# 10 Environmental interpretation
## *by M Cressey and K J Edwards*

### 10.1 Geology and soils *by M Cressey*

The solid geology of the area is dominated by metamorphic quartzite and feldspars attributed to the Tarskavaig Assemblage of the Moinian Series (British Geological Survey 1970, 1979). Numerous intrusive basalt dykes of Tertiary age run through the locality in a NW–SE direction. The region is characterized by a highly exposed and indented coastline with high cliffs overlooking rocky platforms.

The archaeological site is situated between two rock cliffs that rise to 100 m OD. In between the cliffs an area of grazing land slopes down to a peat-filled basin to the north. Behind the site, to the south, a small terrace forming the crest of a former shoreline falls gradually to a series of younger raised beaches. Recent removal of the beach gravels, for track building, has exposed the depth of the highest beach. Soils across the archaeological site are shallow, and mainly colluvial in origin, with an artificial component where cultivation has been possible.

Below the crest of the main raised beach the grassy turf gives way to a sorted ploughsoil. Local wisdom suggests that this has not been cultivated for many years and never with modern machinery. The ploughsoil contains abundant lithic material: evidence of Mesolithic activity that has been ploughed-out. The crest of the beach has not been cultivated in recent times and some peat development has taken place. In order to establish the character of the soils, a series of soil test pits was dug across and away from the central cultural area (Tr1).

#### *10.1.1 Soil Pit 1* (Illus 41)

To determine the extent of slope-wash, Soil Pit 1 was placed near a small soligeneous bog about 20 m north and downhill of trench 1 (Illus 10). Three individual soil units were identified:

*Illus 41 Camas Daraich: Soil Pit 1*

**Unit 1** 1001 Turfline (0–0.10 m);

**Unit 2** 1002 Mixed plough soil (0.10–0.15 m). Compacted glacial clay with dark silt and occasional mottles, roots are rare. Occasional stones. Texture – compact clay with a fine consistency. Lithics present in the lower spit. Munsell SBG (gley) 3/1 dark greenish grey/7.5 YR 3/2 dark brown;

**Unit 3** 1003 Glacial till (0.15–0.55 m). Angular blocky fragments of sandstone intermixed with coarse orange–brown clay. Occasional patches of sand present. Roots rare, large stone at base with moulded edges.

Observations: a shallow mixed plough soil containing lithics overlies boulder clay with coarse angular fragments of sandstone. The soil profile is very wet owing to the poorly drained nature of the site. The fact that lithics are present within Unit 2 shows the degree of soil mixing due to past cultivation.

### *10.1.2 Soil Pit 2* (Illus 42)

Soil Pit 2 was positioned to define the character of the local soils up-slope to the south of trench 1 (Illus 10) and was placed approximately 10 m from the edge of the large cliff that overlooks the west edge of the site. Three units were recorded:

**Unit 1** 2001 Turfline (0–10 m);

**Unit 2** 2002 Re-deposited natural soil (0.10–0.30 m). Rounded beach pebbles intermixed with fine orange clay;

**Unit 3** 2003 Natural compacted beach pebbles (below 0.30 m). This layer had been cut by a field drain (Context 12 in Tr1) to a depth of 0.70 m. This was filled with tightly packed angular blocks of sandstone and gneiss and comprised a cut with a U-shaped profile.

Observations: Unit 2 consists of an accumulation of beach pebbles at the base of the cliff. The high stone content shows that this portion of the site was not cultivated, perhaps owing to its position close to the cliff. At some point in the 18th century (based on a fragment of white glazed pottery), a crude but effective land drain was constructed. This drain runs downhill and cuts the west edge of Tr1.

*Illus 42 Camas Daraich: Soil Pit 2*

#### 10.1.3 *Soil Pit 3* (Illus 43)

Soil Pit 3 was dug to determine the character of the soils outside the area of common grazing, and to establish the extent of any cultural material such as lithics or areas of burning. It was positioned on the top of the raised beach, some 35 m to the south of the site (Illus 10). Only two units were recorded.

| | | |
|---|---|---|
| **Unit 1** | 3001 | Well humified peat with abundant roots (0–0.20 m). Stones absent. Consistency plastic. Munsell 5YR 3/1 dark reddish brown; |
| **Unit 2** | 3002 | Natural beach deposits ( > 0.20 m). Poorly sorted rounded pebbles of varying size, in general below between 0.08 and 0.1 m in length. |

Observations: blanket peat has formed over raised beach deposits. This poorly drained area has never been cultivated. Two pieces of flaked stone were recovered.

#### 10.1.4 *Discussion*

The results from test pitting confirm that soil depth varies across the site. The soils are shallower on the crest of the raised beach but become slightly deeper towards the base of the slope to the north below trench 1. In Soil Pit 1 the soil cover rests on glacial till and possibly demarcates the limit of the beach deposit observed at the base of Soil Pits 2 and 3. More work is needed to define the precise limit of this deposit.

### 10.2 Geomorphology and palaeo-environment

*by M Cressey*

#### 10.2.1 *Background*

Previous palaeo-environmental research near to the Camas Daraich site has been undertaken by Selby (Selby 1997) and included bio-stratigraphical analyses on a series of sediment cores obtained from the peat-filled basin less than 100 m to the north-west of the archaeological site (Illus 44, centre: NG 565 002). Although local relative sea-level changes formed the main subject of Selby's research, pollen, diatom and radiocarbon data are also available.

The peat-filled basin measures 250 m × 200 m and Selby's core reached a depth of –3.26 m. Four radiocarbon dates were obtained at critical horizons within the stratigraphic profile (Table 32).

#### 10.2.2 *Results*

The Point of Sleat basin was formed as a result of glacial scouring. After de-glaciation, unconsolidated

*Illus 43 Camas Daraich: Soil Pit 3*

**Table 32 Radiocarbon dates from the Point of Sleat basin (after Selby 1997). Calibrations at 95.4% probability using OxCal v3.4 (Stuiver *et al* 1998; Bronk Ramsey 2000)**

| Code | Depth (cm) | Altitude (m OD) | Conventional $^{14}$C Age BP | Cal BC |
|---|---|---|---|---|
| Beta 93813 | 107–105 | 3.58–3.56 | 2850 ± 100 | 1400–800 |
| Beta 098612 | 173–172 | 2.91–290 | 3830 ± 60 | 2470–2060 |
| Beta 098613 | 196–195 | 2.68–2.67 | 10,460 ± 50 | 10900–10000 |
| Beta 93990 | 319 | 1.44 | 12,570 ± 70 | 13600– 12300 |

**Table 33 List of species recovered from the 4-mm flotation fraction**

| Context | Sample | Species | Number | Weight (g) |
|---|---|---|---|---|
| B3, SW, cxt 08 | s.5 | *Betula* | 7 frags | 0.03 |
| B3, SW, cxt 08 | s.5 | *Corylus* nut shell | 1 frag | 0.05 |
| C2, NE, cxt 08 | s.7 | *Corylus* nut shell | 6 frags | 0.4 |
| B1, SE, cxt 10 | s. 9 | *Corylus* | 5 frags | 0.5 |
| B1, NE, cxt10 | s.13 | *Betula* | 6 frags | 0.01 |
| B1, NE, cxt 10 | s.14 | *Betula* | 6 frags | 0.05 |
| B1, NE, cxt 10 | s.14 | *Corylus* nut shell | 1 frag | 0.01 |
| TPZ, Z03 | s.4 | *Corylus* | 1 frag | 0.01 |

*Illus 44 Camas Daraich: general view to the NW, showing the peat-filled basin and the general area of Selby's core*

minerogenic material and weathering products from skeletal soils eroded into the basin where they accumulated as sand and fine clays. According to the diatom record a fresh-water environment was present at the time of initial in-filling. At 12,570 BP (corrected to 11,820 ± 70 for carbonate shell error) local land pollen was found to be of low abundance with hazel, sedges and grasses the most dominant taxa. An increase in marine conditions is indicated by the diatoms and is thought to be related to the re-advance of ice during the Loch Lomond Stadial (when downloading of fresh ice compensated for the isostatic recovery of the land allowing sea water to invade the area).

About 10,460 ± 50 BP, regression of the sea allowed the development of hazel scrub with a fern understorey. Information over the next few millennia was lacking (a probable hiatus in sedimentation unfortunately correlates to the period of Mesolithic activity), but around 3830 ± 60 BP the sea inundated the site. The basin finally became isolated at about 2850 ± 100 BP when sea levels fell to their present position. Based on the pollen evidence, after 2850 ± 100 BP the landscape is typical of open moorland with *Calluna vulgaris* and Sphagnum mosses dominating the non-arboreal vegetation.

In summary, two episodes of relative sea-level changes are present within the Point of Sleat bio-stratigraphic record. The first appears to have occurred within the Late Devensian at around 11,820 ± 70 BP or soon after. It is possible that this is related to isostatic loading by the Loch Lomond glaciers, which were thought to have temporarily halted, or slowed, isostatic recovery of the land. This allowed the sea to inundate the area. The second high sea-level stand (the culmination of the Main Post-Glacial Transgression) is recorded at 3830 ± 60 BP and sea then fell rapidly after 2850 ± 100 BP to the present day level.

### *10.2.3 Discussion*

The position of the archaeological site on the high raised platform is probably due to the shelter afforded by the flanking cliffs on the eastern and western sides. The age of the raised beach on which it sits is probably Devensian (70,000–10,000 BP) with the storm beach to the south representing the main Late Glacial transgression. A lower shoreline to the north consisting of steepening ramps of beach boulders backed by a low terrace may be attributable to the Main Post-Glacial sea-level, which at 10 m OD (estimated) marks the culmination of the Main Post-Glacial Transgression of about 6000–6500 BP. Selby, however, suggests that the Main Post-Glacial Transgression in this area dates to between 8850 ± 170 BP and 7790 ± 100 BP, with a shoreline at about 5 m OD (pers comm, K Selby). There is certainly ample evidence of varying sea level in the vicinity of the site, though the precise dates have yet to be determined. With regard to the Mesolithic, although two marine transgressions are recorded within the peat-filled basin, these events did not impact directly on the archaeological site, which is considerably higher in altitude than the basin.

The fact that the in-filled basin examined by Selby (Selby 1997) has, at different times, been both inundated by the sea and has been a fresh-water lagoon, may have added to the attraction of Mesolithic settlement at Camas Daraich. Although access to sweet water would not have been a problem given the amount of streams and small rivers in the area, the complex history of the basin suggests that it would have provided varied resources in terms of both wildlife and plants as salinity varied and vegetation became established.

## 10.3 Macroscopic organic material *by M Cressey*

Samples taken during the excavation of trench 1 were examined for the presence of identifiable organic material. This work used routine identification techniques with reference to type material (Schweingruber 1990). Pieces greater than 4 mm were identified (Table 33), but fragments below this size were considered below the working limit for identification.

Identifiable charcoal was low in frequency in all samples. No plant macrofossil remains were observed. Both hazel (*Corylus avellana*) and birch (*Betula sp*) are represented, and hazelnut shell is also present (Table 33).

## 10.4 On-site pollen *by K J Edwards*

### *10.4.1 Pollen samples*

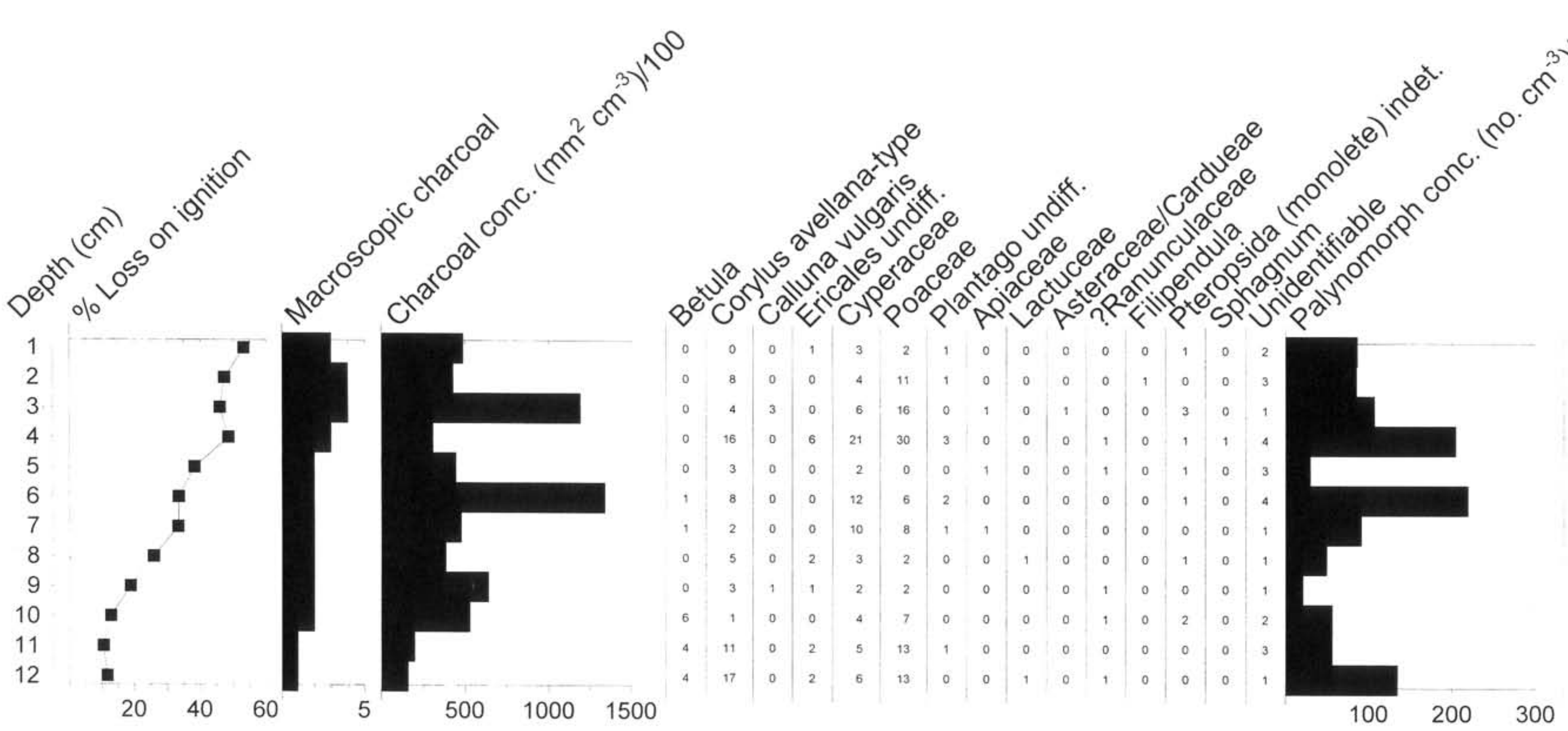
A short monolith ('sample 12': square B1 SE, context 10) was examined for its organic and palynological content. The monolith tin was obtained from context 10 at the edge of the drainage ditch (context 12) where it cut through context 10. The sample was clearly of interest as it was from an inferred cultural layer which overlay the raised beach and was possibly part of a hearth. The context contained microlithic material and produced radiocarbon dates on charred hazelnut shells (Section 11 – Radiocarbon Determinations). The possible effect of the drainage ditch is discussed below (Section 10.4.4).

### *10.4.2 Description*

The monolith consisted of 120 mm depth of what appeared to be friable black peaty soil with inclusions of clay, stones and rootlets. The peaty matrix had a silty feel suggesting a minerogenic component.

### *10.4.3 Methods and presentation of results*

The matrix was explored further by loss on ignition (LOI) of contiguous 10-mm thick samples (16 hours at 360°C). Parallel samples were prepared palynologically using standard NaOH, HF and acetolysis techniques (Faegri and Iversen 1989). The addition of tablets containing spores of *Lycopodium clavatum* enabled estimates of absolute palynomorph counts to be made (Stockmarr 1971). Samples were embedded in silicone fluid. The sieve retent (mesh




*Illus 45 Camas Daraich: analysis of the on-site pollen sample*

size 180 μm) from the NaOH wash was examined under a low-power binocular microscope.

The pollen content was exceedingly sparse (range 2106–21,868 total palynomorphs $cm^{-3}$), while microscopic charcoal was in great abundance. Consequently, it was impractical to carry out a normal pollen and spore count – they were simply noted and identified [pollen type nomenclature follows Stace (Stace 1997), amended after Bennett (Bennett 1994)] along with the charcoal counts [these all exceeded 500 fragments (range 522–998)]. Estimates were made of the area of individual charcoal fragments in two dimensions using a microscope eyepiece micrometer. The values (in 10 $\mu m^2$ units = 256 $\mu m^2$) are expressed as concentrations ($mm^2$ $cm^{-3}$). A qualitative assessment of the macrofossil charcoal content of the sieve retent was made and results are expressed on a 5-point scale (0 – absent; 1 – occasional; 2 – more frequent; 3 – frequent; 4 – abundant). All retents contained minerogenic material.

The computer programs TILIA and TILIAGRAPH (Grimm 1991) were used for presentation of the LOI, pollen and sieve retent data which are shown in Illus 45.

#### *10.4.4 Discussion*

The results (Illus 45) indicate that organic content decreased down-profile from 53.2% at the top of the monolith to around 11% in the basal two samples. This is consistent with the minerogenic component evident by feel and seen within the sieve retent. The matrix material is perhaps more akin to a soil than to a peat deposit. The friable nature of the matrix and the clay inclusions could support this inference as, of course, would the contained lithics and charred hazelnut shells which are frequent constituents of soils in Mesolithic locales. The irregular rather than smooth down-profile palynomorph distribution may indicate, however, that there were additions to the matrix (for example, material carried along the drainage ditch or on shoes).

Microscopic charcoal is present in considerable quantities (mean of 54,949 $mm^2$ $cm^{-3}$; range 15,882–134,032 $mm^2$ $cm^{-3}$) at all levels – even in the basal two samples which have least charcoal representation. The macroscopic sieve samples show most material in the >180 μm size range to be in the top 4 cm, though most of this was fairly small material in the <2 mm size category. This, and the fact that no charcoal fragments in the monolith were visible to the naked eye, would argue against the suggestion that the sample was itself part of a hearth, though a hearth may have been located close by.

Apart from the abundance of charcoal, the palynological results are disappointing. Not one sample yielded a pollen or spore count in the accepted sense, with total identifiable palynomorphs ranging from 8 to 79. All of the identifiable pollen and spores were heavily corroded or cRùmpled. This is not an uncommon occurrence in soils, although the degree of absence and damage may indicate a slow-forming deposit with constant oxidation of samples.

### 10.5 General environmental interpretation *by K J Edwards*

The site was well placed for both fresh water and shelter as well as wider resources. Given the constraints of the data it would be unwise to attempt any detailed interpretation of the Mesolithic environment. With regard to the pollen data, comment will be limited to saying that all taxa are common indicators of open ground [for example Poaceae (grasses) and Lactuceae (dandelion group)] or heath/marsh habitats [for excample *Calluna vulgaris* (heather), Cyperaceae (sedges)]. The only exception is the most frequently represented pollen grain on-site, that of *Corylus avellana*-type (cf. hazel), of which 78 grains were found, as well as some macrofossil material. Hazel was an abundant member of Skye's 8th millennium BP flora (cf. Birks and Williams 1983). The hazelnut shells from the excavation were thus probably collected locally.