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AN EARLY MESOLITHIC STONE TOOL ASSEMBLAGE FROM CLACHAN HARBOUR, RAASAY, SCOTTISH HEBRIDES

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ABSTRACT

An archaeological and palaeoenvironmental assessment of inter-tidal peat deposits at Clachan Harbour, Raasay was carried out in advance of the construction of the ferry terminal at Clachan Harbour in January 2007. An assemblage of 27 worked lithics was recovered from beneath the peat. Typological analysis and radiocarbon dating indicate that the lithics are of Early Mesolithic date. One of the lithics is in baked mudstone; the remaining 26 are of Skye tuff. The assemblage from Clachan Harbour is the first Scottish lithic assemblage that has been demonstrated to have been manufactured from Skye tuff. However, since mudstone and tuff are similar in appearance, it is proposed that other assemblages excavated in this part of Scotland may have been misidentified as mudstone.

Key words
Mesolithic, inter-tidal peat, Clachan Harbour, Raasay, Skye tuff

INTRODUCTION

A small assemblage of worked stone tools was recovered during a programme of archaeological and palaeoenvironmental fieldwork in an area of inter-tidal peat deposits at Clachan Harbour, Raasay in January 2007 (NGR NG 54465 36404; Figure 1). Typological analysis and radiocarbon dating indicate that the lithics are of Early Mesolithic date.

The project, funded by The Highland Council, was carried out in advance of the construction of the ferry terminal. This report presents a description of the excavations and a detailed description of the lithics, with special reference to raw-materials, typological composition and technology and discusses the significance of the finds in the wider Scottish context.

BACKGROUND

Clachan Harbour is a sheltered, crescent-shaped bay that faces the Isle of Skye across the Narrows of Raasay. Inter-tidal peat and relic tree roots and branches were first recognised in the bay during the *Scotland's First Settlers* project in 2002 (Hardy & Wickham-Jones 2002). Two possible worked stone tools were recovered, which were considered to be of probable Mesolithic date (ibid).

The primary purpose of the fieldwork in 2007 was to characterise the deposits in the bay and to assess their vulnerability to erosion, with particular reference to the changes that could be caused by the construction of the ferry terminal. The 2007 survey (Cressey *et al* 2007) established that the peat is mainly concentrated within the central northern part of the bay and that it is probable that further extensive peat deposits survive under the storm beach on the northern and western sides of the bay and beneath the sand-flats on the western side (Figure 1). Analysis of samples taken during the survey has been used to reconstruct the Early Holocene relative sea-level changes (Cressey *et al* forthcoming; see also Dawson in press).

ARCHAEOLOGICAL EXCAVATION

Two areas of the inter-tidal peat (Areas F1 and F2 on Figure 1) were explored, due to their higher potential for erosion. Lithics were recovered from both areas. Each find was given a unique catalogue number (CAT no.), which is used throughout this report. A full register of contexts can be found in the archive report (Cressey *et al* 2007). Only those that are necessary to describe the stratification in relation to the artefacts are used in this report; they are the four digit numbers in brackets.

Area F1 was a strip of upstanding peat and tree root remains, c.13.5m long by 4m wide at its southern end and 0.6m at its northern end (Figure 2). Recent peat cutting was visible as vertical cut marks on the east and west sides. Two trenches were excavated in Area F1. Trench 1 was 4.25m long by 0.5m wide, and aligned north to south. The peat in this trench was revealed to be 0.3m deep at maximum. Trench 2 was 3.75m long by 0.5m wide and was aligned north-west to south-east across the erosion damaged southern extremity of Area F1. A solitary tuff flake (CAT 8) was recovered from Trench 1.

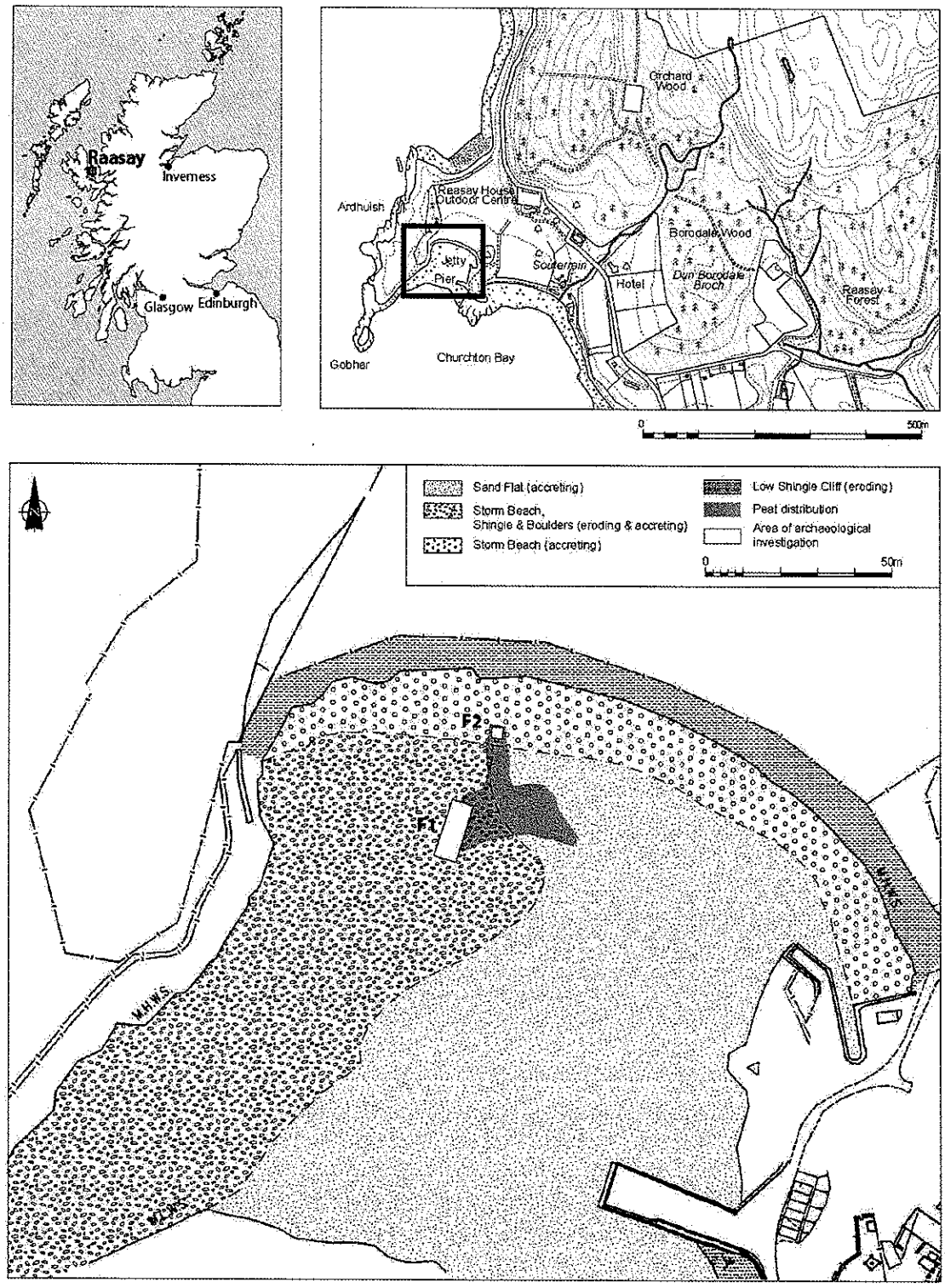

Figure 1. Location of Clachan Harbour, Raasay, showing location of inter-tidal peat and areas investigated

Area F2 was initially identified as a thin, fragmentary strip of peat jutting out to the south of the cobble storm beach. A trench measuring 3m x 3m was excavated over this area (Figure 3). Excavation revealed that the storm beach cobbles (2101) overlay shell-rich sand (2102) which in turn overlay peat (2104). The peat lay on natural orange silty clay (2106) and bedrock. Thin lenses of dark brown to black compacted silt (2105) were present between the peat (2104) and the natural orange silty clay

Figure 2 Plan of Area F1

(2106) mainly in the centre and on the eastern side of the area (Figure 4). The excavation was carried out using a 0.2m by 0.2m grid system. The deposits from each square were retained and processed by wet-sieving with a small mesh to recover artefacts. Artefacts retrieved were plotted on the grid and their contexts recorded. Eight lithics (CAT 1, 3 to 7, 18 and 19) were recovered from the peat (2104), in Squares 31, 72, 76, 89, 123, 164 and 211 (Figure 3). Seventeen pieces (CAT 2, 9 to 16

and 20 to 27) were retrieved from the thin lenses of compacted silt (2105) beneath the peat. A small concentration in the northern part of Area F2, covering Squares 203-206 and Squares 218-221 (Figure 3), indicates an area of concentrated anthropogenic activity. A tooth from a wild boar was found in grid square 218 in Area F2, associated with the stone tools.

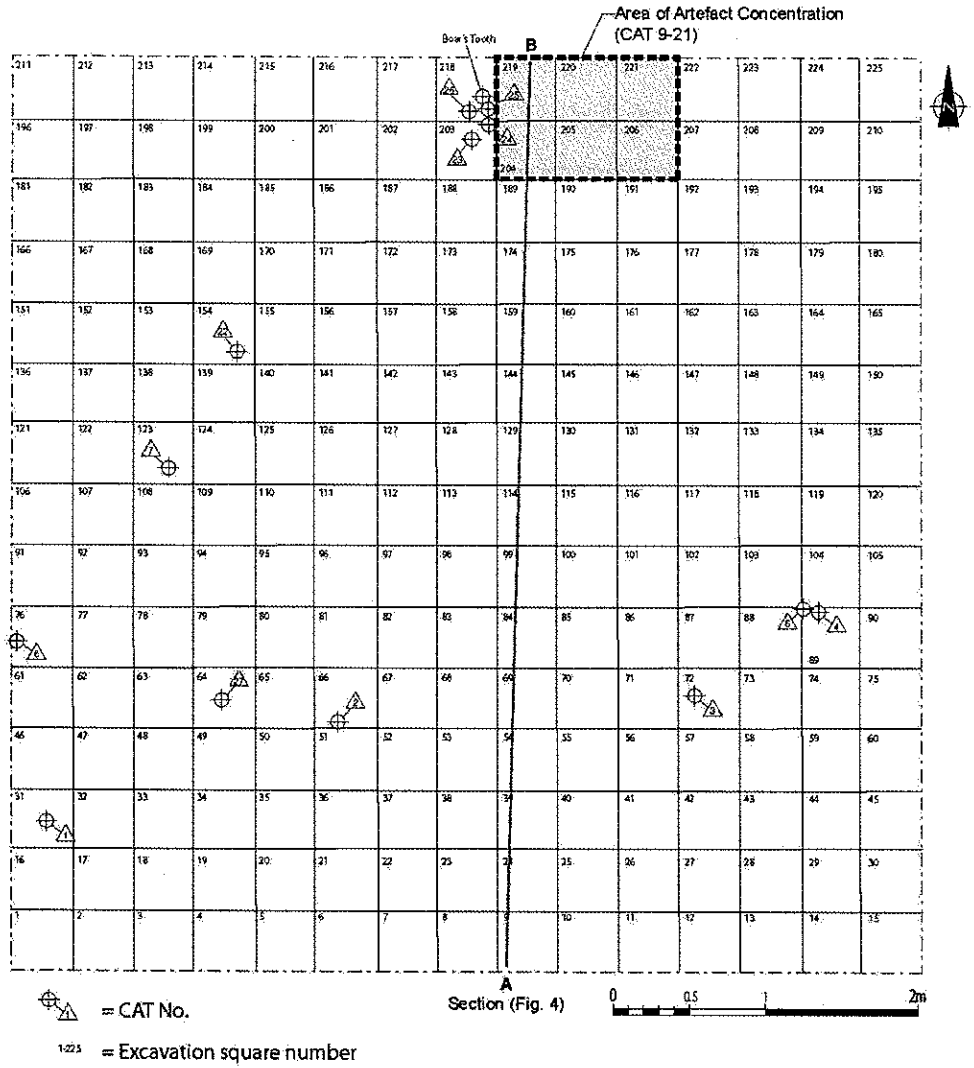

Figure 3 Plan of Area F2

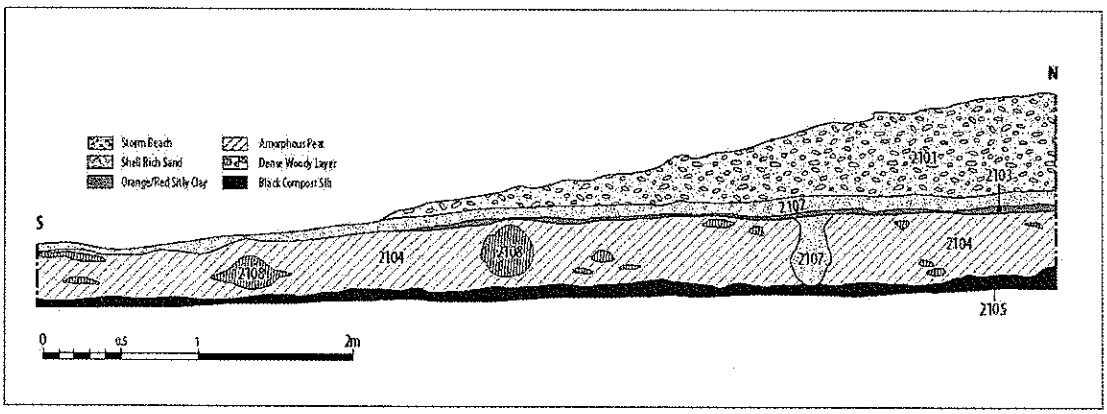

Figure 4 Trench 1, section showing biostratigraphy recorded in F2

THE ASSEMBLAGE

Twenty-seven lithic artefacts were recovered (Table 1).

Flakes	9
Blades	10
Indeterminate pices	4
Opposed platform cores	1
Core fragments	1
Truncated pieces	1
Notched pieces	1
Total	**27**

Table 1. General artefact list.

Definitions

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

Flakes: All lithic artefacts with one identifiable ventral (positive or convex) surface, GD > 10 mm 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).

Raw material – types, condition and sources

Whilst the collection appeared to be in baked mudstone, it is difficult to distinguish between hand-samples of fresh Staffin baked mudstone and Skye tuff. Thus, the assemblage was subjected to detailed geological inspection and it was discovered that only CAT 16, which is heavily weathered, seems to be in baked mudstone, whereas the remaining assemblage is more likely to be in tuff (Dr John Faithfull, pers comm.).

Baked mudstone developed when fine-grained sedimentary rock was altered in connection with volcanic events in the Skye area, transforming the sedimentary country rock into a much harder metamorphic rock (a meta-sediment). Baked mudstone is particularly common around Staffin Bay (Emeleus & Bell 2005, 35), on

the north-eastern coast of Skye, but minor local outcrops are expected to exist (Wickham-Jones & Hardy 2004, 22). Tuff, on the other hand, is an igneous type of rock, formed when ashes were blown out from volcanoes during eruptions; when underwater deposition occurs, tuff becomes stratified and takes on the features of a sedimentary rock (Pellant 1992, 205). Tuff has been observed around Kilchrist (south of Broadford), and around Fionn Coire (between Sligachan and Glen Brittle), but it may well occur elsewhere (Dr Brian Bell, pers comm.).

In general, both rock forms have excellent flaking properties, but both are also characterised by a degree of layering and the development of planes of weakness. When it has just been procured from a primary source, Staffin baked mudstone is black, and it may be banded. However, it is a relatively soft rock, and with time it weathers and becomes grey, light-grey, or white. When it weathers, its surfaces disintegrate and turn into a fine powder. This may make heavily weathered pieces appear almost 'soapy' (CAT 16). The local tuff is also very dark, varying between black and dark grey. The material from Clachan Harbour is generally characterised by the presence of stretched-out lenses, giving it a slightly stripy appearance. Although the tuff may become slightly greyer, as it weathers, it does not disintegrate in the way Staffin baked mudstone does, and it remains relatively hard.

Most of the artefacts from Clachan Harbour represent inner material, with approximately one-quarter being secondary pieces. One of the latter (CAT 22) has abraded cortex, defining it as deriving from a pebble source. In most other cases, the 'cortex' is slightly rough, and it is more likely that this 'cortex' represents the coated surfaces of internal planes of weakness. It is not possible to say whether the bulk of the assemblage was procured from primary or secondary sources. No pieces were defined as burnt.

Debitage

Twenty-three pieces of debitage were recovered from the site, with flakes (nine pieces) and blades (ten pieces) being approximately equally numerous. Four indeterminate pieces were also retrieved. The flakes are generally plain hard-hammer blanks, and they vary considerably in size. Some are probably from the preparation of cores, whereas others may be intended blanks from actual flake production. The blades are all macroblades (broad blades), and apart from two possible soft-hammer blanks (CAT 11, 22), all were detached by the application of hard percussion. On average they measure 49 x 18 x 8mm (LW ratio = 2.7). Although the thickness of the blades clearly defines these as robust, their LW ratio defines them as relatively slender.

Four indeterminate pieces are in somewhat coarser material, with an extensive cover of abraded cortex. They may be naturally broken-up pebbles.

Cores

The assemblage includes two cores, namely one opposed-platform core (CAT 9) and one core fragment (CAT 16). The former appears relatively fresh (tuff), whereas the latter is weathered, with a powdery surface (baked mudstone). Although the term 'opposed-platform core' refers to a relatively well-defined formal class of cores, CAT

Technology

The assemblage is indicative of a specialised broad blade industry. Some flakes may have been produced during preparation of the blade cores, or as part of parallel flake production, but the main focus of the knappers was to manufacture long, slender, robust blades with average dimensions of 49 x 18 x 8mm (Figure 4). The longest blade is 71mm long, requiring raw blocks or nodules of at least 100mm. The blade width varies between 12mm and 26mm.

All flakes and most blades are hard-hammer blanks, although two blades seem to have been detached by the application of soft percussion (CAT 11, 22). In general, the various hard-hammer indicators of the artefacts (pronounced bulbs, circular impact points, bulbar scars, etc.) are somewhat 'muted'. This may be due to the relative softness of the raw material; hard percussion on a cortical platform results in fewer and weaker hard-hammer indicators than if a decorticated surface had been struck, with the cortex acting as a 'cushion'. The generally soft character of fine-grained rock forms like tuff and baked mudstone may act in a similar manner. However, the more 'muted' appearance of the site's hard-hammer indicators may have been caused by the prehistoric knappers' choice of percussors (ie hard or elastic hammerstones; cf. Sørensen 2006, 31). All blades have careful trimming of their platform-edges, whereas the platform surfaces are generally plain and unprepared (Figure 6).

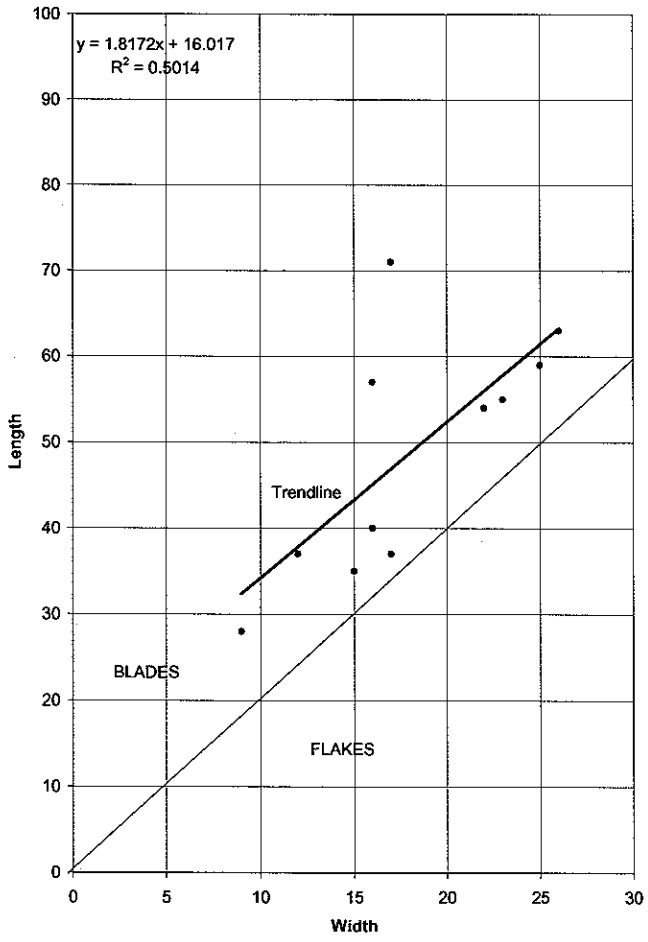

Figure 6 The intact unmodified / modified blades from Clachan Bay.

DATING

The two cores support the above presentation of the industry. Both involve plain platforms, probably exploiting the regular, flat surfaces created when tuff and baked mudstone split along natural planes of weakness. CAT 16 displays trimming along one platform-edge. Due to its fragmentary state, it is not possible to determine what sort of blanks were detached from CAT 16, but CAT 1 is definitely a broad blade core. CAT 1 also testifies to the use of cresting. The crest of this piece represents an attempt at regulating core-shape during the reduction process, but most likely cresting was also used at the beginning of this process, to guide production of the core's very first blade. No bipolar pieces were identified.

The assemblage includes no diagnostic core or tool types, and only the blades hint at a date. In Britain, blades generally predate the Late Neolithic, with the latest blades probably having been manufactured during the earliest part of that period (Ballin forthcoming a & b). As the Late Mesolithic is characterised by the production of microblades, broad blade assemblages are most likely to be either Early Mesolithic or from the later part of the Early Neolithic.

Generally, Early Mesolithic blades tend to be quite robust (see for example the blades from Ann Corran on Skye and Morton Site A in Fife; Saville & Miket 1994; Coles 1971), whereas Early Neolithic blades tend to be more delicate (cf. Early Neolithic assemblages, such as Auchategan on Bute and Garthdee Road in Aberdeen; Ballin 2005; 2006), suggesting an Early Mesolithic date for the Clachan Harbour collection.

Within the Early Mesolithic, the dominance of hard percussion is a very early technological attribute. Generally, the well-known British Early Mesolithic phases are characterised by the use of soft percussion (Reynier 2005; Butler 2005, 84), but no sites are presently known from the period immediately after 10,000 BP (the Palaeolithic/Mesolithic transition). Early Mesolithic assemblages from NW Europe have been shown to be strikingly homogeneous (Jacobi 1976; David 2007), and the earliest post Palaeolithic assemblages are typically distinguished by obliquely blunted points (ie no geometric microliths) and the use of hard percussion (eg the assemblages from Barmosen in Denmark and Duvensee 8 in northern Germany; Sørensen 2006, 36; Bokelmann 1981). This phase is presently not represented in the British material. Early Neolithic blades were generally manufactured by the application of soft percussion (Butler 2005, 121), although later Neolithic blades tend to have been detached by the use of hard hammers.

Two radiocarbon dates (Table 2) were obtained from samples of *Betula* (birch) wood from the peat (1204) above the silty clay lenses (1205) from which many of the lithics were recovered. They provide a *terminus ante quem* for the formation of the lenses, and thus for the deposition of the lithics. The two dates fall within the range 7598–7084 cal BC, and thereby support an early prehistoric date for the assemblage below the peat.

Lab code	*Context*	*Species*	*Age (BP)*	*Cal date 2 sigma*
GU-17165	2104	*Betula*	8545 ± 30	7598–7542 BC
GU-17166	2104	*Betula*	8230 ± 30	7353–7084 BC

Table 2. Radiocarbon dates. Calibrations carried out using OxCal 4.

CONCLUSION

Twenty-seven lithic artefacts were recovered from the excavations at Clachan Harbour. Apart from one piece in baked mudstone, the entire assemblage is in tuff. All of the artefacts have been demonstrated to be of Early Mesolithic date. The finds represent a broad blade industry, manufactured by the application of primarily (if not entirely) hard percussion. Cores and tools consist of one opposed-platform core, one core fragment, one truncated/backed blade, and one notched blade; the remaining 23 artefacts are debitage.

Baked mudstone has, until recently, rarely been discussed in the Scottish archaeological literature (Woodend Loch in North Lanarkshire is a notable exception; Davidson *et al.* 1949). However, recent excavations have made available new collections of artefacts in this material – largely from the general Skye area (eg Camas Daraich and Home Farm, both on Skye; Wickham-Jones & Hardy 2004; Ballin 2008). Apart from a small note (Gray 1960), the assemblage from Redpoint, Highland, remains unpublished; it includes 197 baked mudstone artefacts, but is dominated by almost 1,100 pieces of worked quartz. Since baked mudstone and tuff are similar in appearance, it is probable that some of the assemblages classified as mudstone have been misidentified.

Scottish Mesolithic research has been characterised by great problems relating to the definition and dating of earlier and later parts of the Mesolithic period (cf. Finlay *et al.* 2004). Increasingly early radiocarbon dates of Late Mesolithic assemblages, such as from Cramond, Edinburgh (Lawson 2002; Saville 2008), and East Barns, East Lothian (Gooder 2003; 2007), have pushed back the borderline between the Mesolithic period's early and late stages (broad blade and microblade industries), and a boundary of 9200 BP / 8400 cal BC has been proposed (Saville 2008). Early Mesolithic assemblages have been somewhat elusive, but they are now being reported from all parts of Scotland, such as the Southern Uplands (Weston, South Lanarkshire; Barrowman forthcoming) and the Highland zone (Chest of Dee, Aberdeenshire; Ballin 2004). The finds from Camas Daraich on Skye have been securely dated to the first half of the Mesolithic period (mid 7th millennium BC), and its lithic assemblage represents an early narrow-blade industry (Wickham-Jones & Hardy 2004, 58). Early Mesolithic assemblages from less recent excavations include material from Morton Site A in Fife (Coles 1971); An Corran on Skye (Saville & Miket 1994); and several collections from the island of Jura (Mercer 1970; 1974; 1980; Saville 2004).

PROPOSAL FOR FUTURE RESEARCH

Whilst the lithic assemblage from Clachan Harbour is small, it is the first assemblage to be published that has been demonstrated to be in Skye tuff. It is suggested that reanalysis of assemblages that have been classified as mudstone would be useful, to check whether they have been misidentified. The analysis should include comparative investigation by thin-section analysis of baked mudstone and tuff. One product of this work should be the development of a tool by which archaeologists can more easily distinguish between these two, visually similar, related raw materials.

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APPENDIX: CATALOGUE

CAT 1. Tertiary, notched piece on a hard-hammer blade; fine-grained, grey tuff (71 x 17 x 9 mm). Trimmed, plain platform. The proximal left corner may have broken off along a plane of weakness. Three retouched notches in the left lateral side (chords = 7-13 mm), and a short stretch (11 mm) of uneven retouch in the right lateral side. SF 1, Area F2, Square 31, Context 2104.

CAT 2. Distal fragment of tertiary flake; fine-grained, grey tuff (19 x 24 x 2 mm). SF 2, Area F2, Square 66, Context 2105.

CAT 3. Tertiary hard-hammer blade; fine-grained, grey tuff (37 x 17 x 5 mm). Trimmed, plain platform. SF 3, Area F2, Square 72, Context 2104.

CAT 4. Distal fragment of tertiary flake; fine-grained, grey tuff (12 x 11 x 1 mm). SF 4, Area F2, Square 89, Context 2104.

CAT 5. Distal fragment of tertiary flake; fine-grained, grey tuff (11 x 12 x 2 mm). SF 5, Area F2, Square 89, Context 2104.

CAT 6. Tertiary indeterminate piece; coarse-grained, grey tuff (19 x 10 x 6 mm). SF 6, Area F2, Square 76, Context 2104.

CAT 7. Truncated piece with full lateral backing, on tertiary hard-hammer blade; fine-grained, grey tuff (37 x 12 x 5 mm). Trimmed, plain platform. Oblique truncation at the distal end. The left lateral side is fully blunted. Probable hafting retouch in the form of a concavity in the left lateral side, proximal end, in conjunction with an opposing short stretch of retouch. SF 7, Area F2, Square 123, Context 2104.

CAT 8. Tertiary hard-hammer flake; fine-grained, grey tuff (15 x 16 x 5 mm). Untrimmed, faceted platform. An old platform-edge crosses the dorsal face diagonally, indicating that the parent core was re-orientated. SF 8, Area F1, Trench 2, Context 1200.

CAT 9. Secondary opposed-platform core; fine-grained, grey tuff (63 x 39 x 23 mm). One end is defined by having a traditional untrimmed, plain platform, whereas the opposite end is characterised by having had flakes detached to either side of a keel. On the face opposing the main flaking-front, an attempt was made to manufacture a new guide ridge. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 10. Tertiary indeterminate blade; fine-grained, grey tuff (57 x 16 x 5 mm). The outermost distal tip has broken off, and the platform has collapsed, preventing closer scrutiny of the applied percussion technique. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 11. Tertiary soft-hammer blade; fine-grained, grey tuff (40 x 16 x 3 mm). Trimmed, plain platform. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 12. Proximal fragment of tertiary hard-hammer blade; fine-grained, grey tuff (27 x 13 x 5 mm). Trimmed, plain platform. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 13. Tertiary hard-hammer flake; fine-grained, grey tuff (38 x 20 x 8 mm). Trimmed, plain platform. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 14. Medial-distal fragment of tertiary hard-hammer flake; fine-grained, grey tuff (33 x 16 x 4 mm). The absence of a platform prevents closer scrutiny of the applied percussion and preparation techniques. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 15. Proximal fragment of tertiary hard-hammer flake; fine-grained, grey tuff (15 x 10 x 5 mm). Untrimmed, plain platform. SF 9, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 16. Tertiary core-fragment; fine-grained, grey to white baked mudstone (28 x 47 x 28 mm). Somewhat weathered. The original intact core probably split along two inherent planes of weakness,

detaching the present core-fragment. This fragment includes *c.* half of the core's trimmed, plain platform, and *c.* half of its flaking-front. A small number of flakes were subsequently detached from the new platform opposite the original platform. SF 10, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 17. Tertiary hard-hammer blade; fine-grained, grey tuff (63 x 26 x 11 mm). Plain platform. As the platform has partially collapsed, it is not possible to assess the preparation technique in detail. SF 10, Area F2, Trench 1, Squares 204-206, 219-221, Context 2105.

CAT 18. Tertiary hard-hammer blade; fine-grained, grey tuff (35 x 15 x 4 mm). Trimmed, plain platform. Probably macroscopic use-wear along the two lateral edges. SF 10, Area F2, Squares 204-206, 219-221, Context 2104.

CAT 19. Secondary indeterminate piece; coarse-grained, grey tuff (18 x 18 x 7 mm). SF 10, Area F2, Squares 204-206, 219-221, Context 2104.

CAT 20. Secondary indeterminate piece; coarse-grained, grey tuff (25 x 20 x 11 mm). SF 10, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 21. Tertiary indeterminate piece; coarse-grained, grey tuff (33 x 17 x 7 mm). SF 10, Area F2, Squares 204-206, 219-221, Context 2105.

CAT 22. Secondary soft-hammer blade; fine-grained, grey tuff (28 x 9 x 5 mm). Trimmed, ?cortical platform. SF 11, Area F2, Square 154, Context 2104.

CAT 23. Tertiary hard-hammer blade; fine-grained, grey tuff (54 x 22 x 6 mm). Trimmed, plain platform. SF 12, Area F2, Square 203, Context 2105.

CAT 24. Secondary hard-hammer flake; fine-grained, grey tuff (42 x 34 x 8 mm). Untrimmed, plain platform. SF 13, Area F2, Square 203, Context 2105.

CAT 25. Secondary hard-hammer blade; fine-grained, grey tuff (59 x 25 x 20 mm). Untrimmed, plain platform. SF 15, Area F2, Square 218, Context 2105.

CAT 26. Secondary hard-hammer blade; fine-grained, grey tuff (55 x 23 x 9 mm). Trimmed, plain platform. SF 16, Area F2, Square 218, Context 2105.

CAT 27. Distal fragment of tertiary flake; coarse-grained, grey tuff (24 x 29 x 5 mm). Sample 55, Area F2, Square 64, Context 2105.