pieces were scattered across the site, but it was not possible to separate the two categories into broad blade and microblade concentrations. Blades concentrated in the OGS area 16; around pit 36 and the area immediately south of this feature; around pit 22 and dark patches, contexts 24 and 25; in linear feature 17; and around pit 11. The presence of blades in these areas suggests that blades were either made or used here, or both.

Preparation flakes: Crested pieces and core tablets were recovered from two areas – seven from OGS 16 and one from the area immediately south of pit 22 and dark patches contexts

24 and 25 (Figure 18). The retrieval of these pieces indicates that cores were reduced and maintained in these areas, and that knapping floors were present here.

Cores: A number of cores were recovered from the site, but their onsite provenance does not form a clear pattern. Three were found in the periphery of OGS 16, and they may represent waste 'tossed' (Binford 1983, 153) out of the knapping-floor of this concentration. Two were found around pits 34 and 36; two at either end of OGS 13; one from linear feature 17; and one from dark grey sand patch context 27 (Figure 19).

Microliths and microburins: The microlithic material was concentrated in two areas, with three microburins recovered from OGS 16, and three narrow microliths from the area around pit 22 and dark patches contexts 24 and 25 (Figure 20). These two groups of microlithic material, separated by 7-8 m, indicate that the site may have been visited at least twice during the late Mesolithic period.

Scrapers: Only seven contexted scrapers were plotted, and four of those were recovered from the area immediately south of OGS C16 and in the area around pits 34 and 36. It is uncertain whether they are associated with one or the other of these two areas, as scrapers would frequently (but not always) be located outside knapping-floors (Stapert 1992, 78). In addition, one was found in pit 11; one in solitary stake-hole 8; and one south of the main excavation area.

Other formal tool types: This group includes three contexted pieces: a truncated blade was recovered south of the main excavation area; a notched piece from OGS 16; and a scale-flaked knife from pit 11.

Pieces with edge-retouch: Nine of these mostly fragmented pieces were recovered from the area around pit 22 and dark patches contexts 24 and 25, and immediately outside this area, with a large group being scattered in the area south-east of the main excavation area.

Burnt pieces: Most of these pieces were recovered from OGS 16; the area around pits 34 and 36; and the area around pit 22 and dark patches contexts 24 and 25. Other pieces were found south-east of the main excavation area and scattered along linear features 17, 20 and 29 (Figure 21). The burnt pieces obviously indicate the use of fire and the presence of a hearth in or near these areas.

Summary and interpretation of distribution: As mentioned above, the site is complex, and the distribution patterns are equally complicated. The burnt pieces, in conjunction with the presence of a number of dark patches, indicate the presence of a number of hearths. Contexts 14 and 15 may be the remains of a hearth associated with the main scatter/knapping-floor of OGS 16. This would make sense if the concentration represents an out-door knapping-floor, and if the knapper(s) was (were) seated on the basis of the prevailing wind direction. Dark patches contexts 24, 25 and 27, which were also associated with burnt pieces, may also be the remains of hearths.

Concentrations of blades, as well as the recovery of preparation flakes and cores, probably indicate the presence of knapping-floors, with lithic reduction taking place around OGS 16; around pits 34 and 36; around pits 22 and dark patches contexts 24 and 25; and around pit 11. The provenance of microliths, scrapers and other tools suggests that tools were made and used in these same areas.

Most of the blades are broad blades, and their general size and execution suggest that most date to the early Neolithic (see for example the blades from Auchategan in Argyll; Ballin 2006b). Early Mesolithic broad blades would have been less regular (c.f. the blades from Morton Site A; Coles 1971), and middle and late Neolithic broad blades would have been more robust (c.f. Ballin 2011b). Late Mesolithic activity is indicated by the distribution of the microliths, which were recovered from OGS 16 and around pit 22 and dark patches 24 and 25. The finds from the former location is therefore mixed, probably dominated by early Neolithic material, but with a supplement of late Mesolithic material. It is possible that the latter location may be mainly late Mesolithic. The scale-flaked blade knife from pit 11 may be later Neolithic, but this is not entirely certain.

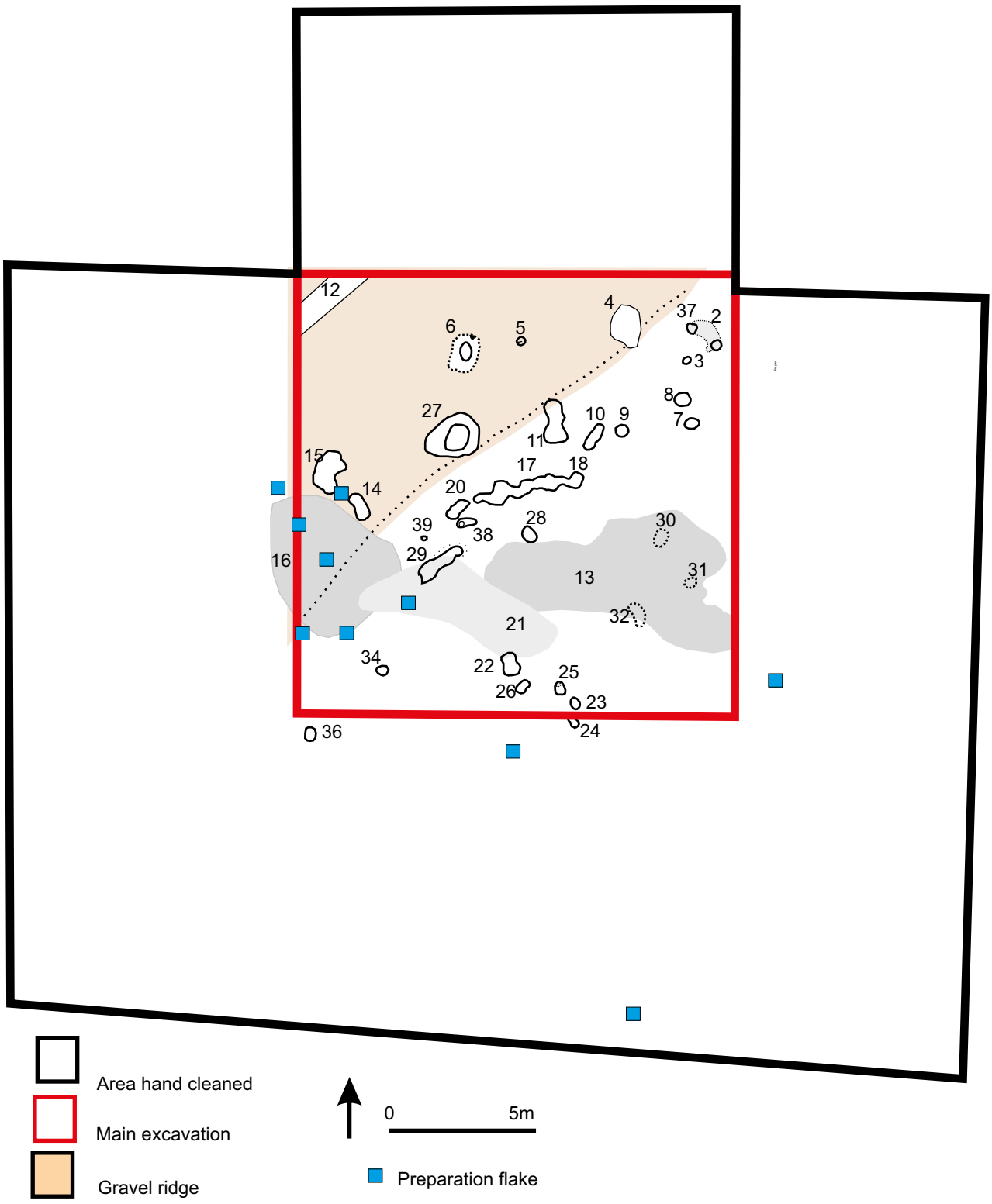

Figure 18: The distribution of preparation flakes.

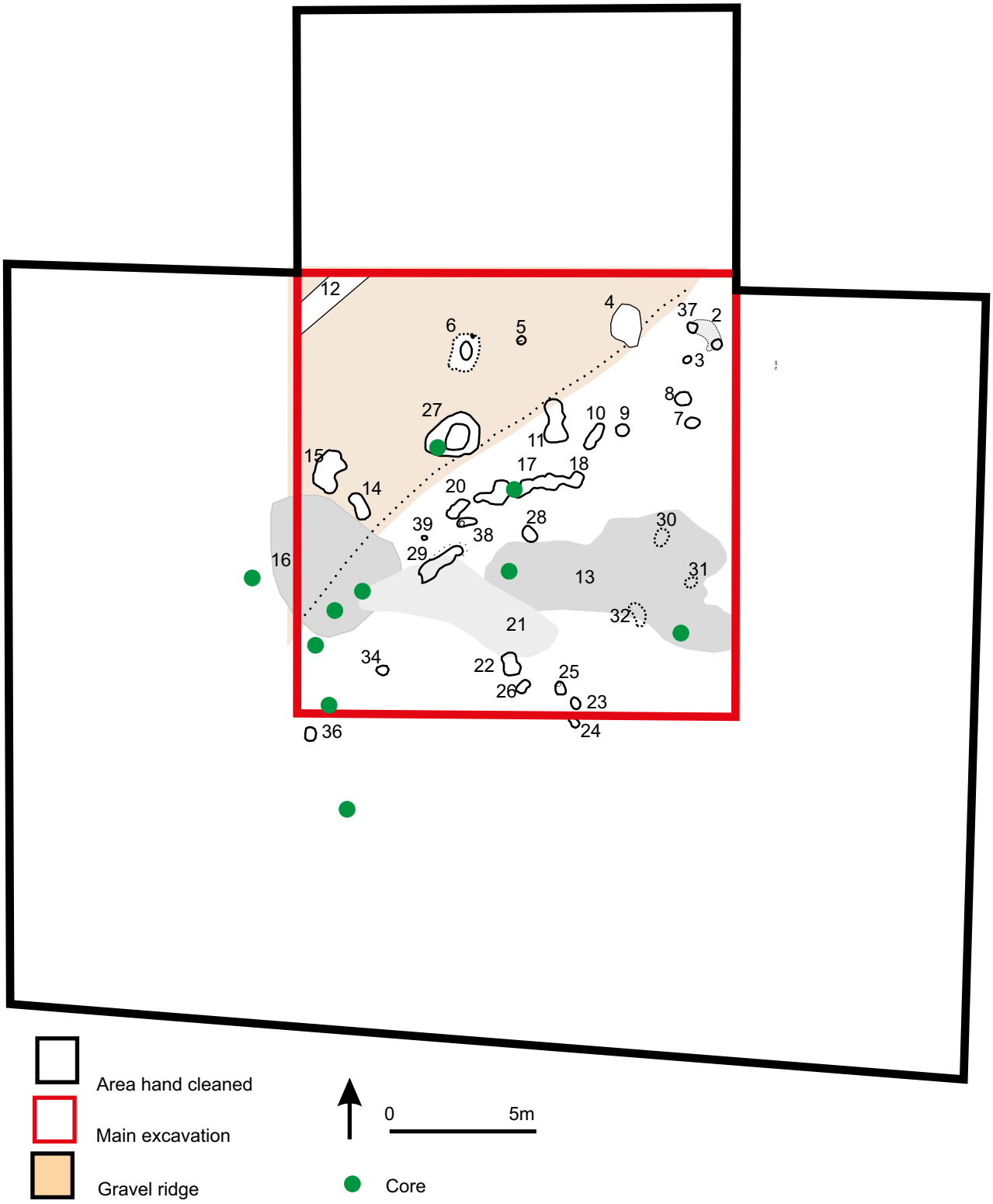

Figure 19: The distribution of cores

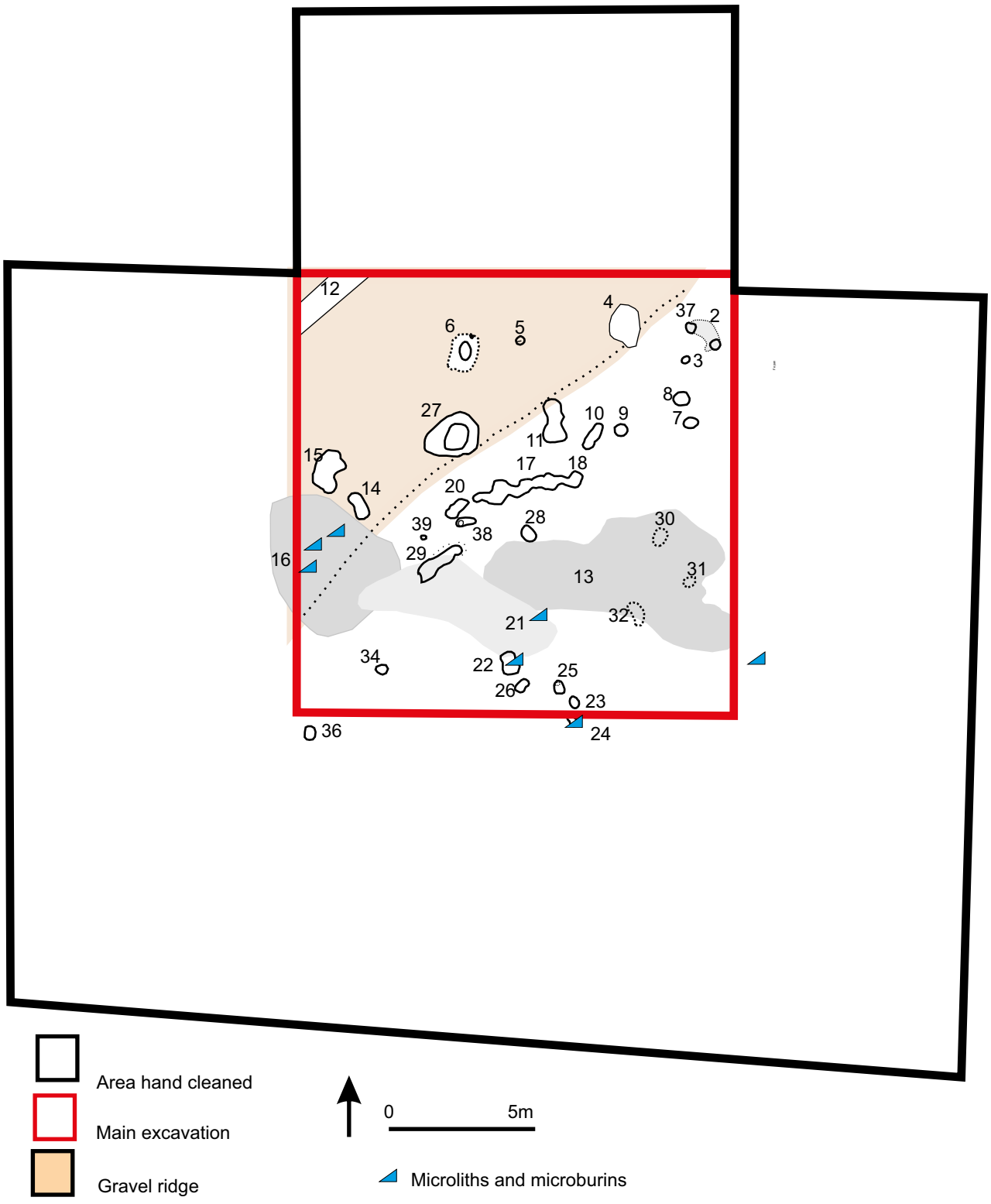

Figure 20: The distribution of microliths and microburins

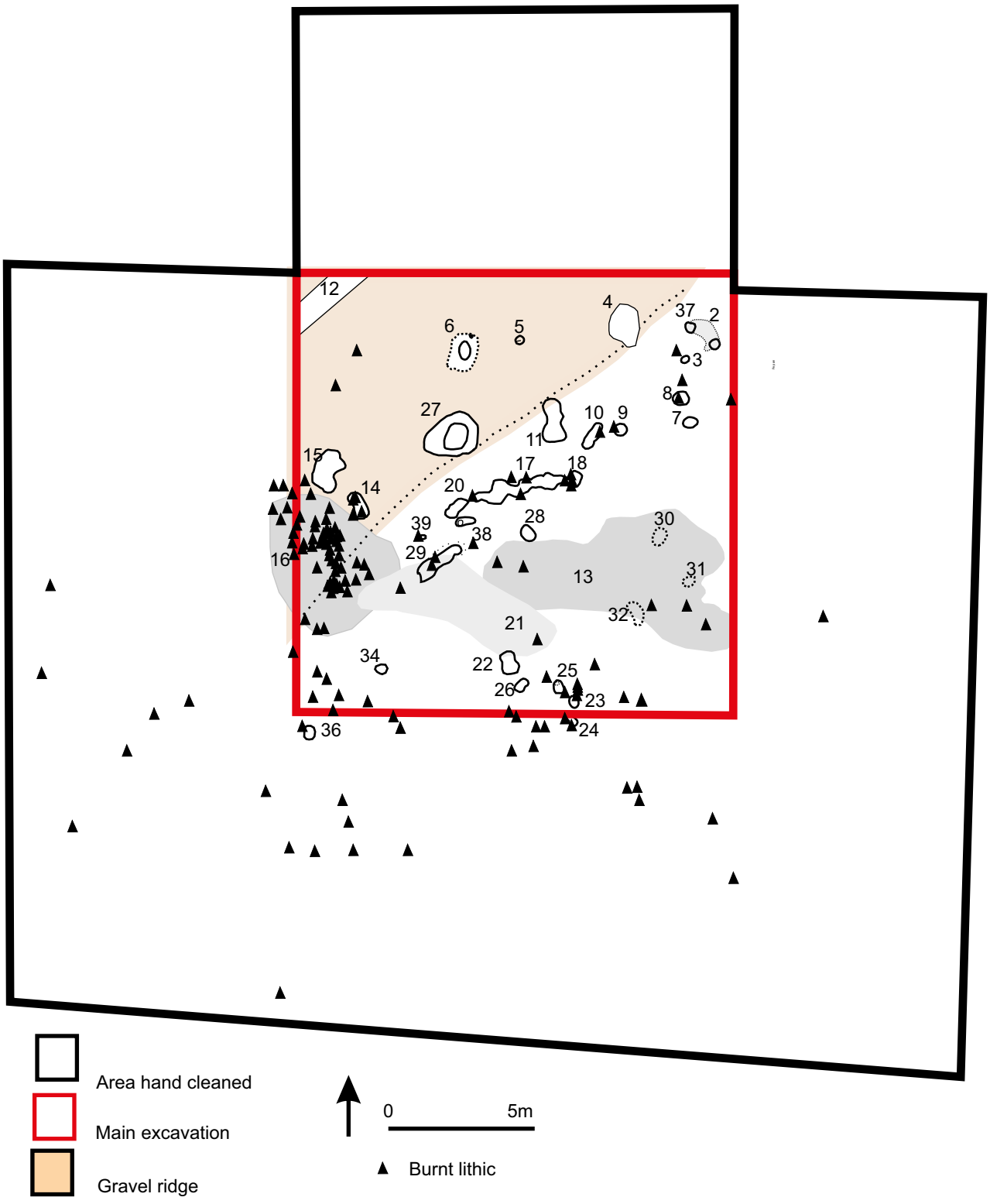

Figure 21: The distribution of burnt pieces.

Dating

As suggested above, the location seems to have been visited on a number of occasions through prehistoric times. The distribution of the artefacts across the site suggests that it is generally a palimpsest, and that the remains left by the various visitors overlap somewhat. The lithic assemblage includes several diagnostic elements, such as blank, core and tool types, and technological attributes.

The composition of the blades in Figure 8 clearly supports the suggestion that the site was visited several times in prehistory, most likely during the late Mesolithic (microblades) and Neolithic (broad blades) periods. The regularity and relatively delicate nature of the broad blades suggest that the broad blades date to the early Neolithic period, as early Mesolithic broad blades tend to be less regular, and middle and late Neolithic broad blades were usually manufactured by the application of relatively robust approaches, but those from Nether Park are mostly regular, relatively delicate soft-hammer specimens.

The fact that all cores are regular conical blade or microblade cores, or reworked conical cores (the dual-platform cores and core fragments), and that bipolar material is entirely absent, supports the suggestion that almost all the site's lithics were made, used, and deposited during the late Mesolithic – early Neolithic period (see Table 5, Techno-complex 2). In eastern Scotland, bipolar technique became an integral part of the region's operational schemas from the beginning of the middle Neolithic period (c.f. the analysis of the blades and cores from Stoneyhill Farm near Peterhead (Suddaby and Ballin 2010), to become dominant during the Bronze Age period (c.f. the finds from the Kingfisher estate north of Aberdeen; Ballin 2008).

The presence of narrow microliths (SF 186, 364, 420, 421, 440 and 496) and microburins (SF 265, 284 and 292) indicate a late Mesolithic presence, whereas the scale-flaked knife (SF 429) is clearly of a post-Mesolithic date. The fact that this piece is based on a stout blade suggests that it may date to the middle or late Neolithic period, where almost all other post Mesolithic pieces from the site, such as the relatively delicate unmodified broad blades and the conical broad blade cores, appear to be early Neolithic.

The solitary polished-edge implement (SF 144b) is an intriguing piece. As mentioned above, pieces with highly reflective polished edges tend to be middle or late Neolithic (e.g., the pieces from Airhouse and Overhowden in the Scottish Borders; Ballin 2011b), whereas pieces with more coarsely abraded edges (e.g. the pieces from Milltimber in Aberdeenshire; Ballin 2019) may date to the Mesolithic period. The nature of the polished edges of SF 144b is similar to the edges of the pieces from Milltimber, and a Mesolithic date is therefore likely. However, it should be borne in mind that polished-edge implements are still relatively rare and their specific function and date is poorly understood, and more research of these objects is clearly needed.

Summary and discussion

Nether Park was a relatively complex site characterised by a series of overlapping deposits, pits, one trench with postholes for large timbers, as well as hearths and potential hearths. From this site, 503 lithic artefacts were recovered. Most of these pieces are of flint, with a small proportion being quartz and quartzite (seven pieces). Nine pieces are narrow microliths or microburins and clearly of a late Mesolithic date, whereas the blades are notably dominated by regular broad soft-hammer specimens, suggesting that the lithic assemblage is dominated by early Neolithic material. A plano-convex blade knife from a pit may be later Neolithic.

The distribution of the flints indicates that Mesolithic and Neolithic people were active across the site, but it has not been possible to safely separate the material into unmixed scatters. Although lithic objects were recovered across the site, within the main excavation area and beyond, there are several notable activity 'hot-spots', such as 1) OGS 16; 2) the area around pit 36 and the area immediately south of this feature; 3) the area around pit 22 and dark patches 24 and 25; and 4) pit 11 and its surroundings. The remainder of the site is characterised by low level activity.

The densest concentration of finds is around OGS 16, which is characterised by a relatively large number of broad blades, preparation flakes surrounded by a number of broad blade conical cores, and burnt pieces. These objects suggest relatively intense early Neolithic lithic reduction

here, but three microburins indicate that late Mesolithic people also knapped flint in this area.

The area around pit 36 and the area immediately south of this feature are characterised by blades, blade cores and burnt pieces, suggesting an early Neolithic presence. The area around pits 22 and dark patches 24 and 25 yielded three narrow microliths, some blades, as well as burnt pieces, suggesting late Mesolithic activity. And a plano-complex blade knife was recovered from pit 11 (possibly representing a deliberate Neolithic deposition), with blades surrounding the feature, indicating Mesolithic or (more likely) Neolithic activity. Scrapers were also recovered from the site, with most deriving from the area around pit 36, showing that lithic tools were not just made on the site but also used.

The fact that three of the four formal narrow microliths are crescents links the late Mesolithic component of the site and its assemblage to other East of Scotland sites dominated by crescents. They include Fife Ness (Wickham-Jones and Dalland 1998), and the southern half of Milltimber Zone 5 (Ballin 2019). A radiocarbon sample from material obtained immediately outside the southern half of Milltimber Zone 5 provided a date of 8222-7965 cal BC (SUERC 68101). A string of radiocarbon-dates from Fife Ness suggests a date for this assemblage of c. 7600-7400 cal BC, or roughly 5-600 years later. Saville (2008) dated the early/late Mesolithic transition to c. 8500 cal BC, and although crescents have been recovered from many late Mesolithic assemblages with mixed microlith assemblages, it is possible that crescent-*dominated* assemblages date to a 500 year phase at the beginning of the 4500 year long late Mesolithic period.

Palaeoenvironmental Assessment of Bulk Samples

by Scott Timpany

Introduction

During the course of the excavation bulk soil samples were taken from features in order to retrieve palaeoenvironmental and archaeological materials. Environmental remains recovered from the samples may shed more light on the function of these features, providing dating evidence and tell us more about the activities, economy and diet of the peoples who inhabited this site.

This report presents the results of the bulk sample assessment from two linear features and a number of post-hole, stake-hole, pit, hearth and spread features. A total of 22 bulk samples were taken from the site and all were processed for assessment. The aims of the assessment were to:

- Assess the presence, preservation and abundance of any palaeoenvironmental materials within the samples.
- Assess the potential of the material to inform on any activities associated with investigated features together with evidence of wild plant use, wood fuels and human-environmental interaction.
- Assess whether any proxy-dates for these features can be provided based on any archaeobotanical materials present.
- Assess whether there is any suitable charred plant remains available to provide radiocarbon dating materials.

Method

Bulk Sample Processing

Samples were processed in laboratory conditions using a standard floatation method (c.f. Kenward et.al. 1980). All plant macrofossil samples were analysed using a stereo-microscope at magnifications of x10 and up to x100 where necessary to aid identification. Identifications were confirmed using modern reference material from the collection held at the Archaeology Institute, UHI and seed atlases including Cappers et.al. (2006). Sample numbers are identified by the prefix S.

Results

The results of the sample processing are provided in Tables 6 (Retent finds) and 7 (Flotation finds). Suitable material for Accelerator Mass Spectrometry (AMS) dating is also identified within each table. All plant remains were preserved through charring.

Charred Plant Remains (CPR)

Charred cereal grain was present in only one sample (S08) from the fill (11/2) of pit 11 where a rare quantity of very well-preserved oat (*Avena* sp.) grain was identified (Table 7). A small quantity of wild taxa was recovered from four samples (Table 7). Crowberry (*Empetrum nigrum*) seeds were present in three samples (S18, S23 and S24) two from the fills (29/1, 29/2) of linear feature 29 and one from the fill (37/1) of stake-hole 37. Charred fruitstones of probable bramble (cf. *Rubus fructicosus*) and charred nutlets of probable sedge (cf. *Carex* sp.) were recovered in rare quantities from the fill (18/2) of post-pit 18 at the eastern end of linear feature 17.

Wood charcoal fragments were present in abundant quantities in five retent samples (Table 6), whereas in the flot samples the highest quantities were two samples in common abundance (Table 7), with fragment size ranging from 2 mm to 31 mm (Table 6 and 7) encompassing small flecks of charcoal to more substantial charcoal fragments. Wood charcoal fragments of suitable size and condition for identification/ dating purposes have been recovered from all but three samples (Table 6 and 7). Visual inspection of charcoal fragments suggests the assemblage consists of a mixture of oak (*Quercus* sp.) and non-oak species. Ten charcoal fragments were identified for submission as radiocarbon dating material and confirmed the presence of oak, along with a variety of other arboreal taxa consisting of ash (*Fraxinus excelsior*), hazel (*Corylus avellana*), birch (*Betula* sp.), alder (*Alnus glutinosa*) and willow (*Salix* sp.) suggesting wood fuel was resourced from a number of woodland types.

Other finds

Lithics were recovered in 14 samples with abundance ranging from rare to occasional, with rare abundance of stones showing possible wear identified in two samples (Table 6). Possible cramp material was recorded in one sample from pit 36. Fish bone was retrieved in rare abundances both burnt and unburnt from possible hearth deposits, with burnt fish bone found in the fill (6/1) of hearth 6 and unburnt fish bone from the fill (15/1) of hearth 15. Carbonised material was also recorded in 15 samples in rare to abundant quantities (Table 6).

Radiocarbon dates

The results of the radiocarbon dating samples are discussed by Hamilton (below) and shown in Table 8 Ten samples were submitted for radiocarbon with charcoal used for each sample. Where possible charcoal displaying strongly-curved growth rings was used for dating material, with these fragments recognised to represent shorter-lived branch wood rather than potential trunk wood (c.f. Margeurie and Hunot 2007). Three samples (S5, S12 and S17) failed to produce radiocarbon dates due to insufficient carbon, while seven samples produced dates ranging from the Mesolithic to the Bronze Age. All dates quoted in the text are 95.4% relative probability at 2σ (Table 8).

Discussion

The samples are discussed below by chronology.

Mesolithic

The earliest date at Nether Park was from linear feature 29 where birch charcoal produced a date of 7170-7044 cal BC (SUERC-84117; 8101±29 BP). Two fills (29/1 and 29/2) were sampled from this feature with the dated charcoal being associated with fill 29/2. The feature was found to contain abundant to rare quantities of charcoal that was observed to be non-oak. The presence of charred crowberry seeds (Table 7) within the sample may reflect the remains of wild foodstuffs. A rare quantity of lithics was also recovered from fill 29/1.

Willow charcoal from linear feature 17 has provided a date of 6588–6454 cal BC (SUERC-84114; 7663 ± BP) from the fill of one of the post-pits (17/2). Alder charcoal from another fill (17/2) of this feature has produced a later date of 4599-4463 cal BC (SUERC–84108; 5701 ± 23 BP) (Table 8). The differences in the dates of these two post-pits may suggest that they are not all contemporary with each other or that some include residual material. Four samples were taken from this context and all contained charcoal with oak and non-oak fragments observed. The presence of willow and alder would suggest the resourcing of wet woodland for wood fuel. Lithics were retrieved from three of the post-pit fills (Table 6).

Sample Number	Context Number	Feature	Sample Vol (l)	Retent Vol (l)	Stone		Cramp	Burnt Bone	Unburnt Bone	Carbonised Material	Charcoal		Material available for AMS Dating	Comments
					Lithics	Stone		Fish	Fish		Quantity	Max Size (mm)		
Linear Features														
6	17/2	Fill of post pits within linear feature (17)	1.2	0.2	++					+	++	13	Charcoal +	Charcoal is non-oak. Potential intrusive material (glass) present.
7	17/2	Fill of post pits within linear feature (17)	1.5	0.4	+					++	++++	31	Charcoal ++	Charcoal is oak Possible worked lithic present.
16	17/2	Fill of post pits within linear feature (17)	0.6	0.1	++						++	11	Charcoal +	Charcoal is non-oak.
21	17/2	Fill of post pits within linear feature (17)	0.7	0.1							+++	20	Charcoal +	Charcoal is oak.
10	18/2	Fill of post pit at E end of linear feature (17)	4	0.7	+					++++	++++	26	Charcoal ++	Charcoal is non-oak.
11	18/2	Fill of post pit at E end of linear feature (17)	3.5	0.5	++					++	++++	21	Charcoal ++	Charcoal is oak.
17	20/1	Fil of post pit (20), possibly relating to linear feature (17)	0.7	0.1	+					++	++	5	Charcoal +	Charcoal is non-oak and includes possible heather and bark.
23	29/1	Fill of linear feature (29)	3	0.7	+					++	++++	28	Charcoal ++	Charcoal is non-oak.
24	29/2	Fill of linear feature (29)	0.2	0.1						+	+	10	-	Charcoal is non-oak.
Hearth & Spreads														
19	6/1	Fill of possible hearth (6)	2	0.4		+		+		++	++++	13	Charcoal ++	Charcoal is non-oak.
5	14	Fill of possible hearth (14)	1.5	0.4	++					++	+++	10	Charcoal +	Charcoal is oak.

Key (artefactual): + = rare (0-5), ++ = occasional (6-15), +++ = common (16-50) and ++++ = abundant (>50)
Key (environmental): + = rare (0-10), ++ = occasional (11-50), +++ = common (51-100) and ++++ = abundant (>100)
N.B. charcoal over 0.5cm3 is suitable for identification and AMS dating

Table 6: Palaeoenvironmental assessment: Retent finds

Sample Number	Context Number	Feature	Sample Vol (l)	Retent Vol (l)	Stone		Cramp	Burnt Bone	Unburnt Bone	Carbonised Material	Charcoal		Material available for AMS Dating	Comments
					Lithics	Stone		Fish	Fish		Quantity	Max Size (mm)		
Hearth & Spreads														
15	15//1	Fill of possible hearth (15)	3.7	1.2	++				+	++	++	7	-	Charcoal is non-oak. Fish is possible ray tooth
20	27/1	Possible spread (27)	1	0.07						+	++	5	-	Charcoal is oak and non-oak.
Stakeholes														
14	5/1	Fill of possible stakehole (5)	1.3	0.3						++	+++	15	Charcoal ++	Charcoal is oak.
9	8/1	Fill of stakehole (8)	0.5	0.08	+						++	13	Charcoal +	Charcoal is non-oak.
18	37/1	Fill of possible stakehole (37)	0.4	0.05							++	15	Charcoal +	Charcoal is non-oak.
Postholes														
25	38	Fill of possible posthole (38)	0.5	0.1	+						+++	17	Charcoal +	Charcoal is oak.
Pits														
8	11/2	Fill of possible shallow pit (11).	4	1.1	+					++	+++	18	Charcoal ++	Charcoal is oak and non-oak.
22	11/3	Fill of possible shallow pit (11).	3	0.8						++	++	7	Charcoal +	Charcoal is non-oak.
12	36/1	Fill of post pit (36)	3	0.7	++	+	+			+	++	11	Charcoal +	Charcoal is oak and non-oak. Stone is fragment with possible use wear
Other Features														
13	3/1	Fill of possible small feature (3).	0.4	0.01							+	8	Charcoal +	Charcoal is non-oak.
26	39	Fill of bowl-shape feature (39)	0.3	0.09	+						++	12	Charcoal +	Charcoal is oak.

Key (artefactual): + = rare (0-5), ++ = occasional (6-15), +++ = common (16-50) and ++++ = abundant (>50)
Key (environmental): + = rare (0-10), ++ = occasional (11-50), +++ = common (51-100) and ++++ = abundant (>100)
N.B. charcoal over 0.5cm3 is suitable for identification and AMS dating

Table 6 (Continued): Palaeoenvironmental assessment: Retent finds

Sample Number	Context Number	Feature	Total flot Vol (ml)	Cereal grain	Grain Preservation	Other plant remains	Charcoal		Material available for AMS	Burnt bone	Comments
				Avena sp.			Charcoal Quantity	Charcoal Max size (mm)			
Linear Features											
6	17/2	Fill of post pits within linear feature (17)	4				+	2	-		Charcoal indet.
7	17/2	Fill of post pits within linear feature (17)	7				++	4	-	+	Charcoal is non-oak.
16	17/2	Fill of post pits within linear feature (17)	2				+	9	-		Charcoal looks to be bark.
21	17/2	Fill of post pits within linear feature (17)	7				++	3	-		Charcoal is non-oak.
10	18/2	Fill of post pit at E end of linear feature (17)	50				+++	5	Charcoal +		Charcoal is oak, non-oak and bark.
11	18/2	Fill of post pit at E end of linear feature (17)	25			cf. Rubus sp. +, cf. Carex sp. +	+	3	-		Charcoal is oak and non-oak.
17	20/1	Fil of post pit (20), possibly relating to linear feature (17)	4				+	3	-		Charcoal is non-oak.
23	29/1	Fill of linear feature (29)	5			Empetrum nigrum +	++	5	Charcoal +		Charcoal is non-oak and possible bark. Cinder +.
24	29/2	Fill of linear feature (29)	5			Empetrum nigrum +			-		
Hearth & Spreads											
19	6/1	Fill of possible hearth (6)	20				++	3	-		Charcoal is non-oak.
5	14	Fill of possible hearth (14)	40				+++	9	Charcoal +		Charcoal is non-oak.

Key: + = rare (1-10), ++ = occasional (11-50), +++ = common (51-100) and ++++ = abundant (>100)
Preservation: 1. Excellent, 2. Good, 3. Moderate, 4. Poor, 5. Very Poor
NB charcoal over 0.5cm3 is suitable for identification and AMS dating

Table 7: Palaeoenvironmental assessment: Flotation finds

Sample Number	Context Number	Feature	Total flot Vol (ml)	Cereal grain	Grain Preservation	Other plant remains	Charcoal		Material available for AMS	Burnt bone	Comments
				Avena sp.			Charcoal Quantity	Charcoal Max size (mm)			
Hearth & Spreads											
15	15//1	Fill of possible hearth (15)	10				+	3	-		Charcoal is non-oak.
20	27/1	Possible spread (27)	10				+	3	-		Charcoal is oak, non-oak and bark.
Stakeholes											
14	5/1	Fill of possible stakehole (5)	3				+	2	-		Charcoal indet.
9	8/1	Fill of stakehole (8)	4				++	7	Charcoal +		Charcoal is non-oak.
18	37/1	Fill of possible stakehole (37)	4			Empetrum nigrum +			-		Contains possible charred bark.
Postholes											
25	38	Fill of possible posthole (38)	5				++	2	-		Charcoal indet.
Pits											
8	11/2	Fill of possible shallow pit (11).	10	+	1		++	3	-		Charcoal is non-oak.
22	11/3	Fill of possible shallow pit (11).	20				+++	5	Charcoal +		Charcoal is non-oak and possible bark.
12	36/1	Fill of post pit (36)	10				++	5	Charcoal +		Charcoal is non-oak.
Other Features											
13	3/1	Fill of possible small feature (3).	2				+	2			Charcoal indet.
26	39	Fil of bowl-shape feature (39)	10				++	3	-		Charcoal is non-oak.

Key: + = rare (1-10), ++ = occasional (11-50), +++ = common (51-100) and ++++ = abundant (>100)
Preservation: 1. Excellent, 2. Good, 3. Moderate, 4. Poor, 5. Very Poor
NB charcoal over 0.5cm3 is suitable for identification and AMS dating

Table 7 *(Continued)*: Palaeoenvironmental assessment: Flotation finds

Post-pit 18 at the eastern end of linear feature 17 produced a date that is contemporary with the later date from fill (17/2) with ash charcoal from the fill (18/2) of this feature providing a date of 4531–4372 cal BC (SUERC-84110; 5633 ± 23 BP). Two samples (S10 and S11) were taken from the same fill (18/2) of this feature and both contained abundant charcoal that was observed to be a mix of oak and non-oak wood fuels. A small quantity of wild taxa was recovered from these samples with probable bramble and sedge remains found (Table 7). The presence of these taxa and the identification of ash charcoal may indicate the existence of wet woodland in the area and the utilisation of this for fuel and in the case of bramble fruits, wild foodstuff resources. Small quantities of lithics were also retrieved from this feature (Table 6).

Ash wood fuel was also identified within the charcoal assemblage from the fill (11/2) of possible shallow pit 11 and produced a date of 4229-3989 cal BC (SUERC–84109; 5263 ± 22 BP) at the Mesolithic-Neolithic transition. Two samples were taken from the fills (11/2 and 11/3) of this feature with fill (11/3) producing an early Bronze Age date (see below) suggesting potential later use of this feature. A rare quantity of lithics was retrieved from fill (11/2), which also contained a rare quantity of charred oat grain that is believed to represent intrusive material (Tables 6 and 7). Fill (11/2) produced a common abundance of charcoal that was observed to comprise both oak and non-oak fuelwood.

Neolithic features

An early Neolithic date was produced from hazel charcoal from the fill (6/1) of possible hearth 6 of 3924–3707 cal BC (SUERC-84115; 4999 ± 22 BP). Only one sample (S19) was taken from the feature and contained abundant charcoal that was observed to be non-oak, together with small quantities of burnt fish bone and possibly worked stone (Tables 6 and 7).

Bronze Age features

Fill (11/3) of possible shallow pit 11 has been dated from hazel charcoal to the Early Bronze Age, with a date obtained of 1877–1685 cal BC (SUERC-84116; 3441 ± 24 BP). Ash charcoal from fill (11/2) of this feature produced a late Mesolithic date suggesting fill (11/3) may represent later re-use or incidental infilling. A common abundance of non-oak charcoal was observed to be present in fill (11/3) and this was the only material contained within the sample.

Undated features

One sample (S17) was taken from the fill (20/1) of post-pit 20 and was found to contain a small quantity of charcoal, observed to be a mix of non-oak and heather, together with a rare abundance of lithics. Post-pit 20 is associated with linear feature 17 and as such this feature is likely to date to the early Neolithic period.

Together with possible hearth 6, which produced an early Neolithic date, two other possible hearths (14 and 15), together with a possible hearth spread (27) were sampled. These features all contained charcoal in common to occasional abundances with a mix of oak and non-oak fuel wood observed. A rare quantity of unburnt fish bone (possible fish tooth) was recorded in fill (15/1) from hearth 15. The only other (burnt) fish bone from the site came from the dated hearth 6. Occasional lithics were present in both hearths 14 and 15 but were absent from hearth spread 27.

Three samples (S9, S14 and S18) were taken from the single fills (5/1, 8/1 and 37/1) of three stake-holes (5, 8 and 37). All stake-holes contained charcoal in common to occasional abundances with both oak and non-oak charcoal observed across the three features. The only other CPR present was a rare amount of crowberry seeds recorded in the fill (37/1) of stake-hole 37, which may represent the remains of wild foodstuffs. Lithics were recorded in rare abundance from the fill (8/1) of stake-hole 8. The fill (38/1) of possible post-pit 38 contained a common abundance of oak charcoal and a rare quantity of lithics. One sample (S12) taken from the single fill (36/1) of post-pit 36 was found to contain an occasional abundance of a mix of oak and non-oak charcoal fragments and lithics. A rare quantity of possible worked stone and cramp was also retrieved from this feature (Table 6).

Two other features (2 and 39) were sampled (S13 and S26) from the site and were found to contain rare to occasional quantities of charcoal that was

observed to be a mix of both oak and non-oak fragments. A rare quantity of lithics was also recovered from the fill of feature 39.

The fill (38/1) of possible post-hole 38 contained a common abundance of oak charcoal and a rare quantity of lithics. One sample (S12) taken from the single fill (36/1) of post-pit 36 was found to contain an occasional abundance of a mix of oak and non-oak charcoal fragments and lithics. A rare quantity of possible worked stone and cramp was also retrieved from this feature (Table 6).

Two other features (2 and 39) were sampled (S13 and S26) from Nether Park and were found to contain rare to occasional quantities of charcoal that was observed to be a mix of both oak and non-oak fragments. A rare quantity of lithics was also recovered from the fill of cut feature (39).

Conclusion

- The sample assessment has revealed that charcoal fragments were the main CPR material recovered from the site with a mix of oak and non-oak fragments. Identification of a small number of fragments for radiocarbon dating material revealed a potentially diverse assemblage that include oak, ash, hazel, willow, alder and birch.
- Only a very limited assemblage of wild taxa was found from the site with crowberry seeds, possible sedge and possible bramble identified. A rare quantity of oat grain was recovered from shallow pit (11) but given the prehistoric date for this feature and the good condition of the grain it is likely to be intrusive.
- Although all secure contexts were sampled, the radiocarbon dates indicate that some of the post-pits dug in the early Neolithic appear to have incorporated residual Mesolithic material in their backfilling. As a result, it is difficult to make any definitive statements regarding the environment around Nether Park or changes in that environment between the Mesolithic and early Neolithic.
- The dated samples indicate use of birch and willow in the Mesolithic, with alder and ash in late Mesolithic/early Neolithic contexts and hazel and ash in early Neolithic contexts, with oak (not selected for dating) occurring in contexts from all periods (Tables 6 and 7).
- Suitable material available for AMS radiocarbon dating was identified from the majority of samples processed, which in all cases was charcoal.

Radiocarbon Dating

by Derek Hamilton

A total of nine radiocarbon dates are available from charcoal samples recovered from seven features excavated at the site of Nether Park, Drumoak in Aberdeenshire. The samples were submitted to the Scottish Universities Environmental Research Centre (SUERC) for radiocarbon dating by accelerator mass spectrometry (AMS). All the samples were single-entities (Ashmore 1999) and were pre-treated following methods described in Dunbar *et al.* (2016). The SUERC laboratory maintains rigorous internal quality assurance procedures, and participation in international inter-comparisons (Scott 2003) indicates no laboratory offsets; thus, validating the measurement precision quoted for the radiocarbon ages.

Lab ID	Context description [Context: Sample ID]	Material: species	δ13C (‰)	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-84108	Fill of post-pit in linear trench 17 (17: S6)	charcoal: alder	−26.0	5701 ± 23	4600–4460 cal BC
SUERC-84109	Primary fill of pit 11 (11/2: S8)	charcoal: ash	−25.1	5263 ± 22	4230–3990 cal BC
SUERC-84110	Fill of postpit in linear trench 18 (18/2: S10)	charcoal: ash	−27.1	5633 ± 23	4520–4370 cal BC
SUERC-84114	Fill of postpit in linear trench 17 (17/2: S16)	charcoal: willow	−25.0	7663 ± 24	6570–6450 cal BC
SUERC-84115	Possible hearth deposit (6/1: S19)	charcoal: hazel	−25.3	4999 ± 22	3920–3700 cal BC
SUERC-84116	Secondary fill of pit 11 (11/3: S22)	charcoal: hazel	−27.0	3441 ± 24	1880–1680 cal BC
SUERC-84117	Fill of postpit in linear feature 29 (29/1: S23)	charcoal: birch	−25.0	8101 ± 29	7140–7040 cal BC

Table 8: Radiocarbon dates.

Conventional radiocarbon ages (Stuiver and Polach 1977) are presented in Table 8 where they are quoted in accordance with the Trondheim convention (Stuiver and Kra 1986) and calibrated following the maximum intercept method of Stuiver and Reimer (1986). As part of the chronological modelling process, the radiocarbon ages were calibrated using the calibration curves of Reimer et al. (2013) and OxCal v4.3 (Bronk Ramsey 1995; 1998; 2001; 2009). The *italicised* dates presented in the text below are posterior density estimates derived from mathematical modelling of archaeological problems and have been rounded outward to five years. These dates can change with the addition of new data or when the modelling choices are varied.

Methodological approach

A Bayesian approach has been applied to the interpretation of the Nether Park chronology (Buck et al. 1996). Although simple calibrated dates are accurate estimates of the radiocarbon age of samples, this is not, usually, what archaeologists really wish to know. It is the dates of the archaeological events represented by those samples that are of interest. At Nether Park, for example, a primary question is the overall start and end of activity in the Neolithic period, and how it compares to the dated activity at the nearby excavated timber hall sites at Warren Field, Crathes (Murray *et al*. 2009) and Balbridie (Ralston 1982) and at the smaller structure at Garthdee Road (Murray and Murray 2014).

Methodology is now available which allows the combination of different types of information explicitly, to produce realistic estimates of the dates of archaeological interest. It should be emphasised that the posterior density estimates produced by this modelling are not absolute. They are interpretative estimates, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives. The technique used is a form of Markov Chain Monte Carlo sampling and has been applied using the program OxCal v4.3 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available in Bronk Ramsey (1995; 1998; 2001; 2009) or from the online manual. The algorithm used in the models can be derived from the OxCal keywords and bracket structure shown in Figures 22 and 24.

The samples and model

From context 6 a spread of charred debris (interpreted as a probable hearth deposit) there is a radiocarbon date (SUERC-84115) on a single fragment of hazel charcoal. There are two dates (SUERC-84109 and -84116) on fragments of ash and hazel charcoal, respectively, from two different fills in shallow pit 11. The lower dated sample (SUERC-84109) is from the primary fill, while the secondary fill produced the sample for SUERC-84116. The upper fill result is Bronze Age in date and has been excluded from the modelling of the Neolithic activity. There are two results (SUERC-84108 and -84114) from two fills in linear trench feature 17 that contained a number of post-pits. SUERC-84108 is on a fragment of alder charcoal, while SUERC-84114 is from a fragment of willow charcoal, each from the fill of post-pits in the trench. The willow charcoal (SUERC-84114) is Mesolithic in date and likely to be residual in this feature, so it has been excluded from the modelling. A fragment of ash charcoal was dated (SUERC-84110) from feature 18, which forms part of the linear feature 17. Finally, a fragment of birch charcoal from a post-pit in trench 29, near trench 17/18 produced a Mesolithic date (SUERC-84117) and so has been excluded from the modelling.

With the exception of the two dates in pit 11 being placed within a sequence, the model contains all other dates within a general bounded phase of activity as described in Hamilton and Kenney (2015). The model has good agreement between the radiocarbon dates and the model assumptions (Amodel=95). It estimates that the Neolithic activity at Nether Park began in *5395–4470 cal BC* (*95% probability*; Figure 22; *start: Nether Park Neolithic*), and probably in *4795–4495 cal BC* (*68% probability*). The activity ended in *3930–2960 cal BC* (*95% probability*; Figure 22; *end: Nether Park Neolithic*), and probably in *3905–3510 cal BC* (*68% probability*). The total span of the date Neolithic activity is *595–2215 years* (*95% probability*; Figure 23; *span: Nether Park Neolithic*), and probably *660–1310 years* (*68% probability*).

The chronological modelling from the structure at Garthdee Road and the timber hall at Warren Field, Crathes suggest spans of use of one or two centuries (Marshall 2009; Murray *et al.*

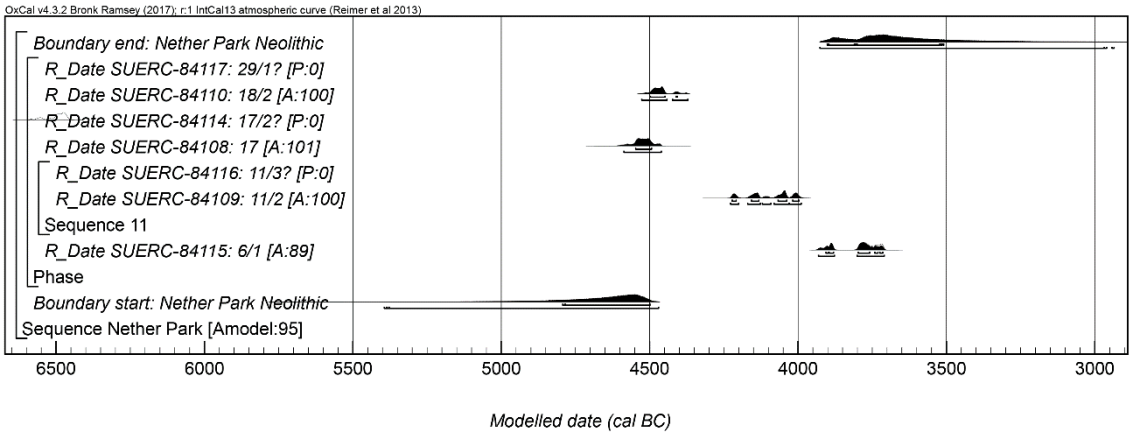

Figure 22: Chronological model for the radiocarbon dates from Nether Park, Drumoak, Aberdeenshire. Each distribution represents the relative probability that an event occurred at some particular time. For each of the radiocarbon measurements two distributions have been plotted, one in outline that is the result of simple radiocarbon calibration, and a solid one that is based on the chronological model use. The other distributions correspond to aspects of the model. For example, 'start: Nether Park Neolithic' is the estimated date that Neolithic activity began at the site. The large square 'brackets' along with the OxCal keywords define the overall model exactly.

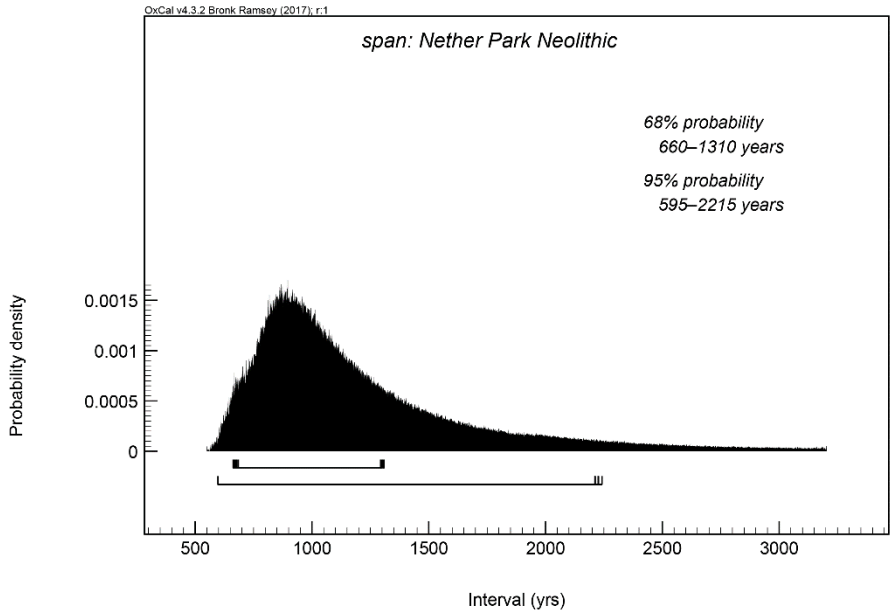

Figure 23: Estimated span of the Neolithic activity at Nether Park, derived from the chronological model shown in Figure 22.

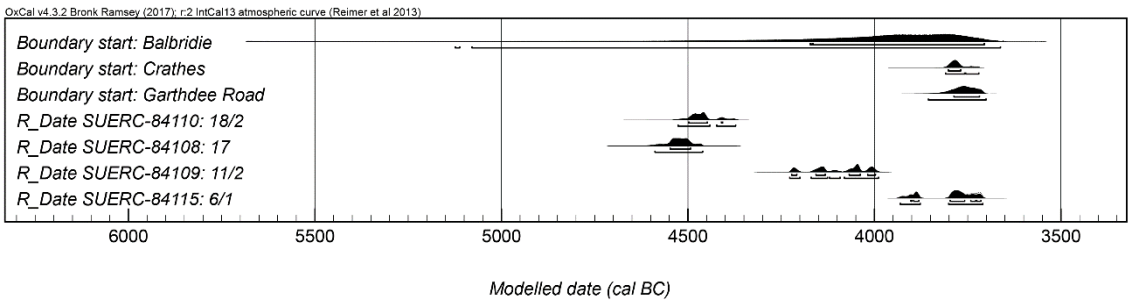

Figure 24: Comparison between the modelled dates for the Neolithic features at Nether Park and the start dates of Neolithic activity at the timber hall sites at Balbridie, Crathes, and Garthdee Road. The start dates for the three comparative sites are from the models presented in Marshall (2009) and Murray et al (2014) but updated for the IntCal13 calibration curve and OxCal v.4.

2014). The low number of non-TPQ dates in the model for Balbridie and the large errors on the older measurements can lead to longer estimates for the model boundaries, and this is likely the reason for the approximate four century span estimated at this site. This stands in sharp contrast to the span of activity of a half millennium to over two millennia at Nether Park, which is more likely the result of a high degree of multi-periodicity in the features. A comparison of the modelled radiocarbon dates from Nether Park and the probabilities for the start of activity at the other three sites (Figure 24) shows that all of the radiocarbon-dated samples recovered from the post-pits within the linear trenches clearly predate the activity at these other sites. However, the activity associated with the hearth (SUERC-84115: feature 6) is potentially contemporary with the start dates from these sites. This date has a 64% probability of being earlier that *start: Garthdee Road* and 52% probability of being earlier than *start: Crathes*. While it only has a 17% probability of being earlier than *start: Balbridie*, it has a 58% probability of being earlier than the earliest result from Balbridie (OxA-1769, not shown here).

Discussion

by H K Murray and J C Murray

The evidence of both the radiocarbon dates (Hamilton, above) and the lithics (Ballin, above) clearly indicate that Nether Park represents a series of unrelated short-term visits to the site from the Mesolithic to the Bronze Age.

The Mesolithic dates derive from the primary fill (29/1) of linear feature 29 (SUERC-84117, 7170–7044 cal BC) and the primary fill (17/2) of linear feature 17 (SUERC-84114, 6588–6454 cal BC). Superficially, this gives a Mesolithic date for the structures represented by these features. However, another sample from fill 17/2 in linear feature 17 yielded an early Neolithic date (SUERC-84108, 4599–4463 cal BC), as did a sample from the primary fill (18/2) of related post-pit 18 (SUERC-84110, 4531–4372 cal BC). Against the background of sporadic late Mesolithic activity indicated by the lithics, this suggests the accidental incorporation of residual Mesolithic material when the later post-pits were dug out and then backfilled. On balance, it appears more probable that the structures indicated by the linear features were of early Neolithic date. There is no unambiguous evidence that any of the structures, hearths or pits on site were of Mesolithic date, although burnt lithics of Mesolithic type suggest, unsurprisingly, that the Mesolithic activity included hearths.

The charcoal identified for the Mesolithic dates (Timpany, above) was willow and birch, both species that might be expected near to the river and both providing easily cut or snapped branch wood for fires, structures or for other needs such as hafting tools. The lithic evidence indicates knapping, possibly on two separate occasions during the late Mesolithic, in two areas of the site; on the old ground surface (context 16) at the edge of the gravel ridge, and to the SW near the small pit 22, and ephemeral features 24 and 25 which may be the remnants of a hearth (Figure 3).

The revisitation and re-use of sites along the Dee valley is well attested, by the analysis of the distribution of flint scatters, and by the small number of excavated sites. Kenney (1993, 209) argues that the vast majority of known flint scatters along Dee valley (in 1993) were within 100 m of the river basin, and she suggests seasonal movements up and down the valley, associated with the rich natural resources, especially salmon.

At Nethermills, a dense concentration of some 30,000 lithics has been interpreted as the result of repeat visits over several thousand years (Wickham-Jones 2017, 45). The scale of the activity at Nethermills is in contrast to the small assemblage (503 lithics) from Nether Park. However, both sites reflect activity along that part of the river that was near to the pit alignment at Warren Field, Crathes, the radiocarbon dating of which suggested two periods of pit digging in the in the first half of the eighth millennium cal BC (Marshall 2009, 76), with the pits remaining as a visible monument until at least the early Neolithic. If a symbolic function for the pits is accepted (Murray et al. 2009, 26-9), then the pattern of the sporadic use of landing places and temporary settlements of different intensity, such as Nether Park and Nethermills, or other sites indicated by the lithic scatters, may reflect periodic gatherings along this section of the

river, with different groups coming together to exploit the seasonal movements of salmon or deer and possibly acknowledging these by rituals associated with the pit alignment.

At some sites, such as the Mesolithic pit alignment at Warren Field, Crathes (Murray *et al.* 2009) and in the deliberate infilling of a small pit at Garthdee (Murray *et al.* 2014, 4-5) there is evidence that initial Mesolithic activity had left a visible mark on the landscape that was recognised as unnatural or unusual by the early Neolithic population and acknowledged in ways that may indicate superstition dictating either propitiation or appropriation of the earlier features.

On sites such as Nether Park, there is unlikely to have been visible evidence of earlier activity, other than the occasional finding (in prehistory) of scatters of earlier tools. In these cases, it may be the physical qualities of the immediate landscape, such as the sheltered hollow at Nether Park, or possibly easy mooring places at the riverside, that attracted repeated use (Plate 7).

A total of four dates from Nether Park are attributed to the early Neolithic, two from fills of the post-pits in the linear feature (17/18), one from a hearth (6) and one from the primary fill of a small pit (11), both on the gravel ridge directly north of the linear feature. However, while the dates from the linear feature appear contemporary, both the dated hearth and pit may relate to a separate, slightly later use of the site. Hamilton (above) suggests that the early Neolithic use of the site may have been intermittent over a period of several hundred years. This does not preclude one or more of the other possible hearths (14, 15 and 27) also being of Neolithic date, possibly contemporary to the linear features.

The lithics (Ballin above) indicate early Neolithic activity across the site, but with a concentration and evidence of knapping on old ground surface 16 and around the nearby pit/post-pit 36. The primary use of pit 11 may also have been early Neolithic.

The structural evidence of the linear features (17, 18 and 29), which appear likely to be of early Neolithic construction, is unconvincing as a building and is best interpreted as some form of windbreak, possibly supporting a temporary shelter of skins. The misalignment between 29 and 17/18 may suggest two separate structures of a similar nature. Some effort was involved in cutting, or gathering fallen timbers, of up to 200 mm in diameter and digging post-pits to erect the posts; this is suggestive of at least one use of the site that lasted, or was intended to last, for weeks or months, rather than a day or two.

If the linear features 17/18/29 are interpreted as a windbreak, or windbreaks, it is clearly fundamental to consider both wind direction and the type of woodland around the site.

Nether Park can be set in the context of more detailed environmental analyses from other sites in the lower Dee valley, such as Nethermills (Wickham-Jones *et al.* 2017, 33-35), Milltimber (Dingwall *et al.* 2019) and Warren Field (Murray *et al.* 2009).

Pollen analyses along lower Deeside show in the early Mesolithic a birch and hazel woodland extending along the sides of the Dee valley, forming fairly open woodland with a light canopy. From c. 7500 BC oak and elm colonisation formed amore shady woodland on terrestrial soils (Tipping 2019a, 32-7). At Nethermills, on the Camphill Terrace surface, oak and hazel were major components of floodplain woodland (Ewan 1981). The dated environmental evidence from Nether Park is limited but the identified samples include birch and hazel charcoal which could have been sourced from woodland of this type. The presence of willow charcoal suggests willow may have been a component of the woodland alongside the river, with alder also present. Oak charcoal was present in many contexts (Timpany, above and Tables 6 and 7).

The windbreak at Nether Park appears to be of early Neolithic date, possibly during an exploratory phase prior to the settlement and land clearance evidenced at the timber halls at Warren Field, Crathes (Murray and Murray 2009) and Balbridie (Ralston 1982). The site may be imagined as within open woodland, possibly in a small clearing formed by natural tree fall.

While current prevailing winds in North-East Scotland are from the SW, there is some evidence based on dendroclimatology that in Northern Scotland in the Neolithic there was a prevailing

Plate 7: Aerial view of the site and the quarry. (© Cabro Aviation Ltd)

wind direction from the NE/NW (Moir 2008, 146-148). If this was the case, then the hypothesised wind break would be sheltering the area to the south of 17/18/27, which is consistent with the main concentration of lithics (Ballin above); this area would also have had some limited shelter from the slightly higher gravel ridge to thenorth of the windbreak. However, the possible hearths, with the exception of the ephemeral 24/25, lie on the gravel north of the hypothesised windbreak, suggesting the spatial separation of different functions.

The analysis of the radiocarbon dates (Hamilton above) indicates that while the activity around hearth 6 may date to around the time of the building of the timber halls at Crathes Warren Field, and at Balbridie, the linear features at Nether Park are earlier. Nether Park may therefore be seen as representing an initial stage of people with early Neolithic cultural characteristics moving, possibly seasonally, up the Dee, prior to the greater degree of investment of large-scale community effort in the construction of the timber halls. The difference in the nature of the activity at Nether Park may also be the explanation for the lack of early Neolithic pottery, even though preservation might be expected to be as good as in the very similar soils at both Garthdee and at Warren Field, Crathes. This does not imply that the people who temporarily settled at Nether Park had no knowledge of pottery merely that it was not appropriate to use it or feasible to invest in making it on a site that was a merely temporary staging post on their movements along the river.

Nether Park, although a small site, adds another insight into the sporadic movements of prehistoric peoples along the Dee valley.

Acknowledgements

The authors are grateful to Leiths (Scotland) Ltd for funding the evaluation, excavation, and post-excavation work and for their help during the excavation. Many thanks are due to Moyra Simon for her hard work on site and to Alan Stewart of Cabro Aviation Ltd for the use of

drone photographs of the site. We are grateful to Caroline Wickham-Jones and Richard Tipping for their helpful advice and comments.

Bibliography

Ashmore, P J 1999 Radiocarbon dating: avoiding errors by avoiding mixed samples, *Antiquity* 73, 124-30.

Ballin, T B 2004a The lithic assemblage from Fordhouse Barrow, House of Dun, Angus. Unpublished specialist report.

Ballin, T B 2004b The Mesolithic Period in Southern Norway: Material Culture and Chronology, *in* Saville, A (ed.) *Mesolithic Scotland and its Neighbours. The Early Holocene Prehistory of Scotland, its British and Irish Context, and some Northern European Perspectives*. Edinburgh: Society of Antiquaries of Scotland, 413-38.

Ballin, T B 2006a *The lithic assemblage from Culduthel, Inverness, Highland*. Unpublished specialist report.

Ballin, T B 2006b Re-examination of the Early Neolithic pitchstone-bearing assemblage from Auchategan, Argyll, Scotland, *Lithics* 27, 12-32.

Ballin, T B 2008 *The lithic assemblage from Kingfisher Industrial Estate, Aberdeen.* Unpublished specialist report commissioned by Aberdeen City Archaeological Unit.

Ballin, T B 2011a The Levallois-like approach of Late Neolithic Britain: a discussion based on finds from the Stoneyhill Project, Aberdeenshire, *in* A. Saville, A (ed.) *Flint and Stone in the Neolithic Period.* Neolithic Studies Group Seminar Papers 11. Oxford: Oxbow Books, 37-61.

Ballin, T B 2011b *Overhowden and Airhouse, Scottish Borders. Characterization and interpretation of two spectacular lithic assemblages from sites near the Overhowden Henge*. British Archaeological Reports British Series 539. Oxford: Archaeopress.

Ballin, T B 2014a The lithic assemblage, *in* Murray, H K and Murray, J C Mesolithic and Early Neolithic activity along the Dee: excavations at Garthdee Road, Aberdeen, *Proceedings of the Society of Antiquaries of Scotland* 144, 20-35.

Ballin, T B 2014b Moray's lithics – impressions from local museums and excavations. Research from Elgin Museum, Moray. Available from: http://elginmuseum.org.uk/l/wp-content/uploads/2014/07/Morays-lithics2.docx Accessed 01/01/2021.

Ballin, T B 2017 Early Mesolithic, Late Mesolithic and other flint artefacts from Nethermills Farm, Banchory, Aberdeenshire. Online academic repository: Academia.edu. Available from: https://independent.academia.edu/TorbenBjarkeBallin Accessed 01/01/2021.

Ballin, T B forthcoming *The Grieve Collection. Flints from sites along the Dee, Aberdeenshire.* Unpublished specialist report.

Ballin, T B 2019 The lithic assemblages, *in* Dingwall, K *et al. The land was forever: 15000 years in north-east Scotland*. Oxbow Books: Oxford, 89-122, 212-220 and 293-304.Binford, L R 1983 *In Pursuit of the Past. Decoding the Archaeological Record*. London: Thames & Hudson.

Bronk Ramsey, C 1995 Radiocarbon calibration and analysis of stratigraphy: the OxCal program, *Radiocarbon* 37, 425-30.

Bronk Ramsey, C 1998 Probability and dating, *Radiocarbon* 40, 461-74.

Bronk Ramsey, C 2001 Development of the radiocarbon calibration program, *Radiocarbon* 43, 355-63.

Bronk Ramsey, C 2009 Bayesian analysis of radiocarbon dates, *Radiocarbon* 51, 337-60.

Buck, C E, Cavanagh, W G, Litton, C D 1996 *Bayesian approach to interpreting archaeological data*. John Wiley & Sons, Ltd: Chichester.

Butler, C 2005 *Prehistoric Flintwork*. Stroud: Tempus.

Cameron, A and Stones, J 2001 Aberdeen: an in depth view of the city's past. Edinburgh*: Society of Antiquaries of Scotland Monograph* 19.

Cappers, R T J, Bekker, R M, and Jans, J E A 2006 *Digital seed atlas of the Netherlands* Groningen: Barkhuis Publishing and Groningen University Library.

Clark, J G D 1932 The Date of the Plano-Convex Flint-Knife in England and Wales, *Antiquaries Journal* 12, 158-62.

Coles, J M 1971 The Early Settlement of Scotland: Excavations at Morton, Fife, *Procedings of the Prehistoric Society* 37, 284-366.

Dingwall, K, Ginnever, M, Tipping, R, van Wessel, J and Wilson, D 2019 *The land was forever:15000 years in north-east Scotland*. Oxbow Books: Oxford.

Dunbar, E, Cook, G T, Naysmith, P, Tripney, B G and Xu, S 2016 AMS 14C dating at the Scottish Universities Environmental Research Centre (SUERC) Radiocarbon Dating Laboratory, *Radiocarbon* 58(1), 9-23.

Ewan, L A 1981 *A Palynological Investigation of a Peat Deposit near Banchory: some Local and Regional Environmental Implications*. Aberdeen, Department of Geography: O'Dell Memorial Monograph No. 11.

Finlayson, B 1997 The plano-convex knife, *in* Mercer, R J and& Midgley, M S The Early Bronze Age cairn at Sketewan, Balnaguard, Perth & Kinross, *Proceedings of the Society of Antiuaries of Scoland* 127, 281-338.

Fraser, S M, Knecht, R, Milek, K, Noble, G, Ovenden, S, Warren, G, and Wickham-Jones, C R 2013 Upper Dee tributaries project, *Discovery and Excavation in Scotland* 14, 17-19.

Hamilton, D and Kenney, J, 2015 Multiple Bayesian modelling approaches to a suite of radiocarbon dates from ovens excavated at Ysgol yr Hendre, Caernarfon, North Wales, *Quaternary Geochronology* 25, 72-82.

Inizan, M-L, Roche, H and Tixier, J 1992 *Technology of Knapped Stone*. Meudon, France: CREP.

Jacobi, R M 1978 The Mesolithic of Sussex, *in* Drewett, P L *Archaeology in Sussex to AD 1500.* CBA Research Report 29. London: Council for British Archaeology, 15-22.

Kenney, J 1993 *The beginnings of agriculture in Britain*. Unpublished PhD thesis. University of Edinburgh. Available from: http://hdl.handle.net/1842/19895 Accessed 01/01/2021.

Kenward, H K, Hall, A R and Jones, A K G 1980 A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits, *Science and Archaeology* 22, 3-15.

Marguerie, D and Hunot, J Y 2007 Charcoal analysis and dendrochronology: data from archaeological sites in north-western France, *Journal of Archaeological Science* 34, 1417-33.

Marshall, P 2009 Radiocarbon dating, *in* Murray, H K, Murray, J C and Fraser, S M *A tale of the unknown unknowns: A Mesolithic pit alignment and a Neolithic timber hall at Warren Field, Crathes, Aberdeenshire.* Oxbow: Oxford, 72-80.

Martingell, H and Saville, A 1988 *The Illustration of Lithic Artefacts: A Guide to Drawing Stone Tools for Specialist Reports*. Lithic Studies Society Occasional Papers/AAI&S Technical Papers 3/9. Northampton: Association of Archaeological Illustrators & Surveyors/Lithic Studies Society.

Mercer, J 1968 Stone Tools from a Washing-Limit Deposit of the Highest Post-Glacial Transgression, Lealt Bay, Isle of Jura, *Proceedings of the Society of Antiquaries of Scotland* 100, 1-46.

Mercer, J 1970 Flint Tools from the Present Tidal Zone, Lussa Bay, Isle of Jura, Argyll, *Proceedings of the Society of Antiquaries of Scotland* 102, 1-30.

Mercer, J 1971 A Regression-time Stone-workers' Camp, 33 ft OD, Lussa River, Isle of Jura, *Proceedings of the Society of the Antiquaries of Scotland* 103, 1-32.

Mercer, J 1974 Glenbatrick Waterhole, a microlithic site on the Isle of Jura, *Proceedings of the Society of Antiquaries of Scotland* 105, 9-32.

Moir, A K 2008 The dendroclimatology of modern and neolithic scots pine (Pinus sylvestris l.) in the peatlands of northern Scotland. Brunel University Institute for the Environment PhD Theses. Available from: http://bura.brunel.ac.uk/handle/2438/6028 Accessed 01-01-2021.

Murray, H K, Murray, J C and Fraser, S M 2009 *A tale of the Unknown Unknowns: A Mesolithic pit alignment and a Neolithic timber hall at Warren Field, Crathes, Aberdeenshire*. Oxford: Oxbow Books.

Murray, H K, Murray, J C, Ballin, T, Cook, G, Cramp, L, Marshall, P, Sheridan, A, and Timpany, S 2014Mesolithic and Early Neolithic activity along the Dee: excavations at Garthdee Road, Aberdeen, *Proceedings of the Society of Antiquaries of Scot*land 114, 1-64.

Murray, H K and Murray, J C 2018 *Nether Park Quarry, Drumoak, Banchory, Aberdeenshire. Archaeological excavation carried out 20th August-6th September 2018 by Murray Archaeological Services Ltd*. Unpublished Interim Summary Report No: MAS 2018-16A. Ralston, I B M 1982 A timber hall at Balbridie farm: the Neolithic settlement of north east Scotland, *Aberdeen University Review* 49, 238-49.

Reimer, P J Bard, E, Bayliss, A, Beck, J W, Blackwell, P G, Bronk Ramsey, C, Buck, C E, Cheng, H, Edwards, R L, Friedrich, M, Grootes, P M, Guilderson, T P, Haflidason, H, Hajdas, I, Hatté, C, Heaton, T J, Hoffmann, D L, Hogg, A G, Hughen, K A, Kaiser, K F, Kromer, B, Manning, S W, Niu, M, Reimer, R W, Richards, D A, Scott, E M, Southon, J R, Staff, R A, Turney, C S M and van der Plicht, J 2013 IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP, *Radiocarbon* 55, 1869-87.

Saville, A 1995 GB 20 Den of Boddam near Peterhead, Grampian Region, Scotland, and GB 21 Skelmuir Hill, Grampian Region, Scotland. Prehistoric exploitation of flint from the Buchan Ridge Gravels, Grampian region, north-east Scotland, *Archaeologia Polona* 33, 353-68.

Saville, A 2008 The Beginning of the Later Mesolithic in Scotland, *in* Sulgostowska, Z and Tomaszewski, A J (eds.) *Man - Millennia - Environment. Studies in Honour of Romuald Schild*. Warsaw: Institute of Archaeology and Ethnology, Polish Academy of Sciences, 207-13.

Scott, E M 2003 The Third International Radiocarbon Intercomparison (TIRI) and the Fourth International Radiocarbon Intercomparison (FIRI) 1990-2002: results, analysis, and conclusions, *Radiocarbon* 45, 135-408.

Stapert, D 1992 *Rings and Sectors: Intrasite Spatial Analysis of Stone Age Sites*., Unpublished Ph.D thesis. Rijksuniversiteit, Groningen.

Stevenson, R B K 1948 'Lop-sided' Arrow-heads, *Proceedings of the Society of Antiquaries of Scotland* 80, 179-82.

Stuiver, M and Kra, R S 1986 Editorial comment, *Radiocarbon* 28, ii.

Stuiver, M and Polach, H A 1977 Reporting of 14C data, *Radiocarbon* 19, 355-63.

Stuiver, M and Reimer, P J 1986 A computer program for radiocarbon age calibration, *Radiocarbon* 28(2B), 1022-30.

Suddaby, I and Ballin, T B 2010 Late Neolithic and Late Bronze Age lithic assemblages associated with a cairn and other prehistoric features at Stoneyhill Farm, Longhaven, Peterhead, Aberdeenshire, 2002-03, *Scottish Archaeological Internet Reports* (SAIR) 45.Available from: http://www.sair.org.uk/sair45 Accessed 01/01/2021.

Tipping R 2019 The early Holocene river Dee and the Camphill Terrace *in* Dingwall, K *et al. The land was forever: 15000 years in north-east Scotland*. Oxbow Books: Oxford, 2.4.4.

Tipping R 2019A Mesolithic valley floor environments, plant communities and resources, *in* Dingwall, K *et al. The land was forever: 15000 years in north-east Scotland*. Oxbow Books: Oxford. 2.6.1.

Warren, G and Dolan, B 2009 Stone tools, *in* Murray, H K, Murray, J C and Fraser, S M *A tale of the Unknown Unknowns: A Mesolithic pit alignment and a Neolithic timber hall at Warren Field, Crathes, Aberdeenshire*. Oxford: Oxbow Books, 97-107.

Wickham-Jones, C R and Dalland, M 1998 A small Mesolithic site at Craighead Golf Course, Fife Ness, Fife, *Tayside and Fife Archaeological Journal* 4, 1-19.

Wickham-Jones, C R *et al*. 2017 Archaeological excavations at Nethermills Farm, Deeside, 1978-81, *Proceedings of the Society of Antiquaries of Scotland* 146, 7-55.

De Wilde, D and De Bie, M 2011 On the origin and significance of microburins: an experimental approach, *Antiquity* 85, 729-41.

Appendix 1: Details of contexts

Context	Sub-context	Detail	Interpretation	Figure/Plate Number
1		Ploughsoil excavated by machine to just above top natural, then hand cleaned. Average c.300 mm over gravels at west, <350-400 mm over sand to east		
2		Initially showed as irregular patch 1.03 x 0.93 m max. greyish back in sand.	May be no more than bioturbation and plough disturbance from the two deeper concentrations subsequently named 2A and 37	Figure 3
	2A	300 by 330 mm. <50 mm deep. With small core of more organic rich soil. Clear burrow in from edge	Possibly small feature/stake-hole but bioturbation has obscured it	
3		Possibly small feature but much disturbed		Figure 3, 5
	3/1	Slightly peaty dark soil. Diam 180 mm <50 mm deep. Burrow in from E. outer spread of staining 140 by 280 mm		
4		c. 900 by 700 mm Patchy spread slightly darker brown/black on edge of gravel	Burrow with topsoil in fill	Figure 3
5		Diameter in section 150 mm, 70 mm deep.	Possible stake-hole/cut pushed in among stones of gravel	Figure 3, 5
	5/1	Dark brown humic with charcoal.		
6		Deposit resting on gravel. Max 1.1 x 0.65 m with darker core of 6/1. 2 heat fractured stones at edges	Hearth	Figure 3, 5
	6/1	500 by 400 mm. Dark brown/black humic with charcoal fragments and staining.		
7		440 by 310 mm. <30 mm. No obvious cut	Possible remnant old ground level in slight hollow	Figure 3, 5
	7/1	Mid grey humic sand/silt		
8	8/1	Dark brown soil with charcoal and some iron staining at base. 100 mm diameter, 60 mm deep.	Possible stake-hole with plough disturbance	Figure 3, 5
	8/2	Bioturbation with grey silty topsoil mixed with lighter sand	Plough line 8/2 cut 8/3	
	8/3	Grey silty 330 by 400 mm, <70 mm deep	Possible backfill around 8/1	
9	9/1	Light grey silty 340 by 300 mm, <50 mm	9/1 appears to be original soil in hollow or in ploughed out feature but no obvious cut.	Figure 3, 5
	9/2	Dark brown humic rich. No evident charcoal. 100 mm diameter. 50 mm deep.	9/2 possible stake-hole	
10	10/1	Light grey silt dries sandy c. 850 by 200-300 mm irregular spread <50 mm deep	Interface of plough and original soil	Figure 3, 5
	10/2	Light grey silt overlying iron pan	? Remnant of original soil in hollow	
	10/3	Dark brown humic no charcoal poss cut into/inserted in 10/2 100 diameter, 50 mm deep	Possible stake-hole	
	10/4	Dark brown humic no charcoal. charcoal poss cut into/inserted in 10/2. 70 mm diam, 40 mm deep Burrow adjacent	Possible stake-hole	
11		1.38 m by 400-650 mm. <150 mm deep. Sections suggest shallow pit which has been open for a while and filled with blown sand and some humic material	Pit	Figure 3, 5. Plate 6
	11/1	Fine light grey silt dries sandy		
	11/2	Dark iron rich with some charcoal		
	11/3	Dark soil some humic content interleaved with patchy layers of sand (11/4)		
	11/4	Light grey/white sand		

Context	Sub-context	Detail	Interpretation	Figure/Plate Number
12		Stone drain across NW corner of site, extended to evaluation Tr 5	19th/early 20th century	Figure 3. Plate 2
13		Irregular spread of very fine light grey silt in shallow hollow in natural sand. 1.5-2 m by c. 7 m Depth 50 mm	Old ground surface	Figure 3
	13A	Lower spit of 13		
14		Carbon rich roughly oval spread but no visible charcoal pieces. Thin spread in slight hollow directly on gravel pebbles of ridge. Merges to 16. 800 by 380 mm Depth <50 mm, tapering to 10 mm at north half. No evidence in situ burning	Hearth	Figure 3, 5
	14/1	Carbon rich.		
15		Carbon rich irregular spread on gravel pebbles of ridge. Merges to 16. <1.4 m by 900 mm. with thickest area at centre c. 450 by 350 mm and <40 mm deep. No evidence in situ burning	Hearth	Figure 3
	15/1	Carbon rich some small frags charcoal		
16		Grey silt similar to but less fine than (13). Interface between base of topsoil and gravel and sand natural. Approx. 4 by 8 m irregular- not really visible as coherent layer but as little pockets of same material in around the gravel pebbles. Merges to 21.	Old ground surface	Figure 3
17		E/W linear incut feature with approx 9 individual post pits within it (including 18). C. 3.8 m long (including 18) and 300-700 mm wide. Cut into natural and visible as darker fill.	Linear feature with post-pits	Figure 3, 4. Plate 4,5
	17/1	Grey sandy		
	17/2	Dark brown humic sandy	Fill of post pits within 17	
	17/3	Mottled sand in section 1	Redeposited natural backfill?	
	17/4	Similar to 17/2 but not so dark and sandier. Probably = 17/3 In section 6.	Redeposited natural backfill?	
18		E end of feature 17	Linear feature with post-pits	Figure 3, 4
	18/1	Grey sandy	Base of ploughsoil sunk in over fills	
	18/2	V dark brown/black almost humic, some vertical worm holes with sand in. c. 680 mm diam, < 160 mm deep.	Post-pit	
	18/3	Redeposited greyish natural sand	Backfill around post?	
19		Re-numbered 38		
20			Post-pit. Relates to linear feature 17	Figure 3, 4
	20/1	Dark brown/black humic		
	20/2	Mottled redeposited sand but looser and slightly greyer than undisturbed natural. Worm holes had pulled some of darker 20/1 down into it		
	20/3	Grey/brown sand, possibly =20/2 less mottled but essentially similar		
	20/4	Brown slightly humic silt. Seems cut into 20/2 and 20/3 or they could be backfill either side	Post shadow/pit. Diameter 240 mm, c. 120 mm deep	
21		Grey silt very similar to (13). This probably originally extended into Evaluation trench 2. Spread c 2.5 m by 800 mm. Merges to 13 and 16.	Old ground surface	Figure 3
22		Pit. Cut through 21. c.720 by 700 mm, <190 mm deep. Hard iron pan on edge of 22/1		Figure 3, 5

Context	Sub-context	Detail	Interpretation	Figure/Plate Number
	22/1	Brown humic sand		
	22/2	Dark brown humic sand. No charcoal		
23		Hollow 400 by 370 mm, depth:70 mm. Fill of grey sandy silt with iron pan at edges		Figure 3
24		Ovoid 180 by 400 mm. Dark brown slightly humic sandy fill with rare charcoal	Possible hearth or spread from hearth	Figure 3, 5
25		Ovoid. <400 by 270 mm. Depth 40 mm. Fill grey brown silt with patch more humic black 180 by 200 at north end	Possible hearth or spread from hearth	Figure 3, 5
26		Kidney shaped hollow. 480 by 240 mm, <70 mm deep. Grey brown silty fill appearing slightly darker and more humic at surface		Figure 3, 5
27		Patch of dirty grey sand (27/2) c. 800 by 600 mm around darker core (27/1) 400 by 300 mm , 60 mm deep.		Figure 3, 5
	27/1	Black, almost peaty, no charcoal evident	Possibly cut into old soil or peaty accumulation in hollow	
	27/2	Grey dirty sand possibly remnant of original soil on the gravel with staining from 27/1		
28		Hollow rather than cut. 420 bt 620 mm. Depth < 80 mm		Figure 3
	28/1	Mid brown slightly humic sand, slightly lensed as if slow build up. Burrow at east side and top.		
29		Linear feature NE/SW 1.72 m long by 330-480 mm. West end butts against natural rock. Seems to have 3, possibly 4,separate pits within this line, with same fills. A: c. 400 mm diameter, <170 mm deep; B c. 300 mm diameter, <170 mm deep; C 400 mm diameter,< 200 mm deep (cut by box section); D 450 mm diameter, <200 mm deep. These were only clearly visible in section.	Linear feature with post-pits	Figure 3, 4
	29/1	Dark humic soil, possible charcoal frags		
	29/2	Mix of 29/1 and silt from pit sides, below 29/1		
	29/3	Dark humic in pit D similar to 29/1		
	29/4	Dirty grey sand	Poss base of subsoil sunk in over fills	
30		Slight burrow activity	Bioturbation	
31		Slight burrow activity	Bioturbation	
32, 33		Numbers not used		
34		Bowl shaped cut 320 by 350mm, <160 mm deep.	Possible post-pit	Figure 3, 5
	34/1	Redeposited yellow natural sand		
	34/2	Mixed mid brown sandy, slightly more humic		
	34/3	Dark brown sandy with humic mix		
35		Number not used		
36		Bowl shaped cut into natural 470 by 420 mm, 160 mm deep	Possible post-pit	Figure 3, 5
	36/1	Grey silt. Very similar to (13), in core 300 mm top diameter	? silting after post removed	
	36/2	Darker silty sand with lumps of iron pan along interface between 36/1 and 36/2 along west side	? backfill around post	

Context	Sub-context	Detail	Interpretation	Figure/Plate Number
37		240 by 360 mm oval. <60 mm deep		Figure 3, 5
	37/1	Dark brown organic rich soil max 220 by 70 mm. Iron pan on base where it rests on natural surrounded by 37/2	Possible stake-hole	
	37/2	Silt/sand		
38	= 19 E87numbered in error	Oval area of grey dirty sand (38/2) c. 250 by 600 mm cut by possible post-pit (38/1). Burrow at east end		Figure 3
	38/1	Black humic carbon rich c. 100 mm diameter, <80 mm deep, with shadow of post hole c. 200 mm diameter	Possible post-pit	
	38/2	Greyish sand, 20-30 mm deep		
39		Small bowl shaped cut feature 200 mm diameter, <80 mm deep	Post-pit, possibly related to linear features 17, 29	Figure 3, 5
	39/1	Black humic sand		

ArchaeologyReportsOnline ARO

Archaeology Reports Online
52 Elderpark Workspace
100 Elderpark Street
Glasgow
G51 3TR
Tel: 0141 445 8800
Fax: 0141 445 3222
email: editor@archaeologyreportsonline.com
www.archaeologyreportsonline.com