3.15 The wood charcoal macro-remains from Mesolithic midden deposits at Sand, Applecross | Phil Austin

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Austin,_Sand_charcoal.pdf'.

3.15.1 Introduction

The archaeological survival of wood in the form of macroscopic charcoal is intrinsically linked to human activity, typically through the exploitation of wood for fuel. In most instances fuel would have been gathered from relatively local sources; though some form of resource selection/avoidance may have influenced the species acquired and the quantities gathered of particular woods (Shackleton & Prins 1992). The substantial quantity of wood charcoal macro-remains recovered from the excavation of midden deposits at Sand rockshelter thus provides an opportunity to gain an insight into the character and composition of the Mesolithic vegetation at a local scale, to assess the nature of woody plant exploitation, and the impact, if any, of human activity on the local vegetation.

Palaeoenvironmental studies of Mesolithic north-west Scotland are largely confined to palynological investigations. Data generated by such studies enable local to regional scale reconstructions of Mesolithic environments and remain the primary source of knowledge concerning the rate and timings of postglacial plant recolonisation. The data generated from palynology, as for all proxies, is of variable quality and the inferences made are often contentious (see for example Tipping 1994; Edwards 2000b). As a consequence of the nature of the deposits at Sand, the information recovered through speculative palynological studies was less useful than had been hoped (Green & Edwards, Section 3.16). The investigation of a further proxy, macroscopic charcoal, was anticipated to yield superior data. This was especially welcome given the paucity of charcoal studies from early prehistoric sites in Scotland.

In addition to wood charcoal most of the samples provided, including those not subject to detailed analysis, contained fragments of nut shell and, much less frequently, bone and mollusc shell. This investigation is only concerned with the results of the wood charcoal analysis.

3.15.2 Methodology

3.15.2.1 Recovery and sub-sampling

All the charred plant material was recovered through standard flotation procedures. Of the 592 samples submitted for examination, 63 were selected for detailed analysis following sorting and cataloguing. The strategy adopted aimed to provide a comprehensive account of the full range of taxa represented on the site as a whole and in individual contexts given the constraints of time and the stratigraphy (below).

Samples from both Trench A and Trench B were selected or excluded from further investigation according to the quality of the remains, including size, and the quantity of fragments. Following Keepax's (1988) recommendation that to recover the full range of taxa present in a sample or context a minimum of 100 fragments per sample should be examined, where possible preference within each context was given to single samples that contained in excess of this figure. However, many of the samples contained considerably less than 100 fragments. In such cases it was necessary to select contexts for which the combined quantity of fragments from varied samples across the context as a whole was 100 or more. In effect, several samples from the same context were treated as a single sample. Where contexts selected for study contained less than 100 fragments, even when all the samples were combined, all suitable fragments present were examined.

3.15.2.2 Identification

The selected samples were sieved using 4mm, 2mm and 1mm meshes. Material below 2mm is unsuitable for identification and no further work was carried out on material in this size category. Fragments greater than 4mm are more readily and securely identified than fragments in the 2–4mm size category and were thus preferentially selected for examination where available. However, because the woods used may have included twig wood or taxa that produce wood of small dimensions, even as mature plants, a minimum of 25 fragments per sample from the 2–4mm category were also examined where available.

To enable identification, each fragment was pressure-fractured with a razor blade to expose the transverse (TS), tangential (TLS), and radial planes (RLS), supported in a sand bath, and examined using an epi-illuminating microscope at magnifications up to ×400. Identification was determined with reference to descriptions in Schweingruber (1990) and, when necessary, to modern reference material held at the Institute of Archaeology, UCL, London.

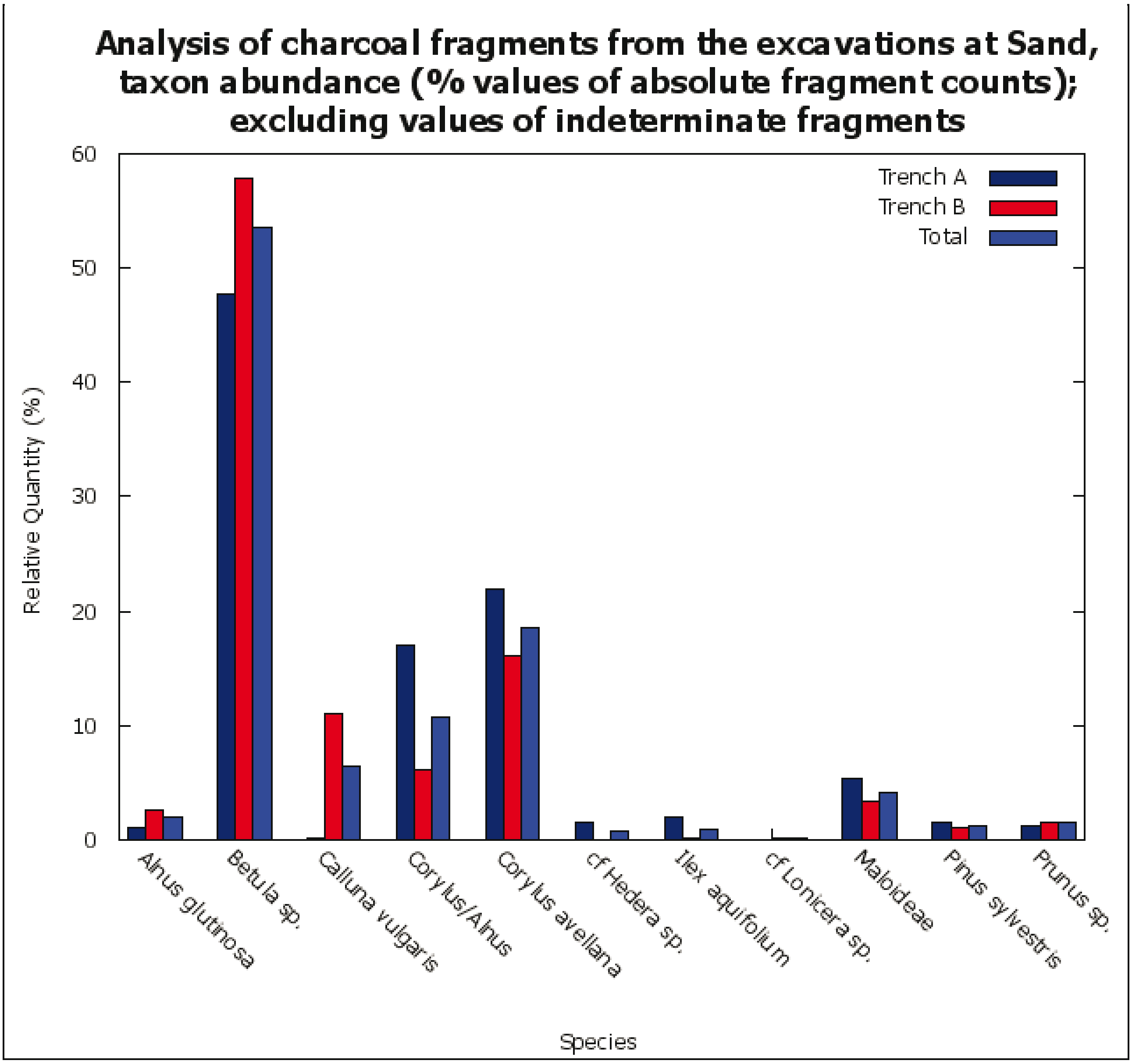
3.15.2.3 Quantification

Problems specific to the quantification of wood charcoal assemblages currently rule out the application of the more sophisticated statistical tools used for quantifying non-woody plant remains. However, a meaningful measure of taxon abundance can be made through presence analysis. Where samples have been recovered from a number of contexts, the presence/absence of a taxon in each context can be taken as a measure of the 'ubiquity' of that taxon (Popper 1989). In effect the actual number of fragments of each taxon present in each sample or context is disregarded. Thus a single fragment of taxon x for example, is attributed with the same significance as 1000 fragments of taxon y. Whilst taxon ubiquity is considered appropriate for this study, to avoid losing information concerning the actual relative frequency of individual taxa within samples/contexts, and the assemblage as a whole, absolute fragment counts were also recorded during analysis and are taken into consideration during the discussion.

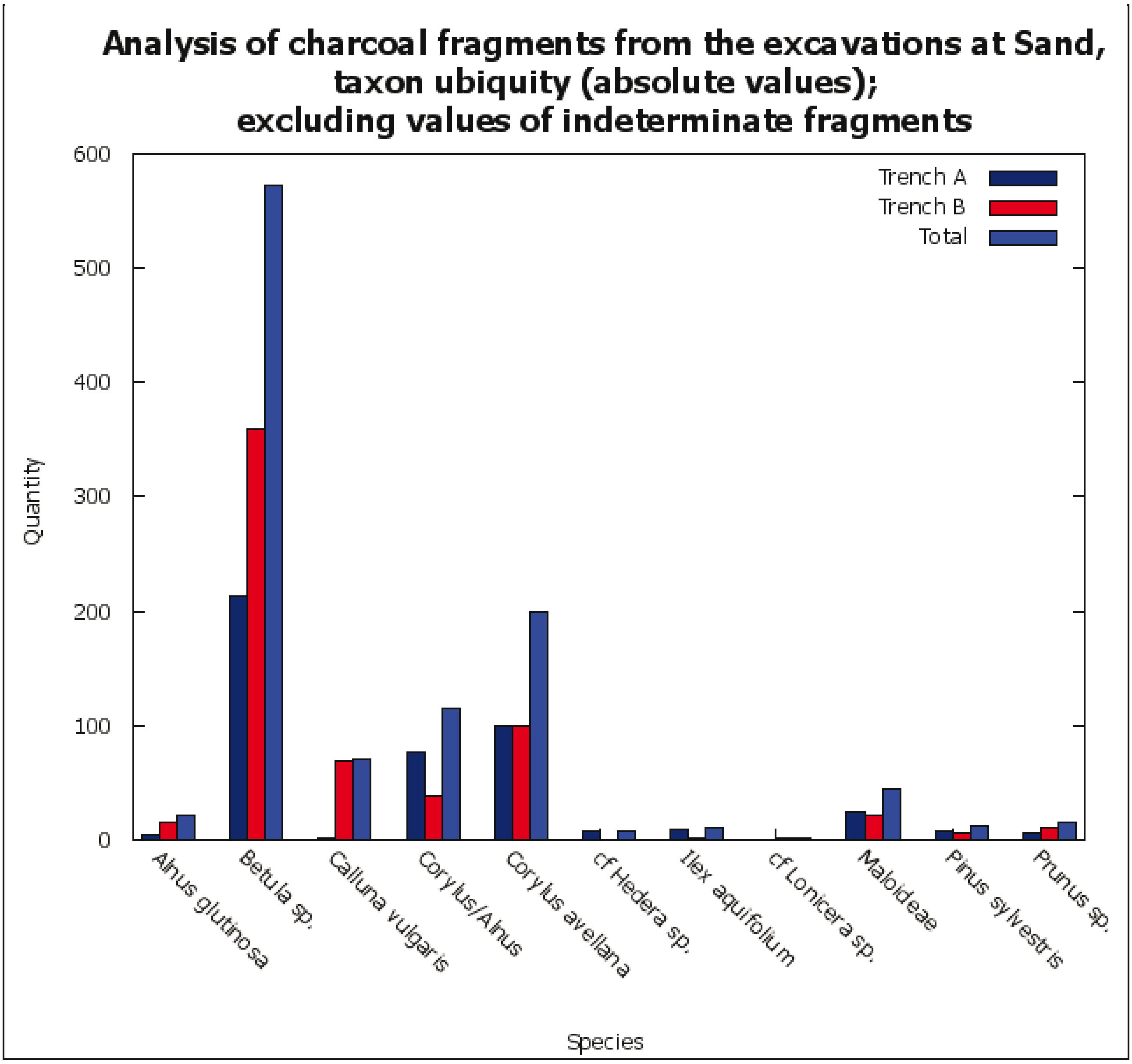
Binomial species names are given where a specimen could be securely identified as being of a particular species, or only one representative of the genus is considered indigenous to the UK, for example *Ilex aquifolium* (holly). Taxon names preceded by *cf* denote that doubts remain about the accuracy of the determination. Nomenclature follows that of Stace (1997).

3.15.3 Results

The results of this investigation are summarised in Table 172 (see pp19–20 of final report). Illustration 517 shows taxon abundance (% values of absolute fragment counts) for Trench A, Trench B, and the site as a whole. Illustration 518 depicts taxon ubiquity for both trenches and the site as a whole. Note that values for indeterminate fragments were not included in calculations and are not included in either chart (see Table 172, below). The full results and catalogue of samples are available in Appendix 11. Skip charts.



Illus 517: Analysis of charcoal fragments from the excavations at Sand, taxon abundance (% values of absolute fragment counts); excluding values of indeterminate fragments



Illus 518: Analysis of charcoal fragments from the excavations at Sand, taxon ubiquity (absolute values); excluding indeterminate fragments

Table 172

This data can be obtained from pp19–20 of the final report and its own page at `table172.html`, as the table is too large to display here.

Table 172: Summary of the results of the analysis of charcoal fragments from the excavations at Sand

NB Samples from B25B are subject to a degree of uncertainty due to a recording error during excavation that affected squares B23A–B26B

A total of 687 fragments was examined from 32 samples from eight Trench A contexts and 836 from 31 samples from nine Trench B contexts. Nine of the 11 taxa identified were common to both trenches. A single fragment of *cf Lonicera* sp. (honeysuckle) was present in Trench B only and seven fragments of *cf Hedera helix* (ivy) were present in Trench A only. Of the combined total of 1,522 fragments examined, 452 were indeterminate.

Where it could be discerned, unidentified fragments were exclusively hardwoods, and included two fragments of root wood, knot wood, and several twigs. Fragments of bark were also present throughout. Twig wood is believed to include *Calluna* (heather), and possibly members of the Maloideae and Betulaceae, but fragments were too degraded or too small to attribute with confidence. Several round-wood fragments initially identified as cf Betulaceae are included among the indeterminate because of the lack of confidence in this attribution. The Betulaceae family includes *Betula* sp (birch), *Corylus avellana* (hazel), and *Alnus* sp (alder), each of which are positively represented in the assemblage; as are *Calluna* and the Maloideae. In some instances it was not possible to differentiate between fragments of *Corylus* and *Alnus* because the anatomical features necessary for positive identification could not be observed. These fragments are recorded independently as '*Corylus/Alnus*'.

It can be particularly difficult to differentiate between members of the Rosaceae family, even as uncharred wood, though identification is usually possible to sub-family. Here, the Rosaceae are represented by the sub-families Prunoideae, genus *Prunus* (blackthorn, cherries), and the Maloideae which includes the genera *Malus* (apple), *Pyrus* (pear), *Sorbus* (whitebeams, rowan, wild service tree), and *Crataegus* (hawthorns). Despite the difficulties of identification, some Maloideae fragments were tentatively identified as '*Sorbus*-type'. Given present day biogeography the most likely of the *Sorbus* spp represented is *Sorbus aucuparia* (rowan), or one or more of its close relations. The presence of either *Pyrus* or *Malus* is doubtful. *Crataegus* is possibly represented in the samples however. Differentiation of the *Prunus spp* was not achieved here. *P spinosa* (blackthorn), *P padus* (bird cherry), and *P avium* (wild cherry) may each be represented. However, the present day distribution of *P padus* suggests that this species may have been more common perhaps than the other *Prunoideae* in Mesolithic Scotland. *Pinus* was the only coniferous species identified, though potentially *Juniperus communis* (juniper) could also have been present.

None of the taxa identified are specifically associated with coastal habitats and there is nothing to suggest the exploitation of driftwood. Though some wood may have derived from the coastal zone, the majority is believed to originate from inland terrestrial environments.

Fragment condition and morphology did not always permit assessment of growth patterns or ring counts in the transverse plane. Those patterns observed indicate that the charcoal was almost exclusively derived from medium to small diameter branches (round-wood) and twigs. No more than ten seasons' growth was noted in any fragment. No evidence of seasonality was apparent from anatomical features.

A summary of the results is given in Table 172, above. Taxon abundance (% values of absolute fragment counts); excluding values of indeterminate fragments is presented in Illustration 517 (above) and taxon ubiquity (absolute values); excluding indeterminate fragments is presented in Illustration 518 (above).

3.15.3.1 Relative frequency of taxa

Betula is by far the most frequently occurring taxon in terms of fragment numbers (n=573), accounting for 53% of the total number of positively identified fragments; followed by *Corylus* (n=199) at 19% (see Illustration 517, above). Both taxa were present in the majority of samples and the only ones represented in all 17 contexts examined (Section 3.15.1). Undifferentiated *Corylus/Alnus* fragments accounted for approximately 11% of the positively identified fragments. The true values for both Corylus and Alnus, are therefore probably greater than listed.

Of the remaining taxa, *Maloideae* (n=45) is the most ubiquitous, being present in 14 contexts, followed by *Prunus* (n=16), present in nine contexts. Despite being represented by a greater number of fragments than either of the above, *Calluna* (n=70) was restricted to eight contexts; all but one from Trench B. It is believed that *Calluna* is probably under-represented in Trench A contexts (only one fragment was positively identified). Several fragments of the indeterminate twig wood recorded in trench A samples were thought to be of this taxon (see above). The values recorded are probably lower, therefore, than the actual number of *Calluna* fragments present. Both *Alnus* (n=21) and *Pinus* (n=13) were present in seven contexts whilst *Ilex* (n=10) was represented in only five contexts. *Hedera* (n=7) and *cf Lonicera* (n=1) were each present in one sample from contexts in Trenches A and B respectively.

3.15.3.2 Fragment properties

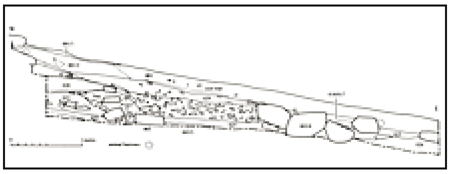
Though some fragments exhibited signs of acute thermal degradation none appeared 'vitrified'. Research carried out by Prior & Alvin (1983) suggests 'vitrification' is a characteristic associated with exposure to extremely high temperatures. The quantity of fragments thus affected, in individual samples and for each context examined, is insignificant and within the range of thermal degradation observable in fragments from small hearth-like open fires (*pers obs*). It may be significant that the most consistently and severely affected fragments were predominantly twig wood.

Fragments exhibiting features suggestive of biological degradation and/or containing fungal hyphae (typically confined to vessels) were present in all contexts from both trenches. It has been suggested that the presence of fungal hyphae is indicative of wood collected as dead-wood, as opposed to living or recently felled ('green') wood (Salisbury & Jane 1940). Biological degradation was inferred in this analysis from abnormal levels of fragment friability or fibrousness and, observed microscopically, damage to the coherence of structural features (for example through the apparent presence of longitudinal cavities characteristic of 'soft rots' (Eaton & Hale 1993). However, it should be noted that, whilst the various characteristics of cellular damage caused by the wood-rotting fungi are well known from studies of uncharred modern wood specimens (for example Eaton & Hale 1993; Rayner & Boddy 1988; Cartwright & Findlay 1958) the diagnostic value of such characteristics for recognising fungal decay in archaeological wood (charred or not) is by no means established and remains uncertain. Hyphae occurred most consistently in fragments of *Betula*, followed by *Corylus* and *Alnus* . As the hyphae are charred it is likely that fungal attack occurred prior to the wood being burnt.

The presence of mineral deposits, visible as orange-brown accretions, was noted in approximately 3% of all fragments examined. The most severely affected were so heavily impregnated that anatomical features were obscured preventing identification. These deposits are believed to accumulate over time through post-depositional leaching of minerals (predominantly iron) through the soil profile.

3.15.4 Discussion

3.15.4.1 Context and taxon representation



Illus 342: SFS 4, Sand – Trench A, south-facing section

Much the same woods are present in approximately the same proportions, with minor variations, in almost all contexts in both Trench A and B. The most conspicuous exception is the earliest of the deposits examined, an otherwise archaeologically-sterile clay-silt (26) uncovered in Trench A (A5B, A6B), which, perhaps not surprisingly, contained very little charcoal (n=27). This context is notable for being the only deposit to contain Hedera (seven of the 14 positively identified fragments). Negligible quantities of *Betula*, *Corylus*, *Corylus/Alnus* were also present. The origin of the charcoal in this context is unclear. Gravity, the topography of the site, and the unconsolidated nature of the deposits, are all important factors in the site formation processes at Sand, collectively responsible for the movement of material downslope over time (see Section 3.2). One possibility therefore is that the charcoal in (26) derived from the overlying silt-clay palaeosol (25) which is upslope (see Illustration 342, right) and had much greater concentrations of charcoal.

The presence of charcoal within the palaeosol (25) suggests that some kind of fire event preceded the main period(s) of activity at Sand. The nature and scale of the fire event(s), where they may have occurred, and the cause (anthropogenic or natural) is/are unclear, but the evidence suggests that anthropogenic fires may be implicated. Sample composition from context (25) – *Alnus*, *Betula*, *Corylus*, Maloideae, and *Pinus*, (*Calluna* may also have been present but was not positively identified) – compares favourably in most respects with the composition of samples from the main body of the organic rich silt deposits (22), and most other archaeological deposits examined here. Charred remnants of vegetation burnt *in situ*, through either natural processes ('wild fire') or human activities (clearance) are likely to include charcoal derived from both deadwood and living plants. It would be expected therefore that the range of plants and plant parts represented would be an indiscriminate mix including not only those woods gathered for fuel but also those not typically gathered for fuel (for example *Vaccinium* spp, and other small shrubs) and plant parts such as root wood (see below). Though bark fragments and higher than average proportions of twig wood were recorded in samples from (25) and (26) during cataloguing, no root wood or 'incidental' taxa were recorded during detailed analysis. The view favoured here is that (25) contains debris from deadwood purposefully gathered and burnt.

The organic rich silt (22), is more clearly an archaeological deposit yet has evidence of human activities distinct from those carried out during the following phase of the site. From the perspective of this study it is notable for being the earliest deposit to contain Calluna. The presence of this taxon in an undisturbed context (Trench B: B3B, spit 9) from early on in the site's history, and its continued presence in later contexts, is a good indication that it was an established component of the local Mesolithic flora.

Context (27), overlying (22), was unremarkable in terms of charcoal composition.

The sandy soils (29) and (17) are particularly interesting in that they contained many 'heat affected' and fire cracked stones, as well as high concentrations of charcoal. Fractured stones were abundant at the site (Clarke, Section 3.6). In both contexts the stones have moved from their original discard locations and there is no indication of the precise spot where they were exposed to fire. The presence of the stones provides some evidence of at least one function relating to the fires in which the charcoal from these deposits was formed. Although no evidence of in situ burning has been identified here, the high concentrations of charcoal in these deposits suggest that the fires occurred locally.

In Area B1 the midden deposit (13), animal-disturbed layers (13/24) and material from contexts (24) and (28), associated with midden (6), seemingly reflect discrete deposits within the midden. The lack of significant variation in the range of charcoal identified in these contexts suggests that more or less the same woods were repeatedly used. The number and frequency of fire events represented by the charcoal is unknown, though several separate episodes are evident. It is also worth noting that small fragments of other materials had percolated into and through the midden (Section 3.2) suggesting that there may have been some local movement of material which would perhaps serve to produce a more uniform range of charcoal fragments in these areas.

Samples from other discrete midden deposits in area B1, contexts (11) and (12), contained abundant charcoal remains. Surprisingly, the ashy layer (11) contained only three taxa (*Betula*, *Calluna*, and *Corylus*), whilst (12), associated with the surface of the midden, contained seven taxa and was thus more in keeping with the general trend. The later contexts (1/1) and (1) also followed general norms. These deposits, described as 'topsoil' and 'shell-mixed topsoil' respectively, were exposed just below the present day surface and it is unclear (without dating) whether the charcoal here is contemporary with the midden deposits below (the range of taxa would suggest that this is the case) or whether it is of more recent origin.

Root wood is uncommon in archaeological charcoal assemblages and so the presence of two small fragments of root-wood from an unidentified hardwood, recovered from Trench B (B6B, spit 6, SW) context (7/8), is of some interest. It is possible that charring resulted from the purposeful employment of root wood as fuel. Root wood is no less effective as fuel than wood from above ground and would have been available through the exposure of root plates following wind-throw, for example. The view favoured here, however, is that charring was incidental to an unknown fire event. Heat generated from surface fires (natural or anthropogenic) permeates below as well as above ground and can thus char surface and narrow sub-surface roots (*pers obs*) A diameter of *c*3mm was recorded for each root fragment and encourages the inference that this is indeed what happened here. It is likely that greater quantities of root wood would have been present, and in more than a single sample and context, if the local vegetation was being affected by fire on a broad scale. This deposit was formed by material that had moved downslope, accumulating around stones (7), obscuring any direct relationship between the charcoal material and the location in which it became charred. Nonetheless the presence of root wood is perhaps compelling evidence that woody plants were present in the immediate vicinity and that most of the charcoal at Sand was generated in hearth-like fires carried out on site.

3.15.4.2 Elements of the contemporary vegetation

Regarding the contemporary vegetation, the high occurrence of light-demanding taxa is striking, notably pioneer postglacial arrivals Betula and Pinus, together with the absence of large deciduous trees capable of forming closed canopy woodland, especially *Quercus* spp (the oaks) and *Ulmus* spp (the elms). The absence of these latter taxa is perhaps surprising given that both appear in the pollen record for Scotland between 6,500 and 6,000BC and, supposedly, pre-date the arrival of *Alnus* (Tipping 1994), which is present. Chambers & Elliott (1989), however, argue convincingly that *Alnus* established populations at an earlier date than the conventional hypothesis. What the factors were that hindered the establishment of oak and elm at Sand, but seemingly enabled alder to establish itself, are unclear. Oak has been identified in charcoal samples from prehistoric deposits at Meall na h'Airde sea cave (see Section 2.2). While it is unknown if these particular deposits are contemporary with those at Sand, it seems that oak was present in the region in early prehistory. Both oak and elm have also been recorded as macroscopic charcoal from Mesolithic deposits to the South, at Bolsay Farm, Islay in the late 7th millennium BC (Kaminski & Seel 2000; Ashmore 2004a & 2004b); albeit as minor components of that assemblage. Out of 1,500+ positively identified fragments from Bolsay Farm, *Quercus* was represented by 11 fragments, *Ulmus* only one. As the authors state, this is in contrast to the significantly higher values recorded for each of these taxa in pollen assemblages from nearby Loch a'Bhogaidh and Coulererach, though factors such as different catchments and/or selective collection of wood should be taken into account.

If these taxa were present in the vicinity of Sand in the past it is almost certain that they would have been represented in the assemblage. Both are excellent fuel woods and have been extensively exploited in the British Isles for artefactual and structural purposes throughout prehistory. This is particularly true of Quercus and is reflected in its status as one of the most ubiquitous taxa recovered as archaeological wood charcoal. Given the quantity of fragments examined and the distinctive anatomical features of both Quercus and Ulmus it is highly unlikely that they have been 'missed' during the sorting and identification processes. Nor are these taxa any more vulnerable to destruction than the other taxa represented. It appears that both taxa were locally absent and this may reflect the dynamic and varied character of earlier postglacial vegetation.

The trees and shrubs that are present indicate that the landscape surrounding Sand would have been characterised by areas of open woodland dominated by *Betula*, and *Corylus* scrub. *Maloideae*, *Ilex*, and *Prunus* sp are likely to have been minor components. Evidence of the open aspect of the vegetation is indicated by the presence of shade-intolerant taxa *Betula*, *Sorbus aucuparia*, *Ilex* and *Pinus*. Whereas *Corylus* is moderately shade-tolerant, it requires open conditions for successful nut production. The abundant presence of charred hazelnut shell at the site clearly indicates that open conditions must have prevailed.

As discussed above (3.15.3.1), the presence of *Calluna* indicates the early establishment of heathland vegetation in the area and it is likely to have been the dominant species where conditions were favourable. It was probably also present in birch/pine woodland associations. In present day western Scotland, Pinus is found in pure stands and as the sub-dominant component in birch/pine woodland (Carlisle & Brown 1968). In the latter *Alnus*, *Prunus padus*, and *Ilex*, may also be present and were probably so in the past.

Alder would have been present in valley bottoms and riverine habitats, given its predilection for damp, even waterlogged, environments. In these locations it would have grown in associations with, among others not represented, birch or pine. In the more favourable locations 'alder carr' may have formed. This is a distinctive type of wet woodland dominated by *Alnus* with *Betula pubescens* (downy birch) as a less prominent but constant member of the community.

Of the taxa identified birch, pine, holly, ivy and rowan, cope particularly well in poor quality or shallow soils and if exposed to harsh weather conditions for prolonged periods, even at elevated altitudes. Stresses induced by such conditions can cause modifications to the growth forms expressed by the plants living in these environments. Wind shaping and stunted growth are likely to have been a distinctive characteristic of trees and shrubs inhabiting the coastal and more exposed inland areas around Sand.

3.15.4.3 Wood acquisition: selection/avoidance, wood and fuel properties

It is difficult to extrapolate from archaeological material the extent to which selection/avoidance criteria may have affected the range of woods exploited and to identify with any certainty what criteria informed the decisions made. This may include quite specific and apparently 'irrational' cultural determinants (Shackleton & Prins 1992). The view favoured here is that wood acquisition at Sand was opportunistic and influenced primarily by environmental constraints (that is low floristic diversity) and practical considerations (for example the availability of deadwood and its accessibility), and this is supported by research on other sites such as that at Nethermills in Aberdeenshire (Boyd & Kenworthy 1992). Indeed, Boyd and Kenworthy conclude that this general pattern of use is reflected across Mesolithic Scotland wherever comparable work has been undertaken. In effect, at Sand, readily available deadwood was gathered as and when needed. Small branches seem to have been favoured over more mature large round wood and stem wood. More than likely this reflects the form of deadwood available rather than a conscious decision. Branches and twigs are the more common component of coarse woody debris and thus more consistently available than stem wood. Stem wood, in the form of fallen logs and standing dead trees ('snags'), only becomes available following the death of a tree (Samuelsson *et al* 1994). Depending on the physical capabilities of those gathering wood, branches and twigs also require less effort to carry than heavier and more cumbersome logs.

Many factors can contribute to the production of deadwood: natural senescence, disease, injury, wind, and environmental change, for example. Some taxa shed plant parts far more readily than others as part of their lifecycle or in response to stresses such as those listed. Scots pine, for instance, naturally sheds its lower branches as it ages (hence the distinctive bole of the mature tree). Birch, on the other hand, is one of the less durable taxa (Eaton & Hale 1993) and seems particularly vulnerable to various forms of fungal attack. This, alongside the comparatively short natural lifespan of birch (*c*100 years), may have resulted in deadwood of this taxon being more readily available than that of less vulnerable and longer lived taxa.

The heating properties of different woods are another aspect that is likely to have influenced the choices made when gathering wood for fire. Individual woods have different properties (Wickham-Jones *et al* 1986), and collection strategies are likely to have exploited this as the occupants of the rockshelter sought to feed their fires. Deadwood burns significantly better than wood fresh from the tree, though extensively decayed deadwood has little value as fuel (Boulton & Jay 1946), but is sought for the smoking of foodstuffs.

Betula, *Corylus*, *Ilex*, *Prunus*, and members of the Maloideae thought to be represented, are all good fuel woods. More significantly, the assemblage includes woods traditionally regarded as poor or unsuitable fuels. "Alder [*Alnus glutinosa*] is one of the worst woods for this purpose" according to one author (Robinson 1917:49). In common with most other coniferous woods *Pinus* is often considered unsuitable because of a tendency to spark dangerously and burn too quickly. The fully mature stems of *Calluna* never attain any great size and, partly as a consequence, have poor heating properties. Whilst it is therefore best employed as kindling, and most likely was used in this capacity at Sand, *Calluna* does possess a relatively more valuable property: it burns with uncommon brightness and is thus a potential source of (good) illumination.

Neither *Hedera* or *Lonicera* appear to feature in the literature concerning fuel woods. This in itself seemingly reflects the fuel value attached to these woods. In both cases it is unlikely that their presence reflects intentional gathering for fuel use unless, perhaps, as tinder or kindling. These taxa may have been incorporated into fire incidentally rather than on purpose; for example, as waste from other activities such as artefact manufacture, or because of their growth habit. Both require some form of support to ascend to canopy level. *Hedera helix* is a climber that affixes itself to the host plant by means of adventitious roots. While Lonicera, a liane, achieves the same result by entwining itself around stems and branches. In both cases they can remain attached following branch loss or the death of the host and by this means end up being charred along with the dead-wood to which they are attached.

The presence of poor fuel woods is intriguing and suggests that supplies of the better fuel woods may have been limited in some way. Whilst low biomass is a possible explanation, scarcity of preferred fuel-woods may reflect a rapid decline in deadwood availability as the result of human activities, specifically fuel wood acquisition. The reality is likely to be a combination of these factors. The evidence does not indicate how much wood was being gathered and consumed, or the rate of consumption. However, fire would have been the focus of many activities, notably the heating of stones and food processing, in addition to providing warmth, light, and a degree of protection. To meet these needs wood gathering may have been necessary on a daily basis. If this was so, total wood consumption could have been considerable over a relatively short time, perhaps as little as one or two seasons, and much of the immediate area may have been denuded of deadwood. This in turn would have required the occupants of the rockshelter to travel greater and greater distances to obtain wood until, presumably, a critical point was reached and the better option was to move to another site where wood supplies were more readily available. However, the impact of wood gathering is unlikely to have had a significant long term impact on the surroundings, at least while living trees and shrubs remained to continue to provide deadwood.

The only direct evidence of plant exploitation at the site consists of the charcoal itself, which indicates the use of a variety of woods for fuel, together with the charred hazelnut shell. The high occurrence of hazel charcoal and hazelnut shell gives some indication of the importance of this plant to the population at Sand as a source of foodstuffs and fuel. The widespread importance of hazelnuts in the Mesolithic economy is well known and need not be reiterated here (see Carruthers 2000 for a detailed discussion of hazelnut exploitation at the Mesolithic site of Staosnaig, Colonsay). No doubt many other taxa represented here were exploited other than as fuel, though there is no evidence to suggest what these modes of exploitation may have been or what parts were being used. It is possible that the bark fragments present in several samples may represent waste from non-fuel use. Birch bark, along with the inner bark of scots pine, has been used in northern Europe as food in times of famine (Niklasson *et al* 1994), for example. Pine resins and pitch extracted from birch bark have also been used as adhesives in artefact manufacture and the papery outer bark of birch, which is excellent tinder, can be used to construct waterproof containers. Other possible uses include fodder (ivy and holly), and medicines. Holly berries for example, are purgative and emetic whilst the leaves have been used in the past to treat fevers. Poles from hazel and other woods may have been used to construct shelters and other structures. Wood from trees and larger shrubs would have been used to make various objects, including weapons and tools. These examples are by no means detailed or exhaustive but serve only to illustrate the myriad of possible uses to which wood and wood products may have been put in the past.

3.15.5 Summary

The charcoal reflects the successive accumulation of debris from small open fires which were located close to midden deposits and used for a range of activities including food processing. The wood used to fuel these fires was most probably collected as deadwood and included poor as well as good fuel woods. The range of woods identified and the proportional representation of each taxon is consistent throughout the site, with only minor variations, irrespective of the nature of each context. This is thought to reflect the short time that the site was in active use, the low diversity of the contemporary woody flora from which the wood originated, and the opportunistic exploitation of deadwood resources. Open woodland dominated by mixed birch/pine and hazel communities probably constituted the principal form of vegetation and this is supported by the work of Shiel on the vegetation of the area today (Shiel, Section 8.2).

Published by The Society of Antiquaries of Scotland, in association with the Council for British Archaeology and Historic Scotland.
Available free of charge in HTML format (see Terms & Conditions of Use).

Use http://www.sair.org.uk/sair31 to cite this page.
ISSN 1473-3803; ISBN 978 090390361 5

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

- … > Documents > Final Reports > Austin,_Sand_charcoal.pdf [final]
- … > Documents > Specialist Reports > Sand_charcoal_report,_Austin.pdf [draft]
- … > Images > Plans and Sections > SFS_FD16.jpg [Illustration 342]
- … > Data > Artefact and ecofact catalogues > Sand_charcoal_archive.pdf [Appendix 11 final]
- … > Documents > Specialist Reports > charcoal_table.pdf [Appendix 11 draft]