

APPENDIX 3

CARBONISED PLANT MACROFOSSILS AND CHARCOAL

by

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Introduction

This report analyses the carbonised plant macrofossils and charcoal recovered from the hand-retrieved and bulk samples taken from the land-based excavations at Dun Bharabhat, Lewis. A total of 25 samples were submitted for analysis, 15 of which produced carbonised remains.

Research basis

The samples were processed as part of doctoral research to produce a regional synthesis on the prehistoric use of plants in Lewis (see Appendix 2). A number of recurrent research questions were formulated for the archaeobotanical remains from each of these sites including;

1. Is it possible to propose generic taphonomic models for the origin, preservation and subsequent dispersal of the carbonised plant macrofossils on the site?
2. What materials were used for fuel?
3. What wood and timber was used and how was it procured?
4. Can aspects of arable agriculture be seen in the archaeobotanical record, from the crops grown to the crop-processing procedures employed?
5. What other plants were gathered and for what purpose?

Methods

On-site sampling

The sampling for the bulk samples has been outlined in Appendix 2, forming the basis of the sampling for both the archaeobotanical and sedimentary analysis.

Bulk sample processing

The bulk samples were processed using a flotation tank (Kenward *et al.*, 1980) with the residue held by a 1.0 mm net and the flot caught by 1.0 and 0.3 mm sieves respectively.

All the flots and residues were dried and sorted using low-powered stereo/binocular microscope at x15-x80 magnification. All macrofossil identifications were checked against botanical literature and modern reference material from collections in the Department of Archaeology, University of Edinburgh. Generally, charcoal identifications were carried out on transverse cross-sections on fragments measuring from 4mm. Anatomical keys listed in Schweingruber (1992), in-house reference charcoal and slide-mounted micro-sections were used to aid identification. Asymmetry and morphological characteristics were also recorded. Nomenclature follows Stace (1991) with ecological information taken from Clapham *et al.* (1989), Stace (1991) and Pankhurst and Mullin (1994).

Results and discussion

Table 4 outlines the provenance, phasing and generic context type of the samples that contained plant macrofossils. The charcoal from the bulk and hand-retrieved samples is presented in Table 5, whilst the cereal and wild species are presented in Table 6 and 7. These results are interpreted below in terms of 1) the material from the occupation layers, with any differences between phases highlighted and 2) the hand-retrieved charcoal and bulk sample (C.169) from the destruction levels. The results are then discussed in terms of other assemblages within the Western Isles and Atlantic Scotland.

Occupation levels

Plant macrofossil taphonomy and fuel sources

As stated in Appendix 2, it is possible to propose from the site stratigraphy and sedimentary analysis two general taphonomic models for the preservation and subsequent dispersal of carbonised plant macrofossils across the site. The first involves the *in situ* burning represented by the destruction deposits (e.g. the hand-retrieved charcoal samples and C.169 bulk sample) and the hearth material (e.g. C.131a). The second involves the subsequent removal and dispersal of the plant remains from the central hearth into the surrounding occupation levels, such as S.87/4 and S.87/6. This can take the form of deliberate cleaning of the hearth by the occupants or gradual

incorporation of small amounts of ashy material into the surrounding floor levels over time.

In Atlantic Scottish archaeobotany, it is necessary to disentangle the fuel-derived plant macrofossils from those relating to use of plants by humans. The detailed mineral magnetic analysis in Appendix 2 has demonstrated that ash of peaty turf and well-humified peat was recovered from the main complex Atlantic roundhouse (CAR) occupation and the secondary occupation respectively. Past research has shown that different fuel types produce varying numbers and proportions of plant parts and species (McLaughlin, 1980; Dickson, 1998; Church *et al.*, in prep. b). For example, peaty turf usually produces relatively large quantities of small culm bases and rhizome fragments, fibrous burnt peat and some seeds of the heathers (*Ericaceae*), grasses (*Poaceae*) and the sedges (*Carex* spp.). Well-humified peat however, produces relatively large quantities of a much more amorphous burnt peat and very few residual plant macrofossils, usually consisting of rhizome fragments. We would therefore expect to see this difference in the four samples analysed e.g. Contexts 131, 165, 210 (secondary occupation hearth material) and C.176 (ash spread in main CAR occupation layers). The three samples from the secondary occupation that were derived from well-humified peat ash correspondingly contained little residual material (a small culm base from C.210), apart from amorphous burnt peat fragments. Conversely, C.176 contained a mix of fibrous and amorphous burnt peat fragments that would be expected for peaty turf (see Table 5). However, it did not contain any other residual material. This could be explained through different burning conditions to those from the experimental research (Church *et al.*, in prep. b), which could preclude the preservation of certain classes of plant material, such as seeds (cf. Wilson, 1984; Boardman and Jones, 1990). It therefore has proved possible to separate the few fuel-derived plant macrofossils from the bulk of the assemblage, which presumably relate to plants from other uses being incorporated into the hearths and resulting ash (*infra*).

Burnt peat fragments were examined from all the bulk samples, which demonstrated that amorphous peat was dominant within the secondary occupation samples, suggesting that well-humified

peat was the major fuel source. The samples from the main and primary/pre-CAR occupation contained a mix between amorphous and fibrous peat, indicative of the use of both well-humified peat and peat turf as fuel. Edwards and Lomax (Appendix 1) outline a phase of increased inwash of eroded material into the loch that occurs throughout the first millennium BC. They suggest increased human activity, coupled with climatic deterioration, as the likely cause. It seems reasonable therefore to suggest that the peaty turf may well have been cut from the surrounding land, which would have made the catchment more susceptible to erosion. In the secondary occupation towards the end of the first millennium BC, more reliance was put on well-humified blanket bog that was probably cut outwith the catchment, on the Uig Peninsula for example. However, caution must be exercised when interpreting landscape change from a small sample assemblage.

Charcoal

Tree and shrub taxa include birch (*Betula* sp.), Ling heather (*Calluna vulgaris* L. Hull), hazel (*Corylus* sp.), pine (*Pinus* sp.) and spruce (*Picea* sp.) All the taxa, except the spruce, could have grown locally (Appendix 1). Nearly all the fragments were roundwood (i.e. from a twig or small branch), except for the pine and spruce. Very few fragments were recovered, which suggests accidental or residual burning rather than wood as a fuel. Indeed, it seems likely that the concentration of Ling heather fragments in C.158 (pre/primary CAR occupation) relates to the burning of peaty turf outlined above. Also, fragments of wood are commonly found in peat used as fuel, which could account for the presence of local taxa. However, the presence of a single fragment of spruce within C.131a points to the collection of driftwood that is discussed in terms of timber procurement in the section below. Generally, little interpretation on the use of trees and shrubs is possible from such a small assemblage.

Arable agriculture

Cultivated plants are represented by grains (caryopses) and rachis internodes of barley (*Hordeum* sp.) Where preservation allowed further identification (see Figures 57 and 58), most of the grains were hulled. The largest assemblage (54 cereal components) came from

C.158 (pre/primary CAR occupation) and contained 15 hulled grains and the only 2 naked grains on the site. It is impossible to evaluate whether naked barley was grown deliberately from such a small assemblage, as the naked grain could be an accidental contaminant of a hulled barley crop. The rachis internodes and asymmetric grains indicate the presence of six-row barley (*H. vulgare* L.), the dominant crop in Iron Age Atlantic Scotland.

It is likely that the grains were incorporated into the archaeological record through cooking accidents or during accidents in the final crop-processing stage for hulled barley. This involves drying the grain prior to the removal of the hulled material by gentle grinding, a process called graddening observed in the domestic setting of the Northern Isles in near-recent times (Fenton, 1982; Holden, 1998). This drying procedure necessitates exposure to heat, which could be achieved using the central hearth. It also requires a specific tool kit, such as saddle querns and grinders, a possible example of which was recovered from the occupation levels. This suggests that we are observing the final stage in the crop-processing procedure with the likely removal of the 'waste' products conducted off-site. However, some of this material can be brought on to the site for various uses, and then become accidentally carbonised on the central hearth. For example, a few cereal-sized culm bases and nodes from straw were recovered from five of the samples. The presence of the culm bases suggests that the crop was harvested by up-rooting, perhaps for ease but also to maximise the straw return from the crop. Also, C.206 contains a number of seeds and a six-row barley rachis that may represent further crop-processing debris, such as the remains from winnowing. The seeds from this sample are dominated by Wild turnip (*Brassica rapa* L.) with a few seeds of common Chickweed (*Stellaria media* L. Vill.), Fat Hen (*Chenopodium album* L.) and knotgrass (*Polygonum* sp.). All were common weeds of crops in prehistory, with Wild turnip a common weed of arable land in the machair. This issue of crops in the wider landscape is addressed below, with reference to the evidence from the destruction level and the off-site pollen record.

Gathered material and other useful plants

Little evidence was recovered for the gathering of other plants. Ling heather (*Calluna vulgaris* L. Hull) charcoal and leaf fragments were found in a few of the samples, which could have been used for furnishings and basket making, for example the peat basket found in the underwater excavations. However, the presence of burnt heather fragments can also be explained by the burning of turves from heathland.

Summary

The carbonised plant macrofossils from the occupation levels consist of a small assemblage with a low density and range of plant remains. They stem from the carbonisation of material within the central hearth and subsequent spread and dispersal into the occupation levels. Hence, the assemblage comprises 1) material derived from the fuel, 2) small fragments of charcoal 3) hulled barley grain from the final crop-processing stage or cooking accidents and 4) limited material, including straw, from earlier crop-processing stages.

Destruction level of secondary occupation

During the excavation, a destruction level from the secondary occupation was revealed across much of the interior of the roundhouse. The level consisted of lenses of burnt material, burnt bone and fragments of pottery interleaved between burnt timbers, some up to 60cms in length. These timbers were arranged in such a way as to suggest the fallen remains of a structural entity of the secondary building, the most likely candidate being the roof. Some of the timbers were sampled by hand and two bulk samples were taken from the interleaving lenses. C.137 was a sample of inorganic clay affected by heating (see Appendix 2) and C.169 on analysis appears to be the remains of a barley thatch.

Macrofossil preservation and taphonomy

All the plant macrofossils, from the thatch to the burnt timber are very well preserved. For example, the degree of preservation for all the grain from C.169 was compared to the grain from C.158, which was representative of the preservation from the occupation levels (see Figures 57 and 58). The two samples were compared using indices formulated by Hubbard (1990). Over 65% of the grain from C.169 lay

within the two best preservation classes, indicating near perfect preservation, whereas over 85% of the grain from C.158 lay within the two worst preservation classes, indicating severe degradation of the grain. This allowed much more detailed identification to be possible for C.169 than is usually possible for material derived from the occupation levels from Atlantic Scottish sites. This excellent preservation stems from the carbonisation process that occurred during the presumed conflagration of the roof. The roof, if left to burn, would eventually have collapsed. This would have provided excellent conditions for slow carbonisation of plant material at a relatively low heat, within a reducing atmosphere (Gordon Thomas, pers. comm.). Experimental work by Boardman and Jones (1990) has shown that these conditions produce the best preservation, in terms of density, condition and the range of plant parts, many of which (the chaff, culms and seeds) would be destroyed in higher temperatures.

The destruction level is also important in terms of its taphonomy, because we can confidently relate the plant remains to specific functions. For example, the burnt timbers were used as structural components within the roof, whilst the cereal rich C.169 has been interpreted as a barley thatch, though it may be possible that it represents bedding, flooring or stored straw within the loft or roof of the structure. This degree of certainty when dealing with macrofossil taphonomy is very rare within Atlantic Scotland, because of the nature of the taphonomic models presented above. This removes the usual problems of taphonomic interpretation, so more confident and detailed analysis of issues such as timber procurement and arable agriculture are possible from such remains.

Timber

Five hand-retrieved samples were taken of the burnt timber. C.169 also contained fragments of burnt timber. The timber seems to be entirely composed of pine (*Pinus* sp.) and spruce (*Picea* sp.), with small amounts of birch (*Betula* sp.), Ling heather (*Calluna vulgaris* L. Hull) and rootwood of indeterminate taxa. The timber was in excellent condition and so identification was possible for most fragments, including the ring counts for all the fragments. The rings per fragment have been presented for the different taxa from all the hand-retrieved sample and C.169 separately. Figures 53 and 54 show the relatively

low ring counts for the birch and Ling, with the highest counts being 16 and 8 respectively. Also, all the fragments were of roundwood suggesting that small branches and twigs were present within the roof, perhaps as furnishings such as heather rope or birch wattle. Both these taxa would have been available locally.

Figures 55 and 56 show the ring counts for all the spruce and pine from the hand-retrieved samples. All the fragments were of timber with the highest ring counts for the spruce and the pine 60 and 94 respectively. The high number of low ring counts reflects fragmentation following recovery of the charcoal, rather than the presence of roundwood or selection of smaller timber. The ring counts from C.169 (Figures 57 and 58) show a greater differentiation between the ring profiles of the two taxa, with less fragmentation of the charcoal within the comparative protection provided by a bulk sample. The pine seems to be of a greater age than the spruce, with the highest counts being 60 and 17 respectively. Further morphological characteristics provide information on the nature and origin of the timber. Several of the spruce fragments contained bore holes, which past researchers have taken as evidence for the use of driftwood (Malmros, 1994; Taylor, 1999). This seems to be the likely source for the spruce, as the taxa is non-native to the British Isles during the Iron Age. The timber could have drifted from North America or even Siberia, having first been transported through the Arctic (Dickson, 1992). The pine did not exhibit any sign of boreholes and bark fragments were recovered from C.169. Also, the ring pattern from the larger pine fragments was very narrow, which suggests the tree was growing in very stressed conditions. This evidence coupled with the presence of Scot's Pine (*Pinus sylvestris* L.) pollen in subzone BH2.IIIb (Lomax and Edwards, Appendix 1), suggests the use of locally-derived timber. Therefore the procurement strategies for timber were both opportunistic, in terms of the driftwood, and also potentially managed in the case of the locally-derived pine.

Thatch

As stated above, C.169 contained a high density of very well-preserved carbonised cereal plant macrofossils. Much of the plant material was derived from cereal straw including nodes, bases and thousands of culm fragments. The

assemblage was therefore interpreted as a possible fragment of thatch. The straw crop seems to be a mix of six-row hulled barley (*Hordeum vulgare* var. *vulgare* L.) and two-row hulled barley (*Hordeum distichum* var. *vulgare* L.). From the proportions of the rachis fragments 73% of the assemblage was six-row with 27% two-row. Also, in two-row barley only symmetric grain is produced whereas six-row barley produces asymmetric and symmetric grain in a ratio of 2:1. Hence, the ratio of 1.4:1 within C.169 confirms a mix of six-row and two-row barley, with the six-row species dominant. The identification of two-row barley is surprisingly rare within the Atlantic Scottish Iron Age. This is partly because of the relative rarity in survival of those features (sterile lateral spikelet and rachis internode) that are used to differentiate the species but also may suggest sophisticated management of the arable resource through selective cultivation of specific species and variants for different functions. For example, the presence of two-row barley in a thatch may represent particular qualities the straw from this species exhibit.

The crop seems to have been harvested by uprooting, due to the high number of culm bases of both cereals and smaller monocotyledons and weed associations with low lying plants, such as the violets (*Viola* sp.). The straw would have been removed early in the crop-processing, during the threshing stage for example. This is confirmed by the ratio between the culm bases and the basal rachises (4.6:1), which shows that most of the ears were separated from the straw prior to its use as thatch. Hence, we can estimate approximately 80% efficiency for the separation of the ear from the straw during early crop-processing.

The presence of wild taxa within the straw presumably relates largely to weed contamination of the crop. Heather furnishings, such as rope or twine, can explain the limited presence of heathland taxa, such as *Erica/Calluna* spp. The remaining taxa are all common weeds of cultivation and dry grassland. The presence of Chickweed (*Stellaria media* L. Vill.) indicates relatively nitrogenous soil conditions, presumably enhanced through the addition of animal manure and seaweed to the soil. Several of the species, including Ray's knotgrass (*Polygonum oxyspermum* Meyer & Bunge ex Ledeb.), Bulbous

buttercup (*Ranunculus bulbosus* L.) and Wild turnip (*Brassica rapa* L.) have strong associations with machair grassland (Pankhurst and Mullin, 1994). This evidence coupled with a second series of pollen sequences from Loch na Beirgh (Lomax, unpubl.), points to the cultivation of the crop occurring largely within the machair grassland behind Traigh na Beirgh. The presence of Wild turnip within the occupation levels (e.g. C206) may also point to the repeated use of the machair as the primary environment for arable cultivation.

Comparison to other sites

Bhalthos Peninsula

Dun Bharabhat was excavated as part of a wider investigation of the common structural Iron Age forms in the Western Isles (Harding and Armit, 1990). Two other structural forms, the wheelhouse complex at Cnip and the CAR and post-CAR occupation at Loch na Beirgh (Harding and Gilmour, 2000), were also excavated on the Bhalthos peninsula during this research campaign. Carbonised plant macrofossils have been analysed from both of these sites (Church, 1996; forth. a) and the assemblages, though different in certain details, are remarkably similar in their basic composition. For example, there is a strong correlation with the predominantly six-row hulled barley crop and Wild turnip, which suggests that all three sites were growing their crops in the machair over the half millennium that the sites were occupied, again supported by the pollen record (Lomax, pers. comm.). Scot's Pine (*Pinus sylvestris* L.) and coniferous non-native taxa, such as spruce (*Picea* sp.), were also recovered from the other two sites, along with a small assemblage of locally derived roundwood taxa. So again, timber procurement was through driftwood collection and local management. Also, as noted in Appendix 2, detailed mineral magnetic analysis of ash from all three sites has shown that the predominant fuel source was well-humified peat (Church *et al.*, in prep. a), seemingly from the same localised position within extensive blanket bog. These striking similarities of plant use and management indicate co-operation between the occupants of the site, in terms of resource management. They also indicate long-term stability in not only these relationships, but also in the division and tenure of the different landscape zones, such as the peatland, machair and shore

that lasted for over half a millennium (Ceron-Carrasco *et al.*, in prep.).

Western Isles and Atlantic Scotland

Several recent excavations at Iron Age sites in the Western Isles have yielded plant macrofossil assemblages and the results of these are summarised and compared by Church (forth. b), with general patterns of plant exploitation emerging. Driftwood is common on many sites (Dickson, 1992; Taylor, 1999), though few sites have large quantities of burnt structural timber like Dun Bharabhat. Most charcoal assemblages consist of low densities of locally derived taxa, similar to the assemblage from the occupation levels at Dun Bharabhat. Six-row hulled barley (*Hordeum vulgare* var. *vulgare* L.) is the dominant crop, though the presence of two-row barley (*H. distichum* L.) is occasionally noted. Naked barley, usually of the six-row species (*H. vulgare* var. *nudum* L.), is also occasionally noted, with some sites, such as the Howe (Dickson, 1994), containing predominantly the naked variant. The cereal assemblages from most sites are dominated by grain, indicating that the crop is generally preserved in its final stages of crop processing, presumably during drying or cooking accidents. The weed associations with the crops are complicated because of the residuality of the fuels burnt in the hearths. However, a number of

researchers have proposed likely zones of cultivation. For example, Smith (1999) suggests that the barley crop recovered from the Iron Age levels at Dun Vulcan, South Uist was probably grown in the interface between the machair and the heathland interior. This zone would have been hundreds of metres from the site, being located within or adjacent to the machair plain during the Iron Age and this cultivation practice is clearly different to those employed by inhabitants of the Bhaltois Peninsula. Therefore, although a barley monoculture seems to dominate, actual cultivation practices change between different areas and regions. Regional variation also seems to appear between the procurement and use of fuel types. For example, the dominant fuel source for the Lewis sites appears to be well-humified peat (Church *et al.*, in prep. a), with the large reservoir of blanket bog already established within the interior of Lewis by the early Iron Age. Preliminary mineral magnetic analysis of other sites from Atlantic Scotland, such as Cille Donain in South Uist (Batt and Peters, forth.) and Old Scatness, Shetland (Clare Peters, pers. comm.) have shown a much greater range in the fuels used, including wood, well-humified peat, peaty turf and fibrous peat. Hence, a picture of continuity and variation is emerging for plant use in the Atlantic Scottish Iron Age.

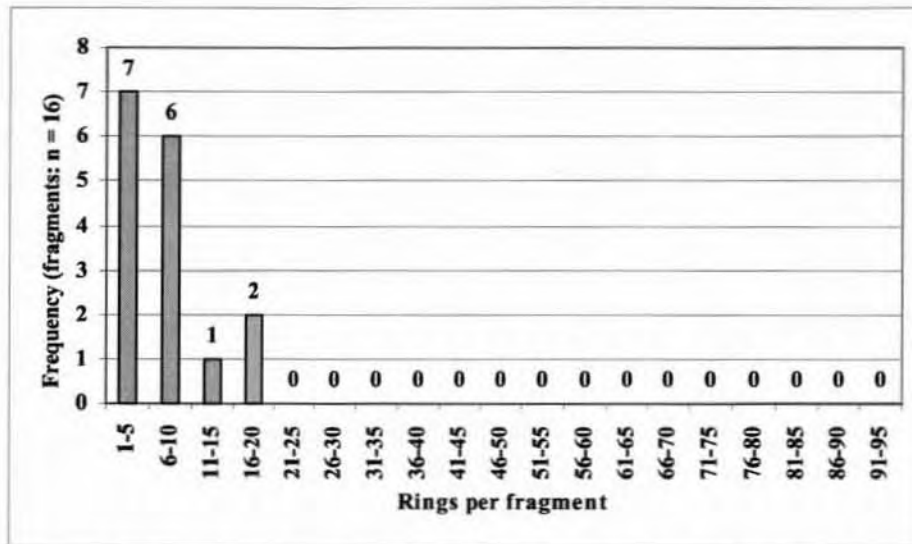


Figure 53: Rings per fragment for Birch (*Betula* sp.) from destruction level

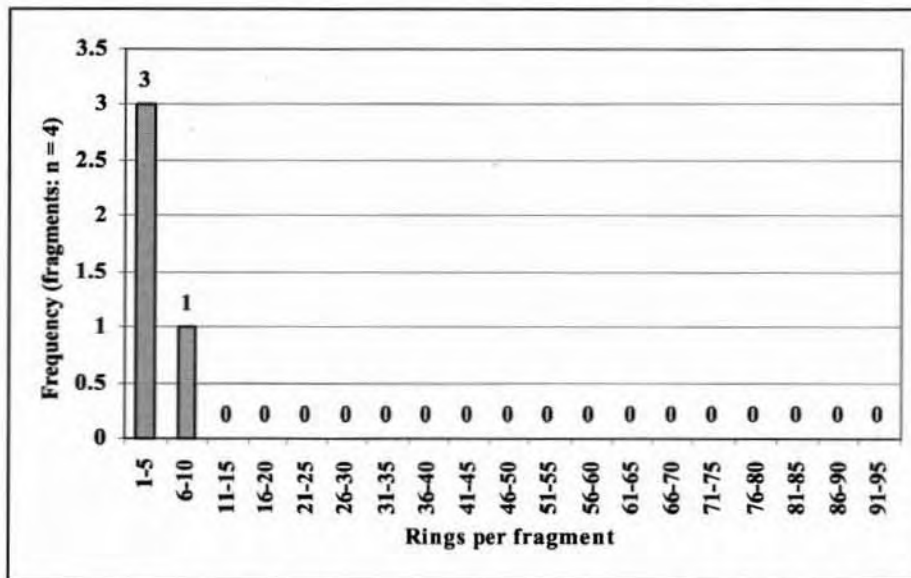


Figure 54: Rings per fragment for Ling heather (*Calluna vulgaris* L.) from destruction level

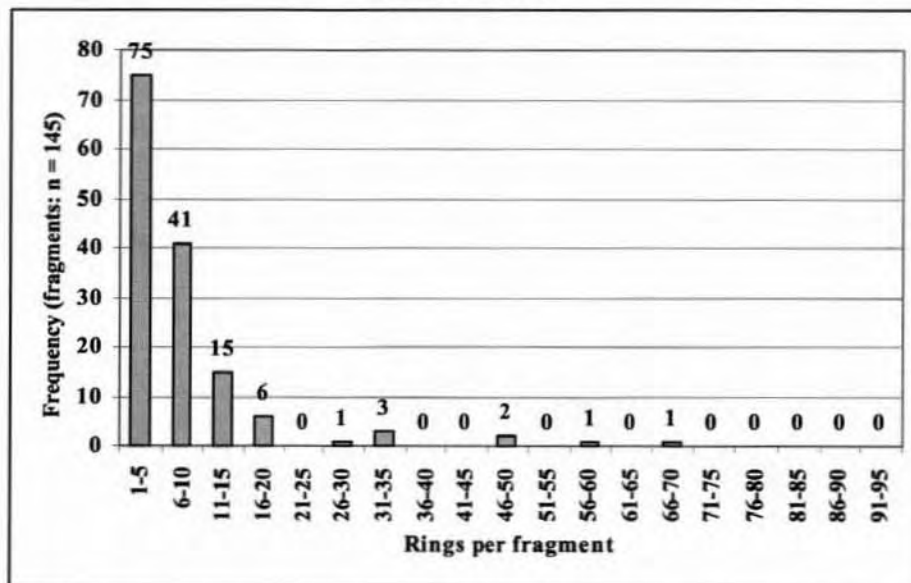


Figure 55: Rings per fragment for Spruce (*Picea* sp.) from destruction level

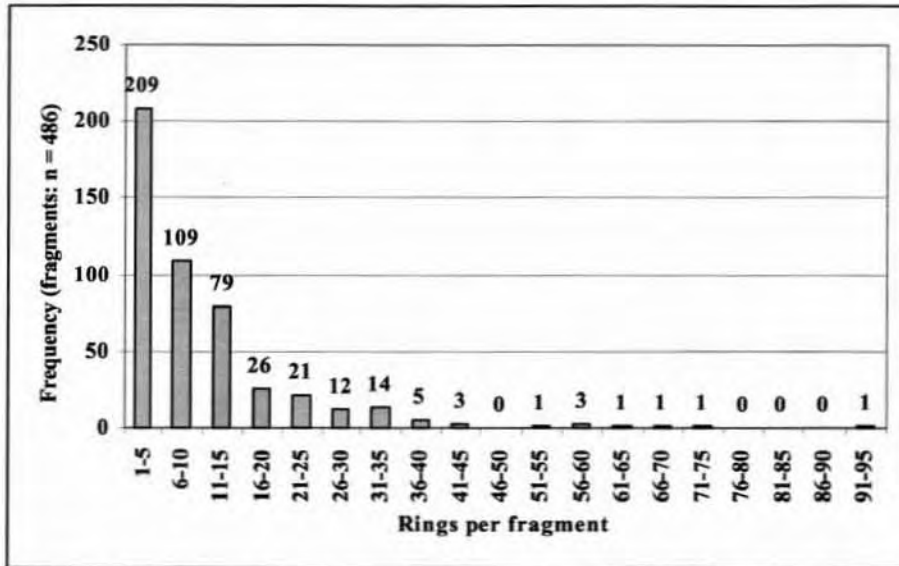


Figure 56: Rings per fragment for Pine (*Pinus* sp.) from destruction level

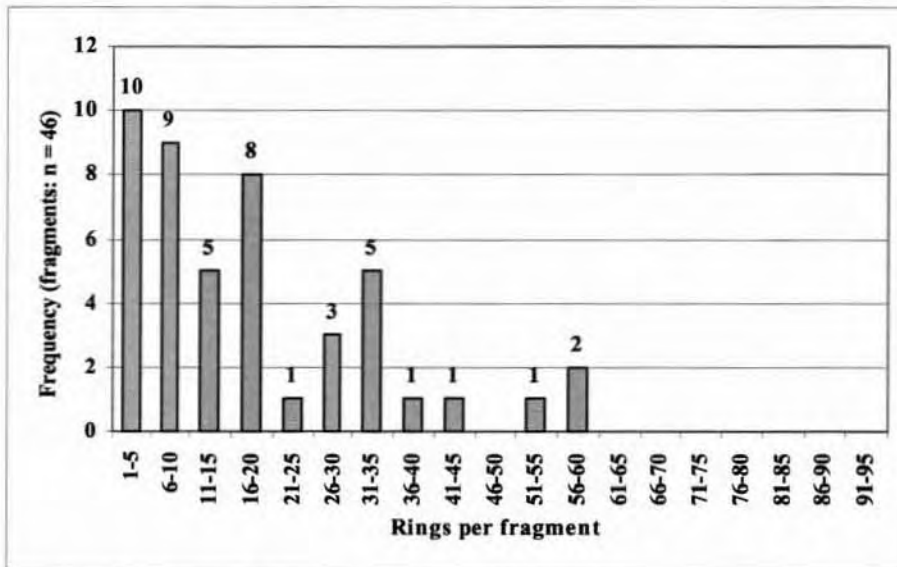


Figure 57: Rings per fragment for Pine (*Pinus* sp.) from C.169 bulk sample

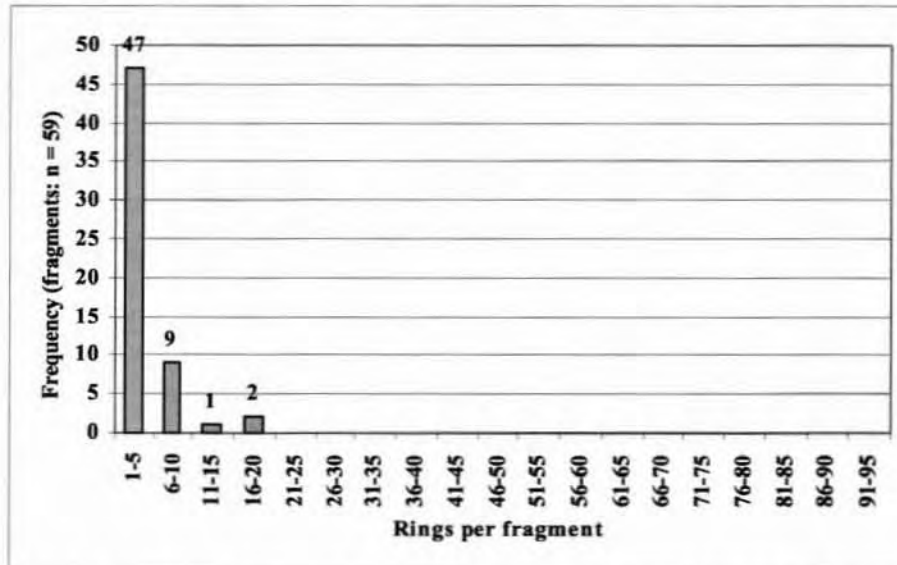


Figure 58: Rings per fragment for Spruce (*Picea* sp.) from C.169 bulk sample

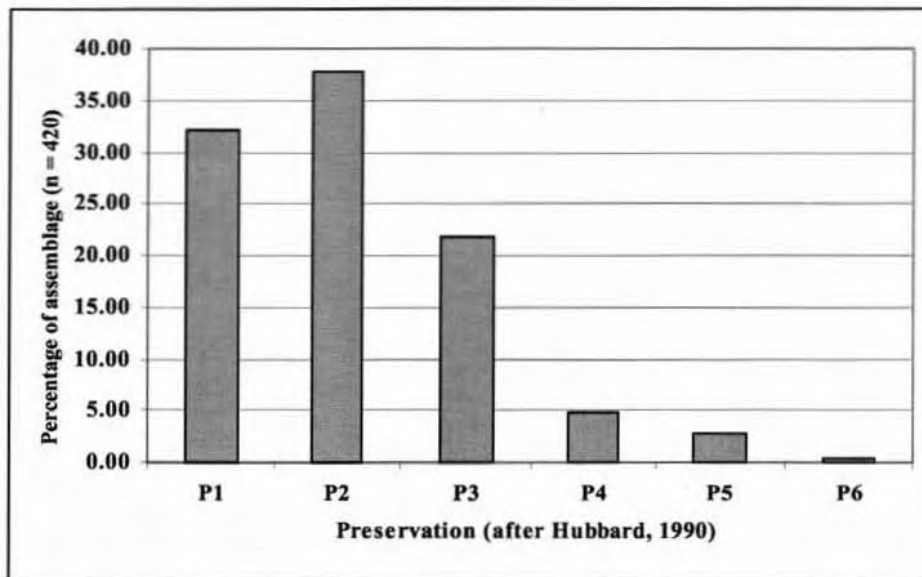


Figure 59: Preservation of grain recovered from C.169 (destruction level)

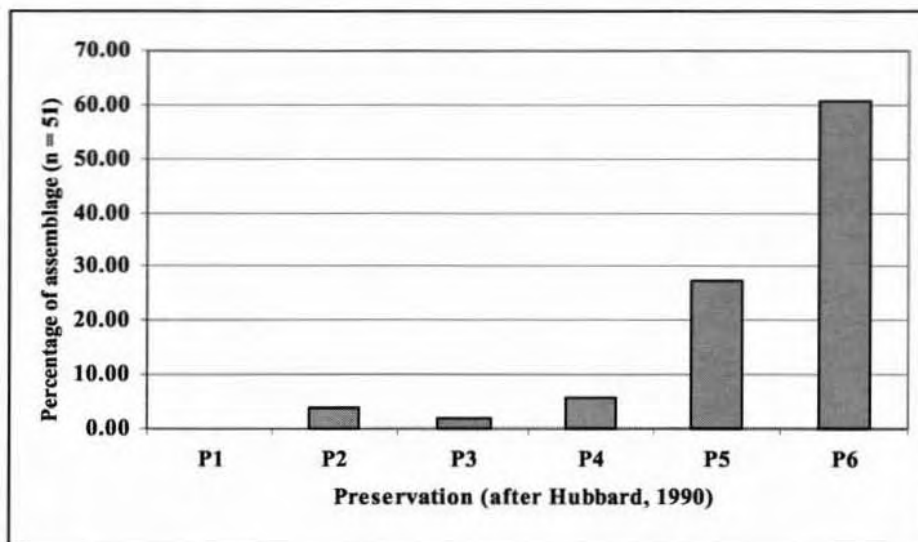


Figure 60: Preservation of grain recovered from C.158 (primary level)

Appendix 3

Sample	Context	Volume (litres)	Phase	Phase notation	Generic context type
	128 N quad	n/a (hand retrieved)	Destruction	D	Destruction
	137B	n/a (hand retrieved)	Destruction	D	Destruction
	174	n/a (hand retrieved)	Destruction	D	Destruction
87/2	181	n/a (hand retrieved)	Destruction	D	Destruction
87/5	186	n/a (hand retrieved)	Destruction	D	Destruction
	169	5	Destruction	D	Destruction
	161	5	Secondary occupation	S	Gallery fill
	164	5	Secondary occupation	S	Gallery fill
	131a	5	Secondary occupation	S	Hearth
	165	5	Secondary occupation	S	Hearth
87/13	210	5	Secondary occupation	S	Hearth
	206	5	Main CAR occupation	M	Occupation
87/4	177	0.5	Main CAR occupation	M	Occupation
87/6	176a	5	Main CAR occupation	M	Occupation
	158	5	Primary or pre CAR occupation	P	Occupation

Table 4: Samples that contain plant macrofossils

Sample							87/13
Context	158	206	161	164	131a	165	210
Phase	P	M	S	S	S	S	S
Volume (litres)	5	5	5	5	5	5	5
<i>Betula</i> sp. (birch) roundwood	2F (10.19)						
<i>Calluna vulgaris</i> (L.) Hull. (Ling heather) roundwood	17F (0.71)	1F (0.01)	1F (0.01)				4F (0.12)
<i>Corylus</i> sp. (hazel)					1F (0.02)		
<i>Picea</i> sp. (spruce)					1F (0.03)		
<i>Pinus</i> sp. (pine)	1F (0.01)	1F (0.01)				1F (0.01)	
<i>Pinus</i> sp. (pine) bark							
Indeterminate rootwood	6F (0.21)						
Indeterminate roundwood				1F (0.01)			
Indeterminate fragments	2F (0.08)						
Total fragments	28F	2F	1F	1F	2F	1F	4F
Total weight (g.)	1.20	0.02	0.01	0.01	0.05	0.01	0.12

Sample					87/2	87/5
Context	169	128 N quad	137B	174	181	186
Phase	D	D	D	D	D	D
Volume (litres)	5*	n/a	n/a	n/a	n/a	n/a
<i>Betula</i> sp. (birch) roundwood	2F (0.03)					16F (4.17)
<i>Calluna vulgaris</i> (L.) Hull. (Ling heather) roundwood	8F (0.57)		4F (0.48)			
<i>Corylus</i> sp. (hazel)						
<i>Picea</i> sp. (spruce)	59F (14.75)	24F (45.5)	73F (35.76)	23F (4.64)		25F (3.31)
<i>Pinus</i> sp. (pine)	46F (3.83)	43F (65.91)	103F (63.29)	122F (45.47)	113F (122.46)	105F (13.95)
<i>Pinus</i> sp. (pine) bark	3F (0.6)					
Indeterminate rootwood						
Indeterminate roundwood						
Indeterminate fragments	14F (1.07)					
Total fragments	132F	67F	180F	145F	113F	130F
Total weight (g.)	20.85	111.41	99.53	50.11	122.46	21.43

Table 5: Charcoal from all samples

* = Identification from 25% of charcoal greater than 4mm in C.169 bulk sample.

Sample				87/4	87/6					87/13	
Context		158	206	177	176a	161	164	131a	165	210	169
Volume (litres)		5	5	0.5	5	5	5	5	5	5	5
Phase		P	M	M	M	S	S	S	S	S	D
Cereals											
<i>Hordeum</i>											
H. sp. caryopsis	Barley grain	11									
H. sp. basal rachis	Barley basal rachis										34
H. hulled caryopsis	Hulled barley grain	9			2				2		77
H. cf. Hulled caryopsis	cf. Hulled barley grain	6							1		
H. hulled asymmetric caryopsis	Hulled barley twisted grain							1			185
H. hulled symmetric caryopsis	Hulled barley straight grain										133
H. naked caryopsis	Naked barley grain	1									
H. cf. naked caryopsis	cf. Naked barley grain	1									
H. <i>distichum</i> var. <i>vulgare</i> L. rachis internode	Two row hulled barley rachis										28
H. cf. <i>distichum</i> var. <i>vulgare</i> L. rachis internode	cf. Two row barley rachis										28
H. <i>distichum</i> var. <i>vulgare</i> L. basal rachis	Two row hulled barley basal rachis										9
H. <i>distichum</i> var. <i>vulgare</i> L. caryopsis	Two row hulled barley grain										4
H. <i>distichum</i> var. <i>vulgare</i> L. sterile lateral spikelet	Two row hulled barley sterile lateral spikelet										42
H. <i>vulgare</i> var. <i>vulgare</i> L. rachis internode	Six row hulled barley rachis	1	1						1		150
H. <i>vulgare</i> var. <i>vulgare</i> L. basal rachis	Six row hulled barley basal rachis										23
H. <i>vulgare</i> var. <i>vulgare</i> L. asymmetric caryopsis	Six row hulled barley twisted grain										7
H. <i>vulgare</i> var. <i>vulgare</i> L. symmetric caryopsis	Six row hulled barley straight grain										14
Cereal indeterminate caryopsis	Cereal grain	23		1							
Cereal indeterminate culm fragment	Cereal straw fragment										1000F+
Cereal indeterminate culm base	Cereal straw root base	1 (1F)						1	1	1	302 (10F)
Cereal indeterminate culm node	Cereal straw node	1		1						1	1299 (55F)

Table 6: Cereal carbonised plant macrofossils from bulk samples

Sample				87/4	87/6					87/13	
Context		158	206	177	176a	161	164	131a	165	210	169
Volume (litres)		5	5	0.5	5	5	5	5	5	5	5
Phase		P	M	M	M	S	S	S	S	S	D
Weed seeds											
<i>Ranunculus</i> cf. <i>repens</i> L. fruit	Creeping buttercup										1
<i>Ranunculus</i> cf. <i>bulbosus</i> L. fruit	Bulbous buttercup										1
<i>Stellaria media</i> (L.) Vill. seed	Common chickweed	2	1								1
<i>Chenopodium album</i> L. seed	Fat-Hen		1								
<i>Polygonum</i> cf. <i>oxyspermum</i> Meyer & Bunge ex Ledeb. fruit	Ray's Knotgrass										2
<i>Polygonum</i> cf. <i>aviculare</i> L. fruit	Knotgrass										8
<i>Polygonum</i> sp. fruit	Knotgrass		2								3
<i>Viola</i> sp. fruit	Violet										7
Brassicaceae undiff. capsule base	Cabbage family										2
<i>Brassica rapa</i> L. seed	Wild turnip	1	39			5					155
<i>Brassica/Sinapis</i> spp. seed	Cabbage/Charlock						1				
<i>Erica/Calluna</i> spp. capsule/ovary	Heather	4				1					2
<i>Erica/Calluna</i> spp. stem/leaf	Heather										3F
<i>Calluna vulgaris</i> (L.) Hull stem/leaf	Ling										18F
<i>Erica tetralix</i> L. stem/leaf	Cross-leaved heather										4F
<i>Galeopsis tetrahit</i> L. seed	Common hemp-nettle										
Poaceae undiff. (medium) caryopsis	Grass grain	1				2					3
Poaceae undiff. (medium) floret/spikelet	Grass spikelet										7
<i>Carex</i> sp. (trigonus) fruit	Sedge						2				
Monocotyledon culm base	Monocotyledon straw root base									1	169
Monocotyledon culm node	Monocotyledon straw node	1									109 (13F)
Monocotyledon rhizome	Monocotyledon rhizome fragment										4F
Indeterminate seed/fruit	Unidentifiable										10
	Totals										
	Total grain components	51		1	2			1	3		420
	Total chaff components	3	1	1				1	2	2	1915
	Total cereal components	54	1	2	2	0	0	2	5	2	2335
	Total wild species	7	43			8	3			1	480
	Total quantifiable components	61	44	2	2	8	3	2	5	3	2815
	Quantifiable components/litre	12.2	8.8	4	0.4	1.6	0.6	0.4	1	0.6	563

Table 7: Wild species and summary totals of carbonised plant macrofossils from bulk samples