

**Bridging the gap:
new evidence for upland occupation in the Mesolithic of Scotland**

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This paper discusses the evidence for periodic human activity in the Cairngorm Mountains of Scotland from the late ninth millennium cal BC to the early fourth millennium cal BC. While contemporary paradigms for Mesolithic Europe acknowledge the significance of upland environments, the archaeological record for these areas is not yet as robust as that for the lowland zone. Results of excavation at Chest of Dee, along the headwaters of the River Dee, are set into a wider context with previously published excavations in the area. A variety of site types evidences a sophisticated relationship between people and a dynamic landscape through a period of changing climate. Archaeological benefits of the project include the ability to examine novel aspects of the archaeology leading to a more comprehensive understanding of Mesolithic lifeways. It also offers important lessons in site survival, archaeological investigation, and the management of the upland zone.

Keywords: Mesolithic; uplands; lithics; climate change.

Interpretations of the Mesolithic argue for the sophisticated use of a variety of landscapes, yet the exigencies of survival and recovery mean that research in north-west Europe has tended to focus on the coast and the lower reaches of river valleys. Activity in the uplands has been recorded, for example in the Alps (see Fontana *et al.* 2016 and other papers in special edition of Quaternary International 423, 2016) and Fennoscandia (Bang-Andersen 1987) and Bailey suggests that expansion to new environments such as upland areas should be seen as a ‘defining characteristic’ of the Mesolithic in many regions of Europe (2008, 357). However, our understanding of Mesolithic lifeways in Britain is still hampered by this evidential gap. While upland sites are reasonably common in some areas (Spikins 2002; Preston 2013), in Scotland, a country dominated in some regions by its highlands, such sites are still rarely documented, isolated and poorly contextualised (Atkinson 2016, Edwards 1996).

This scarcity of sites is perhaps unsurprising. In Scotland, upland areas are ‘amongst the most intransigent in terms of standard survey approaches’ for

identifying Mesolithic material (Saville and Wickham-Jones 2012, 58): peat cover is extensive, slope and soil erosion can be dramatic (Sugden 1971; Robertson-Rintoul 1986), and modern development and agriculture, with their opportunities for prospection, are rare. Yet because upland sites occur in areas where the impact of modern land use practices has been relatively modest, their potential integrity is high, offering detailed evidence and a significant contribution to the Scottish, and wider, Mesolithic.

We report on an interdisciplinary project in the eastern highlands of Scotland, the Upper Dee Tributaries Project (UDTP), where recently excavated evidence indicates long-term use of the Scottish uplands in the Mesolithic. New archaeological work in the Cairngorms has uncovered a range of sites occupying different locations across a wide upland landscape higher than 400 m above sea level (asl) and implying occupation from at least *c.* 8,200 cal BC – close to the earliest dated Holocene inhabitation of eastern Scotland. The focus of this paper is the site of Chest of Dee, a stretch of early Holocene river terrace near the headwaters of the River Dee, lying between deeply-cut waterfalls and a river confluence (Figures 1 and 2). Occupation spreads and features such as fire-pits suggest extensive, intensive and recurring activity in this upland landscape until the early fourth millennium BC, with limited evidence for continued use in later prehistory.

THE LANDSCAPE AND ENVIRONMENT OF THE CAIRNGORMS

The Cairngorm Mountains comprise the largest continuous block of high ground in Britain, with several summits rising to 1200 m asl above gently moulded, high-altitude granite plateaux. Glaciated, U-shaped valleys dissect the plateaux and open to broad, dynamic, gravel-rich alluvial valley floors (Brazier *et al.* 1996) providing high connectivity through the mountains, including along the east-flowing River Dee and its westerly extension, the Geldie Burn (Figures 1 and 2). Today almost treeless (Figure 3), with acid soil and blanket peat, pollen records within 5 km of the Chest of Dee describe dense Scots pine dominated forest displacing birch on valley floors after *c.* 7500 cal BC. This gave way to more varied and open pine-birch woodland – much of it growing on blanket peat – which may have been disturbed by people with fire during the Mesolithic (Paterson 2011, 264). While areas of heather and grass existed at higher altitudes, all the archaeological sites discussed here were below the natural tree line (Bennett 1996).

The climate is harsh, and has been more so in the past (McClatchey 1996), north-facing corries held ice during the ‘little ice age’ of the early modern period (Kirkbride *et al.* 2014). During the most intense climatic deterioration in the Holocene, centred on *c.* 6200 cal BC (Alley & Ágústadóttir 2005) the high Cairngorm may have supported comparable glacial conditions (Harrison *et al.* 2014).

THE UPPER DEE TRIBUTARIES PROJECT: METHODOLOGIES AND INITIAL FIELDWORK

Mesolithic occupation of the Cairngorm massif was unknown prior to 2003, when a programme of footpath repair revealed lithic scatters, some with Mesolithic characteristics, on the National Trust for Scotland’s Mar Lodge Estate, comprising around 29,400 ha of land within the central Cairngorms. At the Chest of Dee, lithic artefacts were revealed by both footpath reconstruction and natural erosion along a 300 m stretch of riverbank. Subsequent survey in advance of further footpath repair identified a tightly-focused lithic scatter in disturbed ground on the opposite bank of the Dee some 2.75 km upstream at Carn Fiaclach Beag (2006), while about 7.5 km to the west, in the upper reaches of Glen Geldie, a small number of lithics were located in a 4 m stretch of eroding footpath at Caochanan Ruadha (2005; Warren *et al.* 2018).

The UDTP was established by the National Trust for Scotland in 2012, in partnership with University College Dublin and the Universities of Aberdeen and Stirling, in the context of an extensive conservation programme of woodland expansion across the estate, including riparian planting. Given the lack of understanding of prehistoric inhabitation in these uplands, large-scale tree-planting has serious archaeological implications, particularly as it concentrates on precisely those landforms where prehistoric discoveries are emerging. The project aimed to investigate the nature, location and sequence of prehistoric inhabitation in its environmental context, and to address the complex conservation management issues relating to the archaeological resource.

In areas targeted for planting, geomorphological mapping defined stable, pre-Holocene surfaces and thus areas of the highest potential for *in situ* preservation of archaeological remains. Nevertheless, extensive Holocene peat cover, albeit thin, meant that prospection was demanding. Erosion is one of the few processes by which sites are brought to archaeological attention, caused mainly by the use and repair of

footpaths and by rivers and streams. However, these provide extremely limited windows of archaeological visibility across a vast landscape (Fraser *et al.* in press).

EXCAVATION AT CHEST OF DEE

The site at Chest of Dee lies at 415 m asl, just upstream of White Bridge where the Geldie Burn flows into the River Dee (Figure 1). The lithic material occurred along a footpath running next to the Dee, and was later identified to be eroding out of the riverbank materials. 'High-build' path reconstruction works involved cutting a strip of turves to either side of the proposed line of the path, then inverting them to create a raised routeway with drainage at the edges. This process brought the mineral soils lying directly beneath the peat onto the path surface; over subsequent years, the artefacts they contained gradually weathered out. Artefacts were collected over a number of visits by both amateur and professional archaeologists, producing an assemblage of 184 artefacts, mainly narrow blade technology, with a smaller assemblage of possible Neolithic-Bronze Age material (Ballin 2004; Clarke 2007).

Geomorphology and Landscape

The River Dee flows across bedrock to the Chest of Dee cataracts, created by an igneous dyke. To the south it is bordered by a well-drained Late Devensian alluvial fan seen in the mid-distance in Figure 2. At this point, it enters a deeply incised rock-cut gorge and falls some 6 m over roughly 175 m distance (Figures 1, 3). The gorge itself, formed in the Younger Dryas when the waterfall and surrounding valley floor were active as part of a wider meltwater channel, seems not to have seen a continuous history of water flow throughout the Holocene. At the head of the waterfalls, where the river swings north to enter the gorge, an earlier bedrock-lined channel, *c.* 50 m to the south, has been abandoned. This relict channel is likely to mark the main course of the river once fluvial discharge dropped at the end of the Younger Dryas. It is now filled with peat (Figure 4), the basal deposit of which has been ¹⁴C dated to 6610-6460 cal BC (SUERC-64468, 7697 ± 37 BP) (Table 1). The active channel probably switched back to the gorge through avulsion around this time. The resultant change in river dynamics served to reactivate the the waterfall and its downstream pools and protected the ephemeral archaeological deposits downstream of the cataracts as the focus of the river's energy was steered away from a direct impact on Area J (Figure 5).

East of the waterfalls, the river has cut through Late Devensian and across Holocene fluvial deposits (Figure 4). The highest and oldest of these surfaces is a large, deeply channelled spread of enormous boulders, probably deposited by a Younger Dryas-age glacial flood or jökulhlaup, which would have filled the valley. It is now preserved on the north bank, for 2 km eastwards from the Chest of Dee. A lower terrace (Figure 4: Early Holocene river terrace) incised *c.* 2.5 m lower than the surface of the jökulhlaup deposit, is visible in the meander scar left by an earlier channel where it eroded the jökulhlaup deposit. It is underlain by coarse glaciofluvial gravel. Initial aggradation of this terrace is not dated directly at White Bridge but a comparably early fluvial terrace fill has been dated in the Geldie Burn, west of White Bridge, to before 8230-7930 cal BC (SUERC-64476, 8870±37 BP). The fill of the Chest of Dee terrace is a remarkably fine-grained silt (Figure 7) which contrasts with the gravel-rich fluvial deposits formed here in the later Holocene. The origins of this silt remain uncertain. It is described here as a river terrace (Figure 4), and it could reflect deposition by the River Dee in a well-wooded, geomorphologically quiescent period; nevertheless, it could also represent a lacustrine deposit ponded behind the jökulhlaup deposit. The majority of the archaeological material occurs on this terrace where the archaeological deposits are interleaved with sandy flood sediments apparently representing episodic inundation (Figures 6 - 8). Above the silt lies a thin layer of peat, developed once the fluvial processes across the terrace surface became less active.

Fieldwork

Test-pitting in October 2013 confirmed that the lithics came from *in situ* deposits, stratified within the pre-peat alluvial silt deposits that comprised the river terrace, and that there were stratified features, in some cases associated with these artefacts. Subsequent work in 2014–16 revealed a site of considerable complexity. The majority of test excavations in the evaluative stages were 0.5-2 m², but larger trenches were also excavated across the focus of the densest lithic concentrations in one area (Area F). The excavation strategy in this large-scale landscape focused on identifying the presence/absence of lithics and stratified features. This enabled the evaluation of relative artefact densities and facilitated the placement of larger trenches. In addition, targeted test pits were dug to provide characterisation of the soil/sediment

stratigraphy. In this way, the utilisation of particular parts of the landscape could be mapped, and stratified material obtained for radiocarbon dating of the human activity.

EXCAVATION RESULTS

The site was divided into evaluation areas (Figure 5). Each area produced different lithic densities, and in addition many of the test pits revealed evidence of human activity in the form of spreads or lenses of charcoal and/or the presence of pits and occupation surfaces. Small quantities of birch and willow charcoal provided the earliest dates, while the majority of the charcoal from the features was of Scots pine type, consistent with the evidence for changing local woodland over the period (Paterson 2011).

Areas B, C, D, J and M

Some areas were relatively devoid of features or other indications of human activity. In Area B, for example, shallow peat deposits lay over undisturbed podzolized and alluvial soils. Further away from the river, Area C had a thin cover of peat and few features or finds: a single microlith, an isosceles triangle, was found in one of the test pits, just below the peat.

The 19 test pits in Area D contained larger concentrations of features and finds, including charcoal lenses within the pre-peat silts in some of them. Though there were few lithic artefacts in the test pits at the eastern end of this area (Table 2), artefact numbers increased towards the west. TP111 (expanded into TP3000, and henceforth referred to as TP3000) contained an assemblage of 72 lithics, including two flints, one a broad triangular microlith, within the charcoal-rich lower fill of a pit, c. 0.4 m diameter and 0.35 m deep (Figures 5, 6 and 20). Samples from this fill produced date ranges of 3960–3780 cal BC (SUERC-28264, 5074±28 BP; SUERC-50743, 5047±26 BP; and SUERC-50744, 5074±27 BP), placing this activity around the Mesolithic-Neolithic transition.

Area M yielded slightly higher densities of lithics (up to 20 lithics in test pits of 1x1 or 2x2 m). In test pit 1150 this included a blade core from an occupation layer dated to 5520–5370 cal BC (SUERC-74121, 6492±28 BP). In TP1200, lithics were stratified in layers towards the base of the test pit (Figure 6). A *terminus ante quem* of 5520–5370 cal BC (SUERC-74122, 6492±28 BP) was provided by charcoal from a small pit dug into the alluvium above these layers.

Test-pitting in other stretches in this area of the site did not produce lithic finds, but a number of test pits did yield evidence of human activity. In Area J, for example, pre-peat charcoal lenses and shallow pits occurred in four test pits. Charcoal from a shallow pit in TP950 cut into the alluvial silts produced a date of 7050–6700 cal BC (SUERC-65016, 7961±35 BP) (Figure 6; Table 1). A lens of charcoal within TP1000 provided a similar date: 7040–6870 cal BC (SUERC-65017, 7941±35 BP) (Figure 6).

Areas A and L

On the south side of the river, deeper deposits of peat up to 0.4 m deep were found in Area A, overlying large granitic boulders from the glacial outwash of the Devensian fan. Artefacts and other evidence of human activity were scarce in this area, only found in two of the four test pits excavated in Area L. A spread of charcoal around 0.5–0.6 m in diameter and 0.04–0.05 m deep was recorded in TP5200, and a small pit, cut into the alluvial silts, was evident in the section of TP5250 (Figure 6). Two small flint flakes were found at the same level as this pit, charcoal from which was dated to 7590–7520 and 7710–7560 cal BC (SUERC-74125, 8497±31 BP; SUERC-75306, 8598±34 BP) (Table 1).

Area F

The densest concentrations of lithics and features lay in Area F, just east of the gorge. Initial survey in 2013 identified some 50 artefacts on the current riverbank, in an area of active erosion. These included blade cores, flakes and blades, together with possible occupation horizons evident in the eroding section (Figures 7 and 8). Nine test pits and four larger trenches were excavated here, all with similar stratigraphy: around 0.3–0.4 m of peat development overlying podzolized and alluvial silt deposits up to c. 1 m in depth. Later consolidation of the surface is represented by the podzols, sealed in turn by later peat development. As in other areas, the lithic artefacts occurred in the pre-peat deposits, within layers sealed by alluvial sediments or cut into the alluvial deposits from near the top of the pre-peat sequence. Pre-peat charcoal lenses and occupation spreads were found in nearly all of the excavation trenches in this area.

The two largest trenches in Area F (TP200 and TP300) contained the highest concentrations of lithics. A total of 662 pieces was recorded, including a high number

of blade cores. TP200 was placed over a number of cut features evident in the eroding river section (Figures 8 and 9). A number of charcoal lenses lay within the alluvial silts. They were shallow – rarely more than 0.02-0.03 m deep – and are interpreted as representative of a series of *in situ* occupation events on the alluvial terrace, occurring in the late sixth millennium BC (SUERC-50741, 6169±29 BP; SUERC-50742, 6249±28 BP) (Table 1). Lower in the profile, further charcoal spreads (e.g. 202, 207, 208, 212 and 213; Figures 9 and 10) produced significant lithic assemblages, including working debris from *in situ* blade production, using rhyolite and some flint (Figure 9). These contexts produced several radiocarbon dates, in a range extending from the very end of the eighth through to the first half of the seventh millennium BC (SUERC 65005–65007 and SUERC 65011–65012) (Table 1).

At the river's edge were two eroded pits (Figure 8). Dates from pit 213 were comparable to those from the earlier occupation horizons within TP200: 7030–6680 and 7050–6770 cal BC (SUERC-58526, 7930±28 BP; SUERC-58527, 7990±28 BP) (Table 1). A lower, charcoal-rich fill from the second pit, 024, produced dates in the late sixth millennium BC (5300–5060 cal BC: SUERC-58525, 6216±28 BP; 5310–5070 cal BC: SUERC-58524, 6236±29 BP).

TP300 was placed to investigate an area where an occupation surface was evident in the eroding river bank around 6 m east of TP200, towards the top of the alluvial deposits (Figures 11 and 12). Few artefacts or features were found in the trench until excavation neared the level of the occupation surface evident in section. Charcoal from this occupation surface produced a date of 8290–7990 cal BC (SUERC-58528, 8977±29 BP) (Figure 11; Table 1). At this depth lithics were found in the northern half of the trench, their distribution at the other side of the trench from the charcoal spread. Four small cut features associated with this surface were recorded, but none contained significant quantities of lithics or datable material (Figure 12).

TP400 was placed 2.6 m from TP300, parallel to the river bank and adjacent to another charcoal horizon, 2 m in length and up to 0.08 m thick, situated near the top of the alluvial sand deposits in the eroding section (Figures 12 and 13). The charcoal layer sealed an *in situ* fire-pit (421) and two other unexcavated charcoal-rich features (410 and 419) (Figure 12 and 13). The fire-pit measured c. 0.9 m across by 0.5 m transversely and 0.12 m deep (Figure 13). It contained a dense but shallow layer of fire-cracked river cobbles (412), within a matrix of charcoal-rich soil. Below

the stones was a layer of re-deposited, orangey-brown sand (413) which in turn sealed a dense layer of charcoal (420), suggesting that the fire-pit had been re-used. All three layers contained significant quantities of Scots pine charcoal which produced date ranges in the late eighth to earlier seventh millennium BC (SUERC-65013, 7945±35 BP; SUERC-65014, 7879±35 BP; SUERC-65015, 7974±35 BP) (Table 1).

TP102, a 1 x 1 m test pit dug to the west of TP200, showed at least three occupation horizons within c. 0.4 m of alluvial sand (Figure 6). The test pit was not bottomed, but lithics were identified in the lowest identified layer (007), which was formed prior to 6070–5920 cal BC (SUERC-59012, 7134±29 BP) (Table 1). Two further layers containing artefacts (002 and 003) lay above the lens of charcoal (005) which produced this date. Further west again, TP103 contained two blade cores, both in association with layers within the lower alluvial sands (Figure 6). Sealed below a layer of hard iron pan, charcoal from the lower lithic-bearing layer (003) was dated to 6210–6020 cal BC (SUERC-58520, 7225±28 BP) (Table 1).

In Area G, overlooking the waterfalls, a large, re-cut pit was evident in an eroding section of sloping ground above the footpath. Excavation indicated that the fill comprised charcoal-rich soil with large stones. The lower fill was dated to 2880–2630 cal BC and the upper 1660–1510 cal BC (SUERC 50746, 4155±29 BP; SUERC-50745, 3309±29 BP) (Table 1). While not Mesolithic in date, the pit demonstrates activity into later prehistory in this striking landscape.

Lithics

A total of 1405 flaked lithics was recovered from the investigations at Chest of Dee. A range of raw materials was flaked including flint (57%), rhyolite (41%) and a small proportion (2%) of other materials comprising quartz, quartz crystal, quartzite and sedimentary rock (Table 2). The rhyolite (Figure 14), is of particular interest, as it has not previously been recognised in Mesolithic assemblages in Scotland. Identified as porphyritic flow banded rhyolite, the evidence from the flaked lithics suggests that it was sourced locally. Rhyolite-bearing intrusive dykes are common in the Cairngorms and the lack of any cortex or eroded surfaces, together with the size of the cores, indicates that this material was sourced from an outcrop. The nearest recorded rhyolite to the Chest of Dee lies in the valley of Allt an t-Sionnaich, which joins the Geldie Burn c 1 km upstream of its junction with the Dee, and is mapped as having two intrusive dykes of ‘microgranitic rocks’ of Siluro-Devonian age intruded into

psammites of the Grampian Group (Sheet 64E Ben Macdui 1:50000 Scale Geology Series). Preliminary fieldwork could not identify this mapped source, though the current peat cover over the whole area makes identification of such outcrops difficult.

Flint was derived from pebble flints, the potential sources of which have not yet been investigated. Although there are well-known deposits of gravel flint along the Buchan Ridge and also the Aberdeenshire coast to the east, the potential of the west coast of Scotland as a source for at least some of the flint at Chest of Dee should be considered. At the heart of the Cairngorm massif, Chest of Dee is well-placed for access from both west and east coasts as well as the Moray Firth.

The presence of cores, core trimming flakes and debitage of rhyolite and flint indicates that both materials were knapped on site (Figure 15). Although the assemblage contains both flakes and blades (Table 3), the majority of cores were blade cores, made on both materials with flat platforms prepared to aid the production of blades (Figure 16). There is considerable variation in blade width (3-26 mm) with broader blades tending to be made of rhyolite (Figures 17 and 18). A small number of retouched pieces were identified, 42 in total, mainly on flint blanks (n=39). Microliths of various forms, scrapers, awls and knife-forms were the most common tools with notched, serrated and edge retouched pieces also present (Table 4).

The largest number of lithics (n=587) came from TP200 in Area F (Table 2), this was the only location in which rhyolite was present in quantity and significantly outnumbered flint (80% of the assemblage, Table 2). The large number of rhyolite cores (n=15; Figure 19) and associated blades, flakes, and small flakes attest to the knapping of rhyolite here. This is supported by the presence of two refitting flakes from the charcoal spread 212 which indicate that working took place close by, if not *in situ*. This rhyolite working focussed on the production of unretouched blades (Figure 18). There was little evidence of the selection of rhyolite blanks for further modification apart from one blade that had been used as a blank for an edge-retouched tool.

TP3000 produced another interesting lithic assemblage comprising 68 pieces of flint and four of rhyolite (Table 2). Flakes dominated over blades and there were only two retouched pieces, an awl and a microlith. An interesting feature of this assemblage was the broad triangular microlith contained within a later pit (Figure 20). Broad blade microliths such as this are commonly understood to represent some of the earliest Mesolithic industries in England, perhaps falling out of use by the early eighth

millennium BC (Jacobi 1976; Saville 2004; Conneller *et al.* 2016), but they are not, to date, frequent finds in Scotland and where they do occur their chronological context is often uncertain. Although the archaeology at Chest of Dee does include dates indicative of activity at this early period, none of the three broad blade triangular microliths from the site is associated with the early deposits. This piece, from TP3000 is associated with a context dated to the Mesolithic-Neolithic transition, one comes from surface collection along the footpath, and one from the pre-peat ground surface in C4.

Dating

Multiple radiocarbon dates from Chest of Dee (Table 1) allow analysis and some Bayesian modelling of the determinations to be undertaken. The earliest dated feature is the occupation surface associated with lithics in TP300. The date of 8290–7990 cal BC (SUERC-58528) from charcoal in an occupation surface is amongst the earliest dates from a Mesolithic site in eastern Scotland. In TP5250, on the opposite side of the river, two results (SUERC-74125 and -75306) on charcoal recovered from a spread near a small pit and in association with two small flint flakes provide a slightly later date of 7590–7520 cal BC for activity (95% probability; Figure 21; *last: TP5250*).

These dates foreshadow the floruit of activity that occurred around the Chest of Dee in the first half of the 7th millennium cal BC that was picked up in TP200 and in Area J. The seven dates from TP200 (SUERC-58526, -65005–7, -65011–2, and -78527), the three from the fire-pit in TP400 (SUERC-65013–5), and two dates from TP950 and TP1000 (SUERC-65016–7) suggest broadly contemporary activity along a short stretch of the north bank of the river. These twelve dates are not statistically consistent ($T'=52.4$; $\nu=11$; $T'(5\%)=19.7$; Ward and Wilson 1978), suggesting some longevity to the deposition of dated material, however after removing SUERC-65007 as a potential outlier the remaining results are statistically consistent ($T'=12.2$; $\nu=10$; $T'(5\%)=18.3$) and could all be the same actual age.

A chronological model was constructed with all of these dates in the computer program OxCal v.4.3 (Bronk Ramsey 2009) and following the structure of the simple bounded phase model presented in Hamilton and Kenny (2015). The model has good agreement ($A_{\text{model}}=92$) and estimated this floruit of activity began in 7115–6810 cal BC (95% probability; Figure 22; *start: 7th millennium Chest of Dee*), and probably in

7050–6885 cal BC (68% probability). This period of dated activity ended in 6645–6440 cal BC (95% probability; Figure 22; *end: 7th millennium Chest of Dee*), and probably in 6630–6525 cal BC (68% probability). An alternative model was constructed by excluding SUERC-65007 as an outlier. The alternative model also has good agreement ($A_{\text{model}}=84$) and estimates this phase of activity on the Dee began in 7060–6765 cal BC (95% probability; Figure 23; *start: 7th millennium Chest of Dee (alt)*), and probably in 6925–6780 cal BC (68% probability). This period of dated activity ended in either 6895–6880 cal BC (1% probability; Figure 23; *end: 7th millennium Chest of Dee (alt)*) or 6825–6615 cal BC (94% probability), and probably in 6795–6685 cal BC (68% probability).

Occupation along this stretch of the bank in the late seventh to early sixth millennium cal BC is represented by the results from TP103 (6210–6020 cal BC; 95% probability; Figure 21; SUERC-58520) and TP102 (6070–5920 cal BC; 95% probability; Figure 23; SUERC-59012) and sixth millennium cal BC activity by results from TP1200 (5515–5375 cal BC; 95% probability; Figure 21; SUERC-74122), the upper horizons of TP200 (5220–5030 cal BC; 95% probability; Figure 21; *last: TP200 Upper horizons*) and TP1150 (5210–5000 cal BC; 95% probability; Figure 21; SUERC-74121).

Early fourth millennium cal BC activity is represented by the pit in TP3000. Three radiocarbon determinations are available from the fill of this pit (SUERC-28264 and -50743/4), and the latest probability provides the best estimate for its infilling in 3915–3770 cal BC (95% probability; Figure 21; *last: Area D TP111*), and probably in 3865–3790 cal BC (68% probability). Finally, later prehistoric activity (third and second millennium BC) was identified focusing on the waterfalls at the Chest of Dee, but also much further east, in Area D (first millennium BC), disturbing features of the late fourth millennium BC (these later dates are listed in Table 1, but not considered further here).

DISCUSSION

Mesolithic Interpretations: Archaeological Evidence

The archaeology at the Chest of Dee suggests repeated visits to the Dee riverbank during the Mesolithic for a period of over five millennia, starting in the late ninth millennium BC. Work to date has identified a particular concentration of activity in the early seventh millennium cal BC (6795–6685 cal BC, 68% probability) based on

model 2; Figure 23). Lithic-bearing features end with a phase of activity in the late fourth millennium cal BC, in the period 3865–3790 cal BC (68% probability). This was a dynamic landscape. The Dee catchment generates major floods today (Maizels 1985; McEwen 2000) and would have done so in prehistory. The gorge and waterfall were inactive during much of the settlement history. Those who lived here prior to the mid seventh millennium (6605–6460 cal BC, 95% probability; SUERC-64468; Table 1; *base of peat in palaeochannel*) experienced a landscape in which the main course of the river bypassed the waterfall. Only in the late seventh millennium cal BC did a shift of the river back into the gorge occur, probably as a result of avulsion. The terrace formation at the water's edge facilitated the creation of living space by Mesolithic communities through the Holocene, but it was not without inundation. For those who understood the world around them, the advantages of riverine and other resources outweighed the risks of episodic flooding.

The focus of human activity appears to have lain on this terrace, directly west of the Dee and Geldie confluence. At this location people were able to take advantage of the many resources offered by the river, in an area of open woodland that lay well below the tree line (Pears 1968). Above the gorge, walkover survey of the footpath and riverbanks for a distance of roughly 2 km has so far failed to identify any traces of occupation upstream, though without major erosion or test pitting below the peat the presence/absence of archaeology here remains uncertain.

At the Chest of Dee, most of the archaeological evidence lies along the north bank of the river, in the form of charcoal lenses and small pits with charcoal flecking which were found in the majority of the test pits. The relative lack of similar material from the south bank of the river may perhaps be explained by the different conditions engendered by the absence of a comparable river-side terrace. While the lack of survival of organic material limits interpretation, the evidence suggests that Mesolithic activity included sourcing lithic materials from the Cairngorm uplands and further afield and working them to prepare blades and other tools at or near the river's edge, together with the lighting of fires for cooking and/or heat. From ethnographic and archaeological parallels, the fire-pit in TP400 may have been a cooking pit (Waselkov 1987: 100–105), though other interpretations are possible (Mithen 2019).

In TP200, the tight distribution of artefacts coinciding with charcoal-rich spreads and a pit feature, all within an area of 2 m across, deserves comment. Dating and Bayesian modelling suggest these features and lithics were closely related

chronologically and deposited around the same time as the activity evidenced in TP400 and in Area J, all in the period 7050–6885 cal BC (68% probability) according to one model and 6795–6685 cal BC (68% probability) according to a second (occupation spreads and fire pit; Table 1; Figures 22 and 23). The focus of lithic material in one area in TP200 is particularly intriguing and could be interpreted as marking the position of some sort of structure – perhaps a tent or light shelter (Figure 9). If this is the case, the surviving evidence suggests that it was small, about the size of that at Caochanan Ruadha (Warren *et al.* 2018), though some material may have been lost to riverbank erosion.

Further work is necessary to establish the limits of the artefact and occupation spreads beyond the boundaries of the modest trenches and to fully characterise the site; to our knowledge few other Mesolithic sites in Britain or Ireland include stratified Mesolithic land surfaces where contemporary activity can be mapped across an extensive area. Later activity appears to have been more intermittent, but the extended radiocarbon chronology provides a strong indication that use of the Cairngorm uplands was not an occasional, random occurrence, but rather was fully integrated into Mesolithic lifeways from the earliest period of post-glacial recolonisation.

Mesolithic Interpretations: Inhabitation of the Upper Dee Catchment

Despite the geographic limitations of a small research project, it seems that early prehistoric inhabitation of the Cairngorms involved a complex range of activities, spread over a considerable geographical area, a system into which the site at Chest of Dee neatly fits. Upriver of Chest of Dee, at the Dee headwaters, small lithic scatters have been recovered at Sgòr an Eòin and Carn Fiaclach Beag – both chronologically undiagnostic (Fraser *et al.* in press). Further into the Cairngorms, some 8 km to the west, lies Caochanan Ruadha. Like Chest of Dee, this site provides good stratigraphic detail and well-contextualised lithics, including microliths. Situated in an upland valley overlooking the Geldie Burn (*c.* 540 m asl), today it is remote and difficult to access. Excavations in 2013–15 uncovered a low-density scatter of worked flint covering an area of around 50 x 25 m, with outlying artefacts up to 380 m upstream (Warren *et al.* 2018). One concentration comprised around 100 lithics in a tight cluster within an area roughly 3 x 2.2 m, centred on a pit or hearth (Warren *et al.* 2018: Figures 7 and 8). On the basis of lithic distribution this has been interpreted as a

light shelter. Use-wear analysis, together with the general lithic technology, suggests that activities focussed on the manufacture and maintenance of microlithic artefacts with the aim of obtaining and processing animal carcasses and plant materials. Dates show occupation of the shelter in the period 6220–6060 cal BC (95% probability), probably contemporary with one phase of activity at Chest of Dee, e.g. TP103 (6210–6020 cal BC; 95% probability; SUERC-58520). Further activity at Caochanan Ruadha, after some decades and possibly well over a century (8 – 165 years, 95% probability), is represented by a further small concentration of artefacts and associated charcoal spreads *c.* 50 m down-slope of this structure, once again broadly contemporary (at 6080–6000 cal BC, 95% probability), with activity at Chest of Dee (e.g. TP102; 6070–5920 cal BC; 95% probability; SUERC-59012). Other isolated finds of worked lithics have been made in the immediate surroundings.

Inter-site comparison is tentative at present. While activity at Chest of Dee and Caochanan Ruadha may have overlapped in time, the sites are very different. There are notable differences between the lithic assemblages: in sharp contrast to the Chest of Dee assemblage, the artefacts from Caochanan Ruadha are dominated by retouched pieces – narrow blade microliths, especially microlith fragments, microburins and snapped or fragmentary blades. Only flint was used and cores were absent, again in contrast to Chest of Dee. These two sites fill contrasting archaeological footprints. The extensive series of pits and charcoal spreads at Chest of Dee differs from the smaller site at Caochanan Ruadha, and Chest of Dee yielded a much greater number and density of lithics. Overall, the evidence suggests that while the Dee/Geldie confluence attracted intensive occupation, with repeated episodes of activity, Caochanan Ruadha, deeper into Glen Geldie, may only have been visited occasionally, perhaps for a night or two at a time (Warren *et al.* 2018, 944).

It seems that Chest of Dee comprised the location for repeated occupation, from which a range of more specialised activities elsewhere might be facilitated. Caochanan Ruadha, where the radiocarbon determinations suggest that inhabitation was possibly at times contemporary with phases of occupation at Chest of Dee, represents an example of precisely that sort of specialised site. The contrasting geographical locales make sense in this context: while Caochanan Ruadha overlooked a shallow upland glen containing peaty wetland and slow-flowing streams, occupation at Chest of Dee targeted the point in the landscape where the River Dee broadens as it moves from the higher uplands, entering a wide valley before dropping towards the

lowlands. Human activity here took place on easy to dig and well-drained alluvial silts backed by a distinctive gorge. Access to a variety of nearby resources was facilitated. Pertinently, the densest archaeological evidence lies next to what is currently a series of shallow pools downriver from the waterfalls. Although we lack data regarding the precise details of the changing configuration of the river at this point throughout the history of the site, it is worth noting that the Dee today supports an active salmon population and until recent times freshwater mussels were also common.

Mesolithic Interpretations: An Encultured Landscape

While it is true that the sites identified to date suggest Mesolithic access to wider landscapes and resources, the evidence garnered so far suggests that this upland landscape was not simply a network of routeways along which hunting and gathering groups passed on their way to somewhere more favourable. This landscape was more than a backdrop to human activity. It was a landscape in which people spent time, developing a web of integrated cultural behaviour, interconnecting along interlinked watercourses, and possibly over summit routeways. Though often portrayed as remote and difficult today, upland landscapes such as this seem to have been highly attractive to Mesolithic communities.

In this regard, it is notable that while Caochanan Ruadha is interpreted as providing evidence for human occupation around *c.* 6200 cal BC, coinciding, at least partially, with the severe, short-lived climatic deterioration termed the ‘8.2 Ka Event’ (Warren *et al.* 2018), the dates from Chest of Dee are less certain. At this stage the calibrated age-ranges are not fine enough to verify activity during the ‘8.2 Ka Event’ and an absence of occupation during the period could equally be argued. This was a time which saw an abrupt drop in temperature of 2–3° C, the formation of permanent snowfields and possibly the re-formation of small valley glaciers in the Cairngorms (Harrison *et al.* 2014). This environmental impact included the initiation of blanket peat growth and major impacts on woodland dynamics (Binney 1997; Dubois and Ferguson 1985; cf. Tipping *et al.* 2008). The human impact in the uplands of northern Britain has still to be fully investigated. Though population models have suggested the collapse of coastal communities at this time (Wicks and Mithen 2014;

Waddington and Wicks 2017), the interpretations remain controversial (Tipping in Dingwall *et al.* 2019, 319) and there is little data relating to the uplands.

Whether or not activity continued into the cold event, and no matter how the different sites related to one another, the presence of human groups in this upland landscape in the seventh millennium BC is a reminder of the inherent lifeskills and resilience of the Mesolithic community. This landscape was more than a larder for those who lived there. The survival of any group depended upon an intimate and long term relationship with the land. In this sense, and whether or not settlement was frequently recurrent, this landscape had become encultured.

Archaeological Benefits

Expansion of our recognition of the Mesolithic record into the uplands offers clear archaeological benefits including a more comprehensive understanding of Mesolithic lifeways. In addition, the unique conditions of upland landscapes, where geomorphological processes differ from those of the lowlands and present landuse provides a different suite of circumstances, mean that novel aspects of the archaeology may be encountered. These can highlight elements that may be rare or poorly understood elsewhere and their investigation plays a significant role in broadening our interpretations of the archaeology. One immediate factor is the ephemeral nature of many sites, possibly representing aspects of Mesolithic lifeways that survive infrequently elsewhere. This contrasts with the record of Mesolithic inhabitation in lowland contexts, where later land uses frequently impact on site preservation. Although the archaeological material is harder to locate in the uplands, the interpretive potential of these locations is undoubtedly significant.

Archaeological Benefits: The contribution of the lithics

The project also impacts on wider scholarship through the contribution of its lithic artefacts in two particular fields: raw materials and typology. Although the use of a wide variety of local raw materials has long been recognised in lithic studies in Scotland (Wickham-Jones 1986), the contribution of rhyolite to the lithic repertoire is new. The recognition of the knapping properties of this material, and its possible procurement from (albeit as yet unrecognised) local outcrops is a first for Mesolithic archaeology in Scotland. Extraction from outcrops in the Mesolithic has been recorded further south in the UK, for example at Maryport in Cumbria where

Langdale tuff was collected from inland outcrops (Clarke and Kirby 2019). It provides a clear example of the detailed local knowledge and intimate relationship with the land possessed by early communities.

Typologically, the presence of ‘broad blade’ microliths (Figure 20) in the Chest of Dee assemblages is important because their place in Scottish assemblages has long been contentious. Often considered characteristic of Early Mesolithic activity in southern Britain, broad blade microliths are rare in excavated Scottish assemblages and have usually been found alongside (traditionally later) ‘narrow blade’ microliths at sites such as Morton, Fife (Coles 1971) and Nethermills, Aberdeenshire (Wickham-Jones *et al.* 2017). Imprecise dating means that these examples are generally assumed to represent mixed or transitional assemblages (cf Cramond, Ballin and Ellis 2019). Recent modelling of dates associated with key artefact types in England has suggested that considerable typological change may be ascribed to the early centuries of the eighth millennium cal BC (Conneller *et al.* 2016), though emerging finds of broad blade material in Scotland has led others to date the Early/Later Mesolithic transition in Scotland to the second half of the ninth millennium BC (Ballin & Ellis 2019).

Interpretation is hindered by controversy about the identification of narrow and broad blade forms, especially in so-called transitional assemblages (Waddington *et al.* 2017, Ballin & Ellis 2019). At Chest of Dee, with its early dates, the presence of three clear broad blade microliths might not be surprising, except for the fact that none is associated with early dates. Further evidence is necessary, both locally and generally. The broad blade microliths at Chest of Dee might be supportive of the early dates for part of the site and could simply reflect the way in which repeated occupation can disturb earlier surfaces. They might also be an indication of conservative tendencies, leading to the continued use of ‘earlier’ types and technologies in these upland landscapes in later periods. The recovery of pieces of a type that has hitherto been regarded as elusive in Scotland from the excavations at Chest of Dee is, nevertheless, an indication of the benefits to be gained from expanding our understanding of Mesolithic archaeology into the uplands. The recognition of a new raw material adds to these benefits.

Archaeological Benefits: Exploring the Mesolithic-Neolithic Transition

The youngest ‘Mesolithic’ dates from Chest of Dee comprise three radiocarbon assays that date the upper fill of pit TP3000 to the period 3960–3780 cal BC (Range based

on SUERC-28264, -50744, -50743; Table 1). The interpretation of this feature is interesting. The date is broadly contemporary with the earliest Neolithic activity along the lower stretches of the River Dee (eg Dingwall *et al.* 2019; Murray *et al.* 2009; Murray & Murray 2014; Noble *et al.* 2016). Yet, the lithics within the fill comprise classically Mesolithic material, including both broad and narrow blade (traditionally early and late) pieces of flint and rhyolite. Indeed, the lithic assemblage from the site as a whole included little overtly Neolithic material apart from four Late Neolithic pieces from the surface collection along the path: two scrapers and two cores.

While the bulk of any lithic assemblage comprises generic material that could derive from any period, there was no indication, apart from the dating of TP3000, that activity on site might include an Early Neolithic presence. Elsewhere in Britain, later Mesolithic activity from upland locations has been shown to overlap in date with Neolithic sites in the immediate lowlands (Griffiths 2014), but this has not previously been demonstrated in Scotland. While the economic focus in the lowlands had shifted to agriculture, one explanation may be that lifestyles in the uplands were more nuanced so that seasonal patterns associated with a Mesolithic lifestyle perhaps continued or were pushed back into a restricted geographic region. Further information, and sites, are needed to address the different possibilities, and the early 4th millennium BC sites at Chest of Dee illustrate the opportunity provided by new upland locations.

Broadening our Understanding of the Upland Contribution to Mesolithic Lifeways Mithen reminds us to broaden our interpretations from the particular to the wider landscape (2019). While integral to all archaeological excavation, this is particularly relevant for the work at Chest of Dee, drawing attention as it does, to the neglected significance of fire and fire-related structures in landscapes such as this. The ubiquity of fire spots along the river terrace at this point is interesting in light of his discussion of fire as both means (for the Mesolithic community), and sign (for the archaeologist) of an encultured landscape.

These sites in the Cairngorms uplands add to the emerging evidence that Mesolithic Scotland encompassed more than the activities of coastal hunter-gatherers. Although a scattering of inland sites has been known for some time, such as Ben Lawers, Loch Doon and Loch Garten (Atkinson 2016; Affleck 1986; Saville 2007) – the latter on the northern edge of the Cairngorm massif, at the other end of the

mountain passes along which the Dee and Geldie sites are located – the coastal bias of existing interpretations and the focus on shell middens and associated environments has long been cause for comment (Saville and Wickham-Jones 2012; Wickham-Jones 2009).

The inhabitation of the landmass we now call Scotland clearly involved exploitation of a wide variety of ecozones in addition to those of the coast. Forested, and upland, environments were an important part of this. Information from sites such as Nethermills Farm (Wickham-Jones *et al.* 2017), Links House (Lee and Woodward 2009; Woodward 2008), and the Tweed Valley (Mullholland 1970; Warren 2001) combine with that from the Cairngorms to highlight the significance of inland woodland and forest environments in the Early Holocene. Though lying below the tree line, sites such as Chest of Dee and Caochanan Ruadha also facilitate an examination of the higher upland zone.

In Britain the association of upland sites with hunting large ungulates has a long intellectual history, partly influenced by past interpretations of Star Carr (Clark 1954; Mellars 1976). Such views have received detailed critique (Spikins 2000; Finlay 2000) but remain influential. In reality, the inhabitation of upland landscapes is likely to have related to a variety of needs set within a range of environments. A mixture of site types can be expected, as reflected in the diverse evidence from distinct locations within the Cairngorm landscape. Examination of these different places facilitates consideration of possible activity sets and the networks that linked them together.

The role of waterborne transport and of riverine resources; procurement of stone, minerals and other raw materials; the harvesting of foodstuffs: all need to be considered in the upland context. So too cultural phenomena such as rites of passage, socializing and communication with other groups, the role of ‘persistent places’ (Barton *et al.* 1995), and the social (and even spiritual) significance of natural features such as the Chest of Dee gorge. Interpretation of upland activities must become as nuanced as that of more extensively researched geographical locales. Hunting may have been carried out in a particular location, but that does not mean food procurement was the sole or even dominant activity. Use-wear analysis at Caochanan Ruadha, for example, suggests this place saw the shooting of animals and processing of meat alongside the use of plant resources (Warren *et al.* 2018). The discovery of carbonised *Taxus* (yew) twigs here, possibly brought in from a considerable distance

(cf Dickson 1993), may relate to use of its toxin in hunting strategies (Borgia *et al.* 2015; Borgia 2019), but the trance-inducing properties of its toxic vapour may also have played a socio-cultural role at this place. At Chest of Dee people were, at least, procuring and working stone as well as cooking, resting by the fire and perhaps fishing.

The Future: Archaeology and Landscape Management in the Upland Zone in the Twenty-First Century

A compelling aspect of the evidence is that although there was small scale erosion, and the material was originally revealed by limited disturbance, in general the lithics and features are *in situ*. Given the ephemeral nature of the sites, this is significant and has important implications for management of the historic environment. In Scotland, the overarching philosophy of contemporary land management views the uplands as ‘wild land’, devoid of significant human footprint. From the governmental perspective, this makes it an ideal arena in which to tackle climate change and contribute to sustainable economic development. Both EU Directive requirements and Government climate change plans aim to expand woodland cover significantly in the coming decades, necessitating a considerable target of new woodland to be planted every year, and inevitably including upland planting at a large scale. As well as new planting, a variety of woodland regeneration schemes exist.

The UDTP has demonstrated that in many cases the depth of peat sealing early prehistoric sites is well within viable limits for successful woodland expansion. This means that planting potentially threatens some of our best-preserved upland Mesolithic sites and landscapes – the vast majority of which remain to be discovered. In terms of mitigation, the limited evidence for Mesolithic occupation in upland locations across Scotland to date has meant that archaeological impact assessments usually only consider upstanding monuments, predominantly medieval or later. Historic environment services at both state and local planning authority level need to consider the potential survival of fragile sites beneath the surface, over potentially vast tracts of land. Bridging this ‘upland gap’ in our knowledge of early human use of the landscape is critical to informing future land management strategies.

CONCLUSIONS

The Upper Dee Tributaries Project breaks new ground in providing evidence for the Mesolithic inhabitation of the uplands in inland Scotland. Despite a previous paucity of evidence, it is clear that hunting and gathering communities were familiar inhabitants of the Cairngorm landscapes from the ninth millennium BC, and that their lifestyle here was extensive, diverse, intense and over considerable time depth. Undoubtedly many more sites remain to be discovered and their contribution to archaeology will be significant, both providing new evidence and expanding existing interpretations. The ‘upland gap’ in our understanding of complex Mesolithic lifeways is bridgeable.

However, constructing that bridge is methodologically challenging. With regard to the specific case explored here, over 200 km of footpaths cross the Mar Lodge Estate, yet the areas where erosion extends into sub-peat levels, with the potential to reveal evidence for early human activity, are widely scattered and generally small scale. While natural erosion provides further opportunities for discovery elsewhere, particularly along watercourses, our research suggests that active monitoring and prospection is necessary to highlight the opportunities to encounter new sites. There is thus a pressing need for fieldwork to locate and examine sites across the Scottish uplands, particularly in the context of landscape-scale management practices.

If the scale of landscape across which sites have been found is thought-provoking, the implications are even wider. The uplands are likely to have been tied into a much broader exploitation of the river valleys and landscapes leading from coast to mountain (Warren 2005; Wickham-Jones *et al.* 2017). The relationships between coast, river valleys and uplands necessitate further research. While this project focusses on the upper reaches of the River Dee, another study now underway includes exploration of relationships between these sites and the intense concentration of Mesolithic activity along the lower reaches of the river. Implied connections with the North Sea coast to the east, including raw materials and other resources as well as transport systems, require investigation. Potential links with northwest Scotland remain to be explored, particularly given the location of the UDTP sites along major mountain routeways. Reclaiming the uplands for the archaeology of early prehistoric populations opens up exciting prospects to enrich our understanding of the full patterns of people’s engagement with the landscape.

NOTE ON RADIOCARBON DATES:

The radiocarbon dates presented in the text have been calibrated using the INTCAL13 calibration curve (Reimer et al. 2013), OxCal v4.3 (<http://c14.arch.ox.ac.uk/>) and the maximum intercept method (Stuiver and Reimer 1986), with the endpoints rounded outward to 10 years. Those that are shown in the figures have been calibrated by the probability method (Stuiver and Reimer 1993), and where modelled are presented in *italics* with the endpoints rounded outward to 5 years.

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