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

T.B. Ballin¹, R. White³, P. Richardson³ and T. Neighbour²

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 baked mudstone and tuff are similar in appearance, it is proposed that other assemblages excavated in this part of Scotland may have been misidentified as baked mudstone.


Keywords: Mesolithic, inter-tidal peat, Clachan Harbour, Raasay, Skye tuff, baked mudstone.

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). Radiocarbon dating indicates that the lithics are of Mesolithic date, and typo-technological analysis suggests a date at the beginning of this period.

The project, funded by The Highland Council, was carried out in advance of the construction of the ferry terminal. This paper 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.

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 peat samples taken during the survey has been used to reconstruct the Early Holocene relative sea-level changes (Dawson 2009).

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 paper. 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 paper; they are the four digit numbers in brackets.

Area F1 was a strip of upstanding peat and tree

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root remains, c.13.5 m long by 4 m wide at its southern end and 0.6 m 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 4.25 m long by 0.5 m wide, and aligned north to south. The peat in this trench was revealed to be 0.3 m thick where deepest. Trench 2 was 3.75 m long by 0.5 m 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.

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 3 m x 3 m 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 (2106) mainly in the centre and on the eastern side of the area (Figure 4). The excavation was carried out using a 0.2 m by 0.2 m 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. Seven lithics (CAT 1, 3 to 7, and 22) were recovered from the peat (2104), in Squares 31, 72, 76, 89, 123, and 154 (Figure 3). Nineteen pieces (CAT 2, 9 to 16, 18 to 21, and 23 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 64, 66, 203–206 and 218 (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.

The low gravel cliff that once sealed the peat has compacted it considerably and this is evident by the shape of the wood remains found within it. The different levels at which the artefacts were recorded is a direct result of differential compaction. This is typical of inter-tidal deposits which are often sealed by marine clays, sand and gravel. This can affect not only the shape of the organic constituents within the peat, but also results in taphonomic alteration to more solid material such as buried archaeological remains including artefacts (Cressey et al. 2001).

THE ASSEMBLAGE

Twenty-seven lithic artefacts were recovered (Table 1). In the present paper, they are dealt with as one assemblage, as they form a homogeneous group in terms of raw material, size and typo-technological attributes. It is thought that they are contemporaneous in the sense that they probably date to the same general period, but they were not necessarily deposited during
the same visit to the site, as indicated by the recovery of artefacts from two different types of context, peat and silt lenses (see above).

**Definitions of recovered debitage forms**

*Flakes:* All lithic artefacts with one identifiable ventral 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.
<table>
<thead>
<tr>
<th></th>
<th>F1 C1200</th>
<th>F2 C2104</th>
<th>C2105 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flakes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Blades</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Indeterminate pieces</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Opposed platform cores</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Core fragments</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Truncated pieces</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Notched pieces</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1</strong></td>
<td><strong>7</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

Table 1. General artefact list.

**Blades:** Flakes where \( L \geq 2W \), and where \( W > 8 \) mm.

**RAW MATERIAL — TYPES, CONDITION AND SOURCES**

Initially, the collection was thought to be baked mudstone, but as it is difficult to distinguish between fresh Staffin baked mudstone and Skye tuff by eye. The assemblage was subjected to detailed geological inspection. 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, The Hunterian Museum and Art Galley, 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 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) — the former approximately 20 km from Clachan Harbour and the latter c.10 km from the site. However, it may well occur elsewhere in the Skye area (Dr Brian Bell, Department of Earth Sciences, Glasgow University, 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 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 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, demonstrating that it derives 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 represented. 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 broad blades, and apart from two possible soft-hammer blanks (CAT 11, 22), all are thought to have been detached by the application of hard percussion (see technology section, below). On average they measure 49 x 18 x 8 mm (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 9 (Figure 5) reflects a degree of improvisation. It is a relatively large piece (63 x 39 x 23 mm), which was reduced by detaching flakes and blades from two opposed ends: at one end, blanks were detached from a true plain, untrimmed platform, and, at the other end, blanks were detached to either side of a keel. Core rejuvenation was attempted by forming a new guide ridge on the face opposite the main flaking-front, but this was abandoned.

CAT 16 is probably a fragment of a traditional single-platform core with a plain, trimmed platform. However, the relatively small size (28 x 47 x 28 mm) of the fragment prevents certain identification. It is thought that the original intact core split along two roughly perpendicular planes of weakness. The surviving fragment includes c. half of the core’s platform, and approximately half of its flaking-front. After disintegration, an attempt was made to use the resulting fragment as a new core, and a small number of flakes were detached from a new striking platform opposite the original platform.

**Tools**

Two tools were recovered from Clachan Harbour: a notched piece (CAT 1) and a truncated piece (CAT 7) (Figure 5). Both tools are based on regular broad blades, with the former measuring 71 x 17 x 9 mm and the latter 37 x 12 x 5 mm. Both blanks are regular pieces with one dorsal arris. CAT 1 has 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. The concave working-edges are shallow,
but meticulously modified, and it is thought that this piece may be a multiple concave scraper. CAT 7 has an oblique truncation at the distal end, and the left lateral side is fully backed. Modification at the proximal end on both sides may be hafting retouch.

**Technology**

Although some broad blades may be produced during the initial stages of microblade manufacture, the fact that all but one blade are broader than 10 mm (Figure 6) indicates that this assemblage represents a broad blade industry (that is, where blade blanks are generally broader than 8 mm; see blank definitions above).

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 is thought to have been the production of long, slender, robust blades the average dimensions of which are 49 x 18 x 8 mm (Figure 4). The longest blade is 71 mm long, requiring raw blocks or nodules of at least 100 mm. The blade width varies between 12 mm and 26 mm.

Due to the small numerical size of the blade assemblage, and uncertainties relating to the production stage of the blades, the average dimensions of these blanks may not be exactly representative of the industry responsible for the Clachan Harbour finds.

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 and 22). In general, the blades’ bulbs of percussion 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. The more “muted” appearance of the blades’ bulbar areas may also have been caused by the prehistoric knappers’ choice of percussors (i.e. relatively elastic hammerstones; cf. Sørensen 2006, 31), but the presence of such features as circular impact points on some blades’ platform remnants are generally recognized as indicators of hard percussion. However, the small numerical size of the assemblage, in conjunction with uncertainties relating to the production stage of the blades, means that it is not entirely clear how representative this material is in terms of the overall operational schema (including the use of different types of percussors) applied during primary production.

All blades have careful trimming of their platform-edges, whereas the platform surfaces are, as a whole, plain and unprepared (Figure 6). The two cores reflect the same patterns of production. Both have 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 cresting was probably also used at the beginning of this process, to guide production of the core’s first blade. No bipolar pieces were identified.
Table 2. Radiocarbon dates. Calibrations carried out using OxCal 4

<table>
<thead>
<tr>
<th>Lab code</th>
<th>Context</th>
<th>Species</th>
<th>Age (BP)</th>
<th>Cal date 2 sigma</th>
</tr>
</thead>
<tbody>
<tr>
<td>GU-17165</td>
<td>2104</td>
<td>Betula</td>
<td>8545 ± 30</td>
<td>7598–7542 BC</td>
</tr>
<tr>
<td>GU-17166</td>
<td>2104</td>
<td>Betula</td>
<td>8230 ± 30</td>
<td>7353–7084 BC</td>
</tr>
</tbody>
</table>

**DATING**

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 most of the lithics. The two dates fall within the range 7598–7084 cal BC, and they indicate an early prehistoric date for the assemblage below the peat.

The assemblage includes no diagnostic core or tool types, and only the blades and their technological attributes 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 possibly even older) or from the later part of the Early Neolithic.

Generally, Early Mesolithic blades tend to be quite robust (see for example the blades from An Corran on Skye and Morton Site A in Fife; Coles 1971; Hardy et al. forthcoming), 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 (Butler 2005, 84; Reynier 2005), 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 (i.e. no geometric microliths) and the use of hard percussion (e.g. the assemblages from Barmosen in Denmark and Duvensee 8 in northern Germany; Bokelmann 1981; Sørensen 2006, 36). 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.

**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. It is suggested that the artefacts are most likely to be of Early Mesolithic date, although an even older date cannot be ruled out. Fairly pronounced bulbar areas, in conjunction with circular impact points, indicate that the finds represent a broad blade industry, manufactured by the application of primarily 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.

It is uncertain whether some attributes, such as average blade dimensions and hammer mode, are entirely representative of the industry responsible for the production of this assemblage, as the assemblage is numerically/statistically small, and as it has not been possible to ascertain the production stage of the recovered blades, for example by refitting. The recovery of the collection from two different contexts, namely 2104 (peat) and 2105 (silt) indicates that the finds may have been deposited at different times, but as the finds appear to represent a typotechnologically homogeneous unit, it is almost certain that they were deposited during the same general period.

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 Skye area (e.g. 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. The well-known baked mudstone/chalcedonic silica assemblage from An Corran on Skye is presently being written up (Hardy et al. forthcoming). Since baked mudstone and tuff are similar in appearance, it is probable that some of the assemblages classified as baked 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 (breath 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 (Hardy et al. forthcoming), and several collections from the island of Jura (Mercer 1970, 1974 & 1980; Saville 2004). As mentioned above, lithic industries from the Palaeolithic/Mesolithic transition are still poorly understood throughout Britain, but recent finds from Stronsay on Orkney are thought to date to this period, and their future publication may prove helpful (Naomi Woodward pers. comm.).

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 made on Skye tuff. It is suggested that re-analysis of assemblages that have been classified as baked mudstone would be useful, to test 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, raw materials.

ACKNOWLEDGEMENTS

The authors would like to thank The Highland Council for their advice and support throughout the whole project. Dr Hannah Cobb, Sue Anderson and Andrew Puls commented on drafts of this paper. The excavations were conducted by Ross White, Phil Richardson, Stephen Birch and Gemma Midlane. The illustrations were prepared by Kevin Hicks. We are grateful to Dr John Faithfull, of the Hunterian Museum and Art Gallery, and Dr Brian Bell, of the Department of Earth Sciences at Glasgow University, for their help in distinguishing between the site’s tuff and baked mudstone. Dr John Faithfull suggested that thin-section analysis would be a useful tool for future research. While thanks are due to the above, responsibility for the final form and content lies with CFA Archaeology Ltd and the authors. The full project archive will be deposited with the National Monuments Record of Scotland. Finds disposal will be allocated through Treasure Trove procedures. Full specialist reports for all classes of material are provided within the site archive.

A full catalogue of the artefacts from Clachan Harbour is available to members of the Lithic Studies Society in the members area of the website: www.lithics.org/Members_Area/. See editorial for 2010 login details and password.

REFERENCES


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