5 THE FINDS AND ENVIRONMENTAL EVIDENCE

Finds from the excavation were sparse. A single quartz flake was found in the Phase 2 burnt deposit C040. Several additional lithic artefacts were recovered from the bulk samples after flotation. The assemblage was completed by a whiteware rimsherd, dating to the 19th century, recovered from the bank material (C075) behind (C106).

5.1 The quartz assemblage, by Torben Bjarke Ballin

Twelve quartz artefacts were recovered from the site (table 1). A full catalogue of the artefacts is included in the site archive.

5.1.1 Raw material: types, condition and sources

A single form of quartz was encountered at the site: ordinary white milky quartz. All twelve pieces had been exposed to fire, resulting in varying degrees of 'granulation' (Ballin forthcoming (a)). Limited exposure had caused some pieces to appear lightly saccharoidal, whereas more extensively exposed pieces are heavily crazed and in an advanced state of disintegration. Several pieces are discoloured brown, but it is not possible in most cases to say whether this is an effect of heating, or whether it is due to iron pan formation (two are definitely affected by iron pan). Most pieces are covered by a dusting of charcoal particles.

All the quartz artefacts are tertiary, or inner, pieces with no trace of cortication. This makes it impossible to determine whether the quartz was procured from pebble or vein sources (the combined use of pebble and vein quartz is suggested by Lacaille in his paper on the nearby site of Rudha'n Achaidh Mhoir (Lacaille 1951). Analysis of quartz assemblages on the Western Isles (Ballin forthcoming (a)) suggests that quartz was usually not traded, but procured locally.

Table 1 List of lithics

Platform flakes	1
Bipolar flakes	2
Indeterminate flakes and flake fragments	2
Indeterminate pieces (incl. chunks)	7
Total	12

5.1.2 Typological and technological assemblage composition

Only debitage was recovered from the burnt mound, cores and tools were absent. Five pieces are flakes or flake fragments and seven pieces are indeterminate (table 1). One piece from C040 is a hard-hammer flake, with two pieces from C011 being bipolar flakes. Two specimens from C003 and C011 are indeterminate flake fragments.

The technological attributes of the flakes indicate that two different approaches were followed. The hard hammer flake from C040 shows that, in this case, the platform-edge of a core was carefully trimmed before the flake was detached from its parent core. Remains of an older, trimmed and abraded platform-edge indicate that this core may have been a roughly cubic piece with at least two platforms, that is, either a core with two platforms at an angle or an irregular (multi-directional) core. The bipolar flakes were detached from their parent cores by the application of the so-called hammer-and-anvil technique.

Platform and bipolar techniques were frequently combined within one operational schema (ibid), with larger nodules being shaped into single-platform cores. When a single-platform core had been reduced somewhat, production flaws occasionally made it necessary to re-define the core by making a new platform-edge along an appropriate edge, and in most circumstances the core became a core with two platforms at an angle and, later, an irregular core with three or more platforms. Finally, when the core had become too small to allow further reduction in platform technique, the exhausted core was reduced in bipolar, or hammer-and-anvil, technique, before it was abandoned.

The indeterminate pieces may be results of quartz cores breaking up along inherent planes of weakness, rather than flaking in a conchoidal manner, or they may be the remains of more regular quartz artefacts which shattered as a result of the exposure to fire.

5.1.3 Stratigraphy and dating

Nine of the twelve recovered quartz artefacts were found in the Phases 2 and 4 burnt material. This indicates that in all probability the assemblage was deposited by the people who formed the burnt mound.

Unfortunately, the attributes of the quartz debitage do not allow precise dating of the pieces. Quartz hard-hammer and bipolar flakes were produced throughout Scottish prehistory, but the use of

Table 2 Species represented by the charcoal

Species	Common name	No. of identifications	Weight (g)
Corylus avellana	Hazel	269	53.96
Betula sp.	Birch	64	10.35
Quercus sp.	Oak	10	1.20
Alnus glutinosa	Alder	4	0.50
Salix sp.	Willow	4	1.90
Pinus sylvestris	Pine	1	0.10
Total		352	68.01

abrasion (even in the absence of deliberate platform faceting) is consistent with a Late Neolithic date (see for example the attribute analysis of selected blank assemblages from Stoneyhill in Aberdeenshire; Ballin forthcoming (b)). However, some Middle Bronze Age quartz assemblages from Shetland had been surprisingly carefully prepared (cf the assemblage from Bayanne on Yell and the material from the Cruester Burnt Mound on Bressay; Ballin forthcoming (c); forthcoming (d)). Indirectly, the Arisaig pieces are dated by their incorporation into the fill of the burnt mound.

5.2 Charcoal analyses, by Michael Cressey

5.2.1 Introduction

Analysis of the charcoal from the burnt mound provides a useful index of the types of wood exploited for fuel and an indication of the composition of the local woodland. It is also a prerequisite of radiocarbon dating sample selection.

5.2.2 Methodology

A system of flotation and wet sieving was used to separate the archaeological material from soil samples. Initially the floating debris was collected in a 300μm sieve and, once dry, scanned using a low-powered binocular microscope (magnification ×10–×200) to identify the archaeological material. Selected charcoal samples were also retrieved from soil samples contained in Kubiena tins. Material remaining in the flotation tank was wet sieved through a 1mm mesh and air-dried before being sorted to identify any remaining significant material.

Charcoal identifications were made using a binocular microscope (magnification ×10–×200) to view transverse cross-sections of charcoal pieces between 2mm and 4mm in size. Anatomical keys listed in Schweingruber (1992) and in-house reference charcoal samples were used to aid identification. Charcoal identifications ceased when 25 individual samples of a given species were reached.

5.2.3 Results

Three hundred and fifty-six individual charcoal samples derived from twelve contexts have been examined. Both vitrified and partially fired charcoal were present and a proportion were below the size suitable for identification.

5.2.4 Interpretation

Six species of wood have been used for fuel within the charcoal assemblage from the burnt mound. The order of abundance is shown in table 2. In general terms the charcoal was amorphous, having no regular cylindrical shape, typical of branchwood. Taphonomic processes, namely compression under mineral-rich layers and a fluctuating water table, will have caused saturation. Together, these will have had an effect on the preservation of the assemblage.

The variability of charcoal between the contexts is also noticeable, with only four samples producing over 25 counts of charcoal; these comprised contexts C011, C040, C062 and C100.

5.2.5 Species composition of the fuel

Hazel is the most common wood exploited and would have been common within the local wildwood close to the site. Birch and oak are likely to have been as common as hazel, but both are under-represented within this assemblage. Alder and willow are present but very low in frequency. Both species are suited to saturated or seasonally flooded land, and land beside streams. Pine is represented by a single fragment.

Based on the above evidence, the local woodland close to the burnt mound would have included stands of hazel, possibly as an under-storey shrub below oak. Birch would have been established in more open areas, along with pine; both are highly tolerant of the base poor soils within the study area. Based on a large number of charcoal studies from Scottish contexts, pine appears to be under-represented, and this may be due to its high resin content and its ability to burn hotly and rapidly (Taylor 1981).

5.2.6 Discussion

The vitrified fragments that were identified by the glass-like alteration to the vascular cell structure of the wood strongly suggest that temperatures were sufficiently high to have reached the state where the charcoal was extremely altered. Ignition above 500°C occurs during the stage of pyrolysis when the right conditions allow the wood to glow and turn into ash if enough oxygen is available (Beall 1972). Where reducing conditions have been reached (ie where little oxygen is present), the conversion of wood to charcoal will be more prevalent. The charcoal is likely to represent only a fraction of that used during the lifetime of the burnt mound. Charcoal vitrification is likely to occur when such fragments have been re-heated either through deliberate or accidental burning. Such differences as may arise in burning conditions (temperature, intensity of fire, length of exposure, heating environment) and wood properties (size, moisture content, taxa, anatomical structure) have a direct effect on taxonomic representation within a wood charcoal assemblage. Small-sized woods such as shrubs, which may also be used as kindling, are more likely to be consumed entirely in lower temperatures, whereas pieces of wood lying at the centre of the fire heat faster and thus can burn completely (Smart & Hoffman 1988). On the other hand, charcoal that is buried in the ash at the bottom of the hearth has a greater chance of preservation, due to lack of oxygen (ibid).

Based on vegetation reconstruction at Carnach Bog, approximately 1.5km to the south-east of Arisaig (Cressey & Verrill 2006), the first indication of human activity occurs in the Middle to Late Bronze Age, with elevated grass pollen levels and an overall decline in arboreal pollen. Hazel pollen was found to have responded to an increase in open spaces. Domestic exploitation of the local woodland would certainly have had a local impact during the lifetime of the burnt mound, and hazel appears to have been locally abundant.

5.3 Soil micromorphology, by Clare Ellis

5.3.1 Introduction

Six Kubiena tin samples were analysed from deposits associated with the burnt mound, with the aim of elucidating the contemporary depositional environment. The summary results are given below. Full descriptions appear in the archive report.

5.3.2 Descriptions

Samples 37A to E covered the lower portion of the profile of the possible burnt mound, with Sample 38A covering the upper portion. The positions of the samples are shown on illus 4.

The Phases 1 and 3 sandy peat and laminated silts and sands (C039, C057/C073) were generally well compacted with complex to massive microstructures, whereas the Phases 2 and 4 burnt material (C040, C003) exhibited open, granular soil microstructures. The former was dominated by decomposed organic matter, while the latter was generally masked by phosphate and/or goethite. Comminuted, evenly dispersed charcoal occurred throughout and was dominant in Phases 2 and 4. Although the profile had been affected by post-depositional root penetration, disturbance by soil biota was minimal. Iron deposits (goethite) dominated the uppermost layers (C047, C003).

5.3.3 Conclusions

- Phase 1 deposits accumulated within relatively slow-moving water.
- Phase 2 deposit C040 was dumped in its present location.
- Phase 3 deposits accumulated under fluvial conditions with occasional deposits and lenses of ash attesting to continued, nearby human activity. The final Phase 3 deposit was largely derived from ash but was reworked and deposited in a fluvial environment.
- Phase 4 deposits were dumped in their present location.

5.4 Radiocarbon dates

Six samples were sent for AMS dating at the Scottish Universities Environmental Research Centre (SUERC). All derived from charcoal recovered from column samples collected during the excavation. These were kept in a temperature-controlled environment during storage.

Four dates from two contexts (C003, C040) relate to Site Phases 2 and 4. The remaining two dates (C039) relate to charcoal inclusions within Phase 3 deposits. The results are shown in table 3. The dates indicate that the burnt material at Arisaig was deposited in the second half of the third millennium cal BC.

All six dates were determined from constituent parts of redeposited contexts. None date the deposition of the charcoal in the location from where it was recovered. The date derived from oak is the oldest of the determinations. The remaining dates were derived from hazel, which may have been coppiced and hence younger at the time of burning than the oak. The dates are closely grouped and there is no evidence for either a significant gap between the combustion of the wood and the deposition of the charcoal in the burnt mound, or of post-depositional processes affecting the integrity of the layers.

The sequence of dates shows that deposits C040 and C039 are very similar in age. The overlying context C003 provides the most recent of the paired dates.

Table 3 Radiocarbon dates from the Arisaig burnt mound

Context (Sample)	Lab Code	RC Date	Material	Delta 13 C	Calibrated Date BC
C039 (1)	SUERC-13244 (GU-14988)	3785±35	Hazel	-27.1‰	2290–2140 (1σ) 2340–2040 (2σ)
C039 (2)	SUERC-13245 (GU-14989)	3920±35	Oak	-25.5‰	2480–2340 (1σ) 2550–2290 (2σ)
C040 (3)	SUERC-13246 (GU-14990)	3745±35	Hazel	-26.1‰	2210–2050 (1σ) 2280–2030 (2σ)
C040 (4)	SUERC-13247 (GU-14991)	3805±40	Hazel	-26.4‰	2300–2140 (1σ) 2460–2130 (2σ)
C003 (5)	SUERC-13251 (GU-14992)	3635±35	Hazel	-27.3‰	2120–1940 (1σ) 2140–1900 (2σ)
C003 (6)	SUERC-13252 (GU-14993)	3710±35	Hazel	-27.7‰	2190–2030 (1σ) 2210–1970 (2σ)

The dates from Arisaig fall in the earlier end of the date-range for burnt mound sites in Scotland (Barber 1990, table 4). They are most similar to those from Machrie Moor on Arran (Barber & Lehane 1990) and Borichill Mor on Islay (Russell-White & Barber 1990).

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