Proc Soc Antiq Scot, 124 (1994), 155–171

The excavation and environmental investigation of a sub-peat stone bank near Loch Portain, North Uist, Outer Hebrides

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ABSTRACT

A stone bank and associated deposits, previously exposed by peat-cutting, were investigated by probing, excavation, microfossil analysis and radiocarbon dating. The excavation was organized and funded by Historic Scotland. Radiocarbon dating indicates that the bank was constructed probably in the earlier half of the first millennium BC. *Pollen analysis shows the bank was built in an area of poor heath-grassland and provides no evidence of arable farming at the time of construction. Investigations of microscopic charcoal provide evidence of burning in the locality during the second millennium* BC, *a phenomenon which has also been observed at other Hebridean sites.*

INTRODUCTION

Field walls, banks and other structures buried by peat are known from numerous locations in the British Isles (eg Herity 1971; Caulfield 1978; Whittington 1980; 1983; Williams 1982; Stevenson 1985). Such phenomena are especially important because of their potential in extending our knowledge of prehistoric settlement and the farming economy. Landscapes sealed by peat are likely to be in a better state of preservation than open, intensively farmed areas where monument destruction has been common. Furthermore, peat and acid soils can act as excellent media for the preservation of palaeoecological material.

Two sub-peat walls, constructed upon deposits of pre-existing peat rather than directly on minerogenic substrates, have recently been reported on the Isle of Lewis (Bohncke 1988; Newell 1989). Here we present the archaeological and environmental examination of another similar Outer Hebridean site. The site, on the island of North Uist, consists of a short linear stone bank located in a small valley. The deposits associated with this feature are discussed in the light of pollen, microscopic charcoal and radiocarbon analyses.

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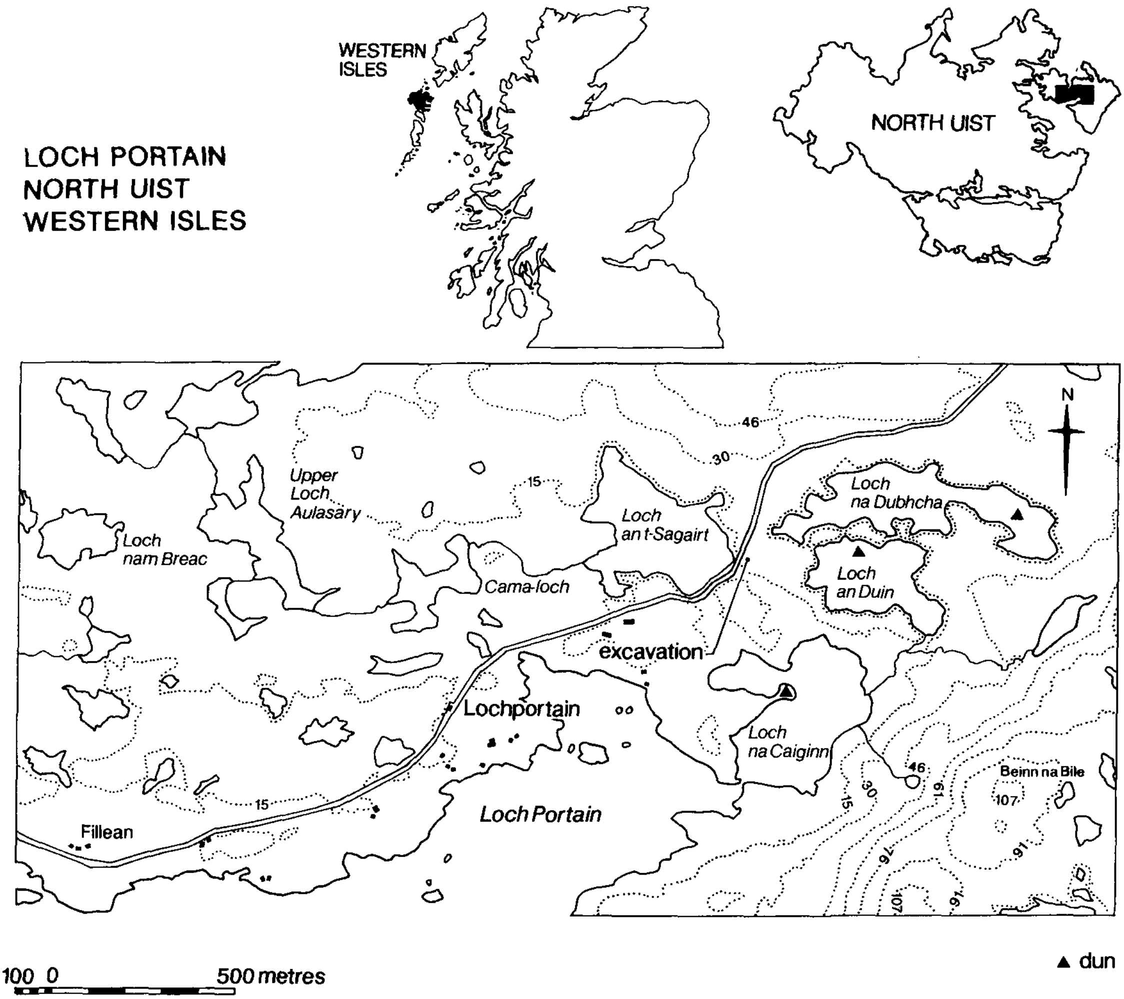
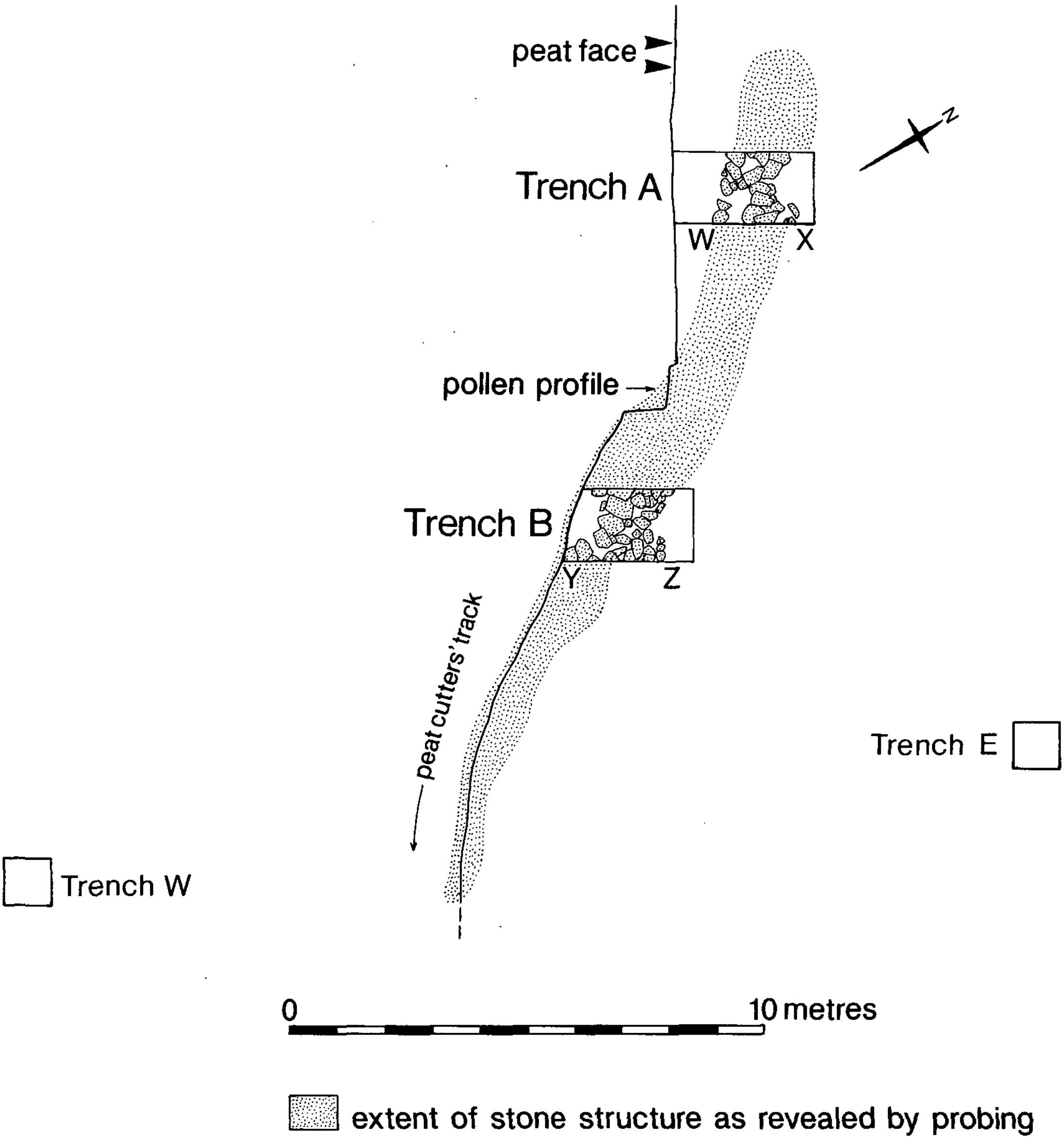


Illus 1 Location map. *Based upon the Ordnance Survey map © Crown copyright*

THE SITE AND FIELD INVESTIGATIONS

The buried stone bank is located in an old peat cutting at about 15 m OD to the south of the Loch Portain road (NGR 950 724). The peat cuttings are in the base of a small, NW/SE trending valley lying between Loch an t-Sagairt and Loch na Caiginn (illus 1). When first seen by the writers in 1986, the structure was visible intermittently over a distance of 16 m in the cut peat face (illus 7). Probing suggested that the stonework was continuous and extended some 20 m within the peat, terminating at its southern end at a peat-cutter's track (illus 2), and that it was 1–1.9 m wide. The visible stone consisted of boulders of Lewisian gneiss (the local bedrock), up to 0.6 m in diameter. They appeared to be laid in three irregular courses but had tumbled in many places.

The initial archaeological investigation consisted of the sectioning of the stone feature in two locations (Trenches A & B) to examine its structure (illus 2 & 3).



ILLUS 2 Plan showing the extent of the stone bank near Loch Portain, and the locations of the trenches and the pollen profile

TRENCH A

A line of boulders, 1.4 m wide, up to 0.6 m high and in three rough courses, was revealed and sectioned (illus 3). The boulders, all Lewisian gneiss, varied from 0.2 to 0.7 m in diameter. They lay over a peat deposit of some 0.8 m depth and were covered by a further 0.3 m of peat.

TRENCH B

The bank in Trench B (illus 3 & 8) was more dispersed than in Trench A, being 1.65–2.2 m wide. Its western edge was defined by a rough line of large boulders, against the eastern side of which smaller stones had been piled. The humified peat immediately beneath the boulders in the southern section of Trench B was mottled orange/brown and uneven in texture. The mottled peat overlay a further 13 cm of humified peat, the upper 3 cm of which contained two clear layers of black peat, possibly charcoal-enriched. A highly humified, amorphous peat was present amongst the stones of the bank and some of the boulders had tumbled onto it. The boundary between this layer and the underlying mottled peat was not well defined. A further 0.3 m of peat had developed over the stone feature.

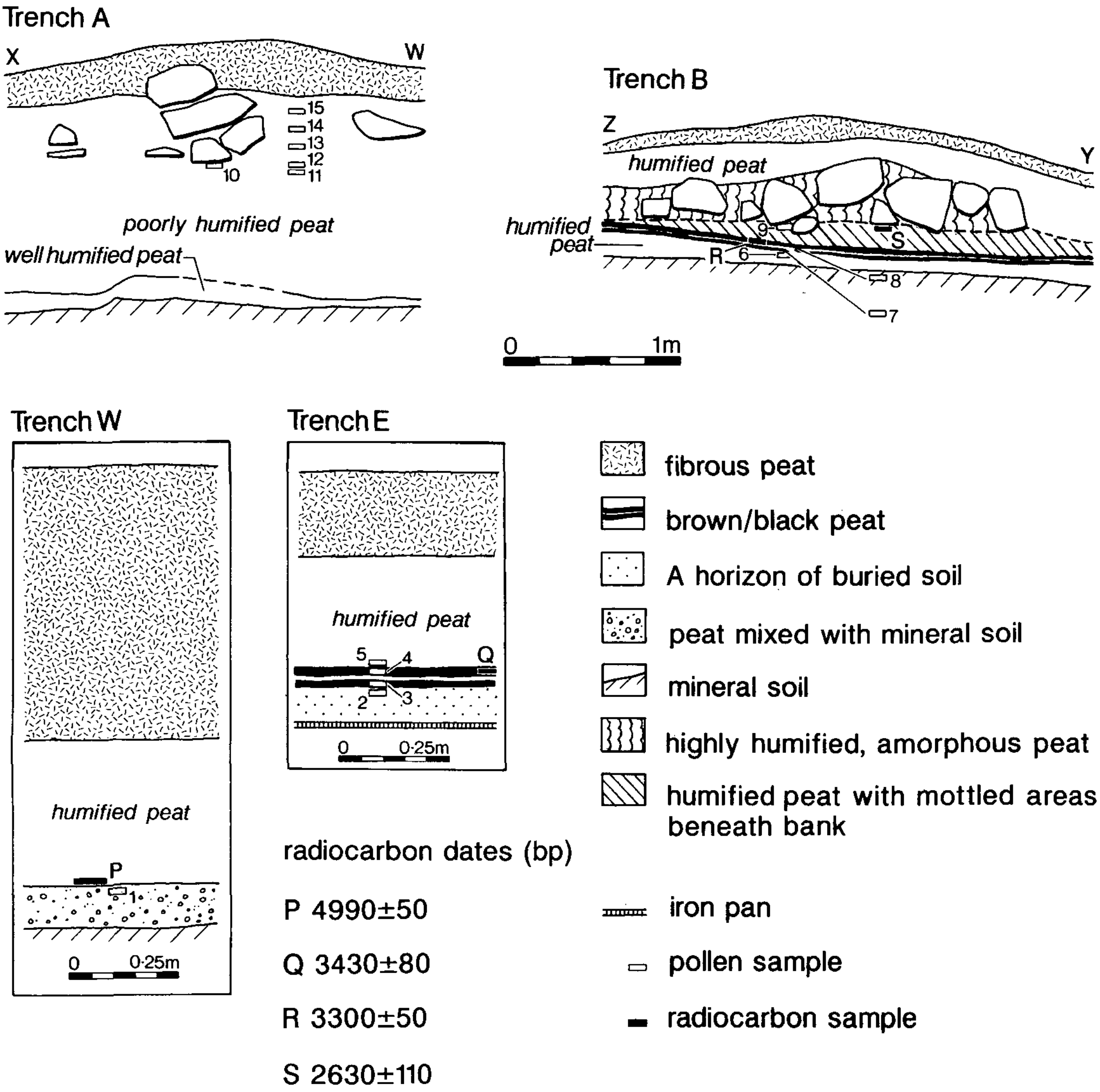
FIELD INTERPRETATION

It was thought originally that the exposed stones formed part of a field boundary. However, probing failed to locate any more than the 20 m length described above. The north-western end of the bank is preserved under peat which is apparently uncut, and there are no abutting stone banks here or elsewhere. Its southern end is exposed in a peat cutting and probing failed to detect any continuation in uncut peat farther south. Although most of the area around the feature had been cut for fuel, no further lines of stone which might have formed part of a field system had been revealed. Extensions and abutting boundaries may have been constructed of peat. It is also possible that parts of the stone bank were dismantled in antiquity.

During excavation, the most tenable hypothesis seemed to be that the stone feature was a linear clearance cairn formed by piling stones to one side of an area cleared for cultivation. It was thought that an earlier slight peat bank might be represented by the mottled uneven peat under the stones in Trench B although it must be stressed that there was no evidence for a comparable feature in Trench A.

It was decided to examine the stratigraphy of two test pits, one on either side of the stone feature (illus 2 & 3) to locate and examine evidence for cultivation associated with the feature. In Trench E, to the east of the feature, the stratigraphy was similar to that in Trench B, clearly showing two thin layers of black, greasy peat, the upper of which was composed of a series of very fine laminations, of alternating black or dark grey colour, just visible to the naked eye. The presence of these laminations suggested that some in-washing of material had occurred. The two black layers were not present on the western side (Trench W) of the bank, where a 0.1 m deep band of peat mixed with mineral matter lay at the base of the profile, immediately above the mineral soil.

These observations seemed to confirm the field interpretation. The post-excavation analyses were designed to explore further the nature of the supposed cultivation, its relationship with the stone bank, and the date and the environmental conditions pertaining at the time of the bank's construction. The nature of the dark organic layers at the base of the peat in Trenches B and E also required elucidation as did the nature of the mixed peat and mineral soil to the west of the bank, interpreted in the field as evidence of arable cultivation.



ILLUS 3 Sections (from Trenches A & B) through the stone bank, and (from Trenches E & W) through sediments to either side of it. The locations of pollen spot samples and radiocarbon samples are shown

ENVIRONMENTAL INVESTIGATIONS

PALYNOLOGY

Samples for pollen, spore and microscopic charcoal analysis were taken with the aims of investigating the general environmental history of the site and testing the field interpretation. The former was investigated with the aid of a profile from the open peat face in the peat cutting ('pollen profile' in illus 2). Although samples were not obtained from this profile for the period during which the stone bank was being engulfed by peat, this period should be satisfactorily covered by the spot samples from Trench A (Samples 12–15). The stratigraphy associated with the pollen profile is shown in the column to the left of the pollen diagram (illus 4).

The pollen profile samples were prepared using standard NaOH and acetolysis techniques (Faegri & Iversen 1989), and, for spot samples, a 'swirling' technique (Hunt 1985). In both cases, tablets of *Lycopodium clavatum* spores were used to determine palynomorph concentrations. Silicone oil was used as the embedding medium. A minimum total land pollen (TLP) count of 250 grains was employed for the pollen profile samples. In the pollen profile diagram (illus 4), pollen is represented as a percentage of the TLP sum with spores as a percentage of this sum plus spores. Microscopic charcoal fragments encountered during the pollen counts were also tallied and are represented as unit area (20 × 20 μm) concentrations to the right of the pollen diagram.

The locations of the spot samples (Samples 1–15) from Trenches A, B, E and W are shown in illus 3. Silicone oil was used as an embedding medium. A minimum sum of 300 grains TLP was counted. Charcoal fragments were tallied in size classes based on the length of the largest axis. Pollen, spore and charcoal data for the spot samples are presented in illus 5 and 6.

Loss-on-ignition determinations were made to elucidate the character of some key layers. Samples were oven dried before being ignited at 400° C for four hours.

RADIOCARBON AGE DETERMINATIONS

Samples of peat were dated at the Radiocarbon Dating Laboratory of the Scottish Universities Research and Reactor Centre, East Kilbride (Table 1). The second humic acid fraction was dated in all cases. The dates are quoted in radiocarbon years and are uncalibrated with respect to dendrochronological age. The errors are expressed at the 1 sigma level of confidence.

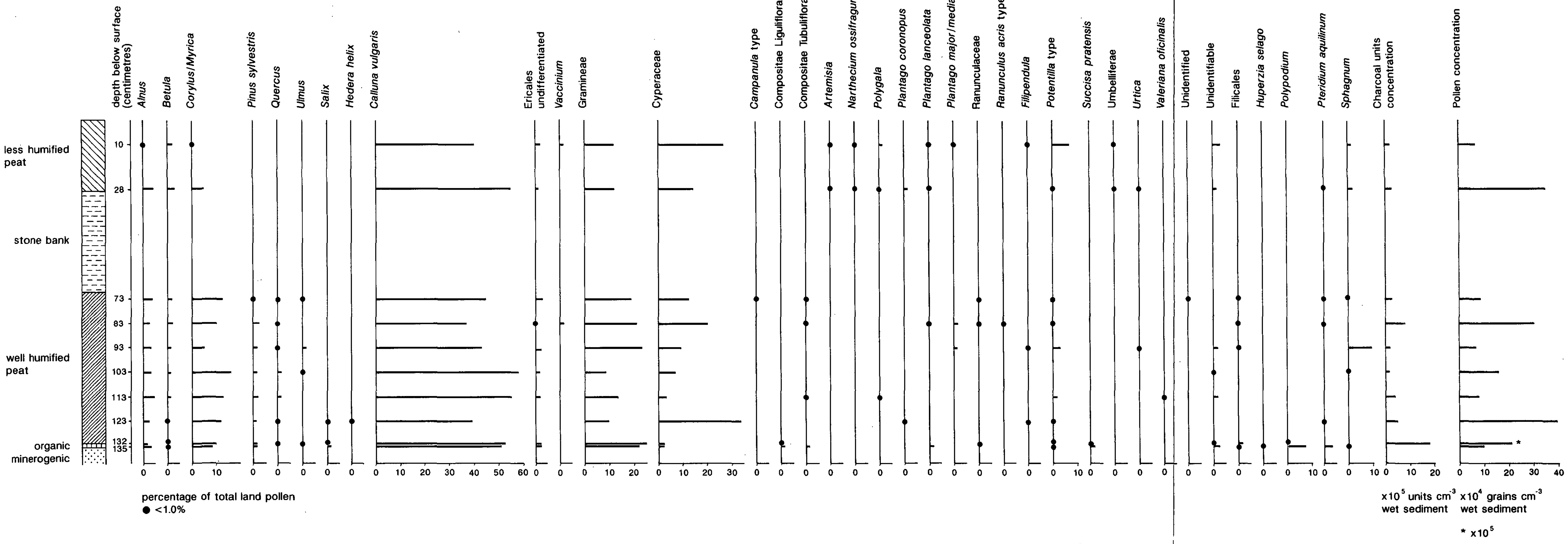
TABLE 1
Radiocarbon age determinations (Sample letters P–S refer to sample locations on illus 3)

Sample	Laboratory Code	Description	Radiocarbon Years
S	GU-2452	1 cm thickness of peat from immediately beneath the stone bank in Trench B	2630±110 bp (680±110 BC uncal)
R	GU-2453	1 cm thickness of peat from the upper dark band of peat in Trench B	3300±50 bp (1350±50 BC uncal)
Q	GU-2456	1 cm thickness of peat from the upper dark band of peat in Trench E	3430±80 bp (1480±80 BC uncal)
P	GU-2455	1 cm thickness from the base of the undisturbed peat overlying the mixed peat and mineral matter in Trench W	4990±50 bp (3040±50 BC uncal)

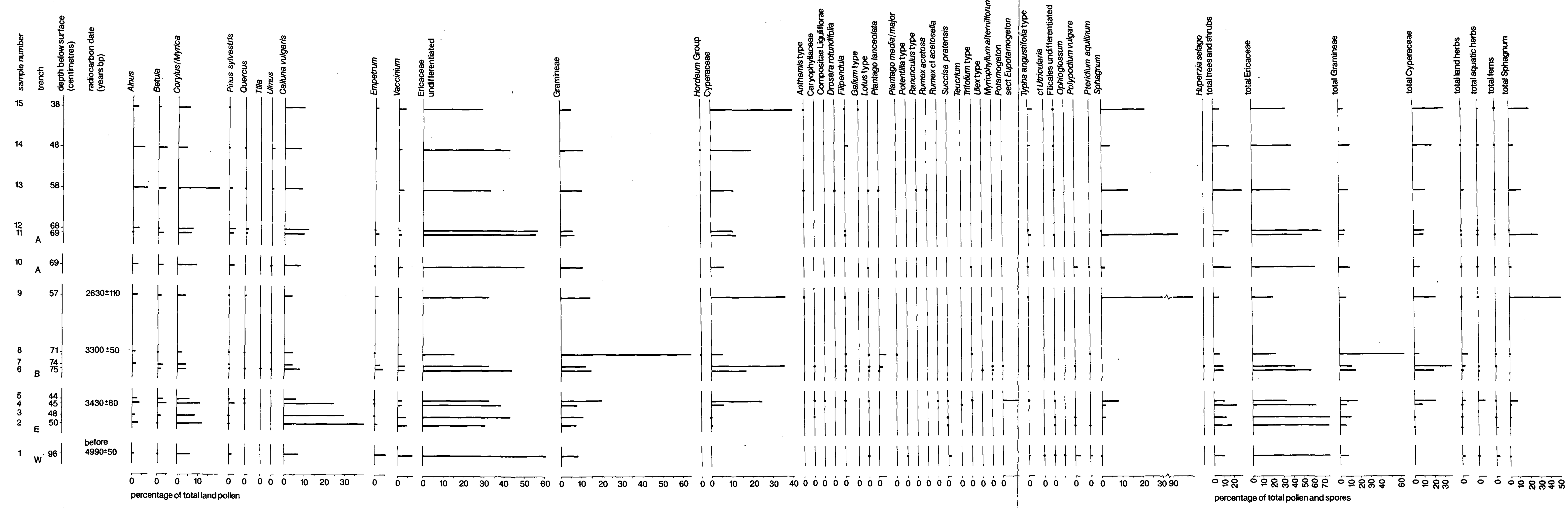
INTERPRETATION OF THE ENVIRONMENTAL EVIDENCE

RADIOCARBON DATES

The upper dark band in Trenches E and B dates to 3430±80 bp (GU-2456; 1480±80 BC uncal) and 3300±50 bp (GU-2453; 1350±50 BC uncal) respectively and the difference between these dates is not significant with respect to the precision of the dates. The mixed peat and mineral matter observed in the base of Trench W was formed much earlier, at some time before 4990±50 bp (GU-



ILLUS 4 Pollen diagram for the open peat face in the peat cutting (labelled 'pollen profile' in illus 2)



Illus 5 Pollen analyses of spot samples; percentage diagram

2455; 3040±50 BC uncal), and cannot therefore have been related to the construction or function of the stone bank.

The top of the mottled peat immediately below a very large, flat-bottomed, basal stone in Trench B (illus 3) dates to 2630±110 bp (GU-2452; 680±110 BC uncal). Although this basal stone appears to be rather small in the section diagram (illus 3), it was in fact much larger and extended into the trench; it is visible in the centre of the photograph of Section B (illus 8) as the largest stone extending forward from the section face. If the uneven mottled peat is undisturbed, then the date from the mottled peat beneath this stone represents a close *terminus post quem* for the feature. The cause of the uneven texture and mottled nature of this peat is uncertain. Mottling is more frequently observed in mineral soils, but a loss-on-ignition test result of 96.6% indicated that this is a highly organic layer. One possible cause of the mottling is that local drainage processes have been affected by the construction of the bank. If so, there is a possibility that the movement of water has introduced some fine organic material from elsewhere into this peat. Even if some material was introduced, it seems likely that the great bulk of the sample was comprised of immediately pre-bank peat and that the date is a reasonably close estimate of the age of the bank. The difference between this date and the much earlier one for the upper dark layer in Trench B, is probably sufficiently great to enable rejection of any idea that the uneven peat may have been an earlier artificial peat bank preceding the construction of the stone feature. In such circumstances, it might be expected that the dates would be closer in age or could even show a reversal.

Interestingly for such shallow deposits, the radiocarbon dates point to the accumulation of organic materials over a considerable period of prehistory. Thus the minerogenic peat in Trench W formed no later than Neolithic times; the dark organic layers in Trenches B and E (and perhaps in the open peat face) are of Middle Bronze Age date; while the peat beneath the stone bank in Trench B may have formed around the time of the Late Bronze Age, suggesting that the bank itself could have been constructed in either Late Bronze or Iron Age times.

PALYNOLOGY

The pollen diagram from the open peat face (illus 4) enables a general reconstruction to be made of environmental conditions prior to the time of construction of the stone bank. The 'gap' before the peat overlying the bank began to form is furnished by pollen spectra Samples 10–15 from Trench A. The pollen samples from Trenches W, B and E provide additional detail concerning the basal layers.

The mixed peat and mineral matter in Trench W

The earliest spectrum is represented probably by Sample 1 from near the top of the mixed peat and mineral matter in Trench W. A loss-on-ignition test gave a result of 17.2%, indicating the high proportion of mineral material in this layer. The pollen content was analysed in an effort to determine whether agricultural activity could have caused the pre-4990±50 bp (3040±50 BC uncal) mixing. It was supposed that at least some of the pollen present at the top would be indicative of the conditions at the time of disturbance. As illus 5 shows, Ericaceae pollen dominates, and ferns are well represented, while there is no sedge (Cyperaceae) pollen and very few *Sphagnum* spores; in general a dry heath is indicated. The few herb species present are compatible with this interpretation. There is no palynological evidence for arable farming in the locality at this time, and it seems that local agricultural activity, if it existed at all, was restricted to rough grazing. Levels of microscopic charcoal are very low. Palynomorph concentrations are extremely low, suggesting that loss of microfossils in an intermittently aerated matrix may have occurred (Havinga 1974) or that sediment accumulation was very rapid. The mixing of peat with loose mineral substrates may have been achieved by the hooves of grazing animals in this bottomland area.

Environmental conditions before the deposition of the lower black band

Sample 2 comes from the buried soil A horizon in Trench E. The loss-on-ignition result for this layer is 18.1%, indicating a high mineral component. The pollen spectrum is dominated by *Calluna* (ling, 39.3%) and Ericaceae (heath family, undifferentiated, 30.8%) with Coryloid (hazel/bog myrtle) and Gramineae (Poaceae, grass family) pollen frequencies of 12.2% and 7.2% respectively. The lowest pollen spectrum in the pollen profile (illus 4) likewise comes from minerogenic material and the assemblage is not dissimilar to that of Sample 2 (illus 5).

Sample 6 comes from humified peat immediately below the lower black layer in Trench B. It contains less *Calluna* pollen than Sample 2, but more Cyperaceae (sedge family) pollen (19% compared with the 0.2% of Sample 2). If these samples are contemporary, this would suggest that the lower slopes exposed within Trench B were less well drained, supporting a damper heath, a supposition supported, of course, by the peat rather than minerogenic nature for the sample levels under discussion. The greater palynomorph concentrations (including charcoal) for Sample 6 could be a function of the different matrix types or of slow sediment accumulation.

The lower black band

Samples 3 and 7 come from the lower black band exposed in Trenches E and B. The spectrum of Sample 3 is very similar to that of Sample 2 which underlies it. Both display Ericaceae dominance (especially *Calluna*) and substantial amounts of Coryloid and Gramineae pollen. Sample 7, on the other hand, bears a strong relationship to its underlying sample, 6, and Cyperaceae is better represented than in Samples 2 and 3. It may be that slightly different vegetation types persisted at the two locations as the lower black band accumulated. It is also possible that Samples 2 and 6 contain pollen from the overlying deposits. The basal black organic deposit in the open peat face profile is very similar to the assemblages in Samples 2 and 3 of Trench E.

The upper black band

On the grounds of radiocarbon dating, it has been suggested that the upper black organic bands of Trenches E and B are broadly contemporary. Sample 4 is from the upper dark band in Trench E, and is separated from the lower dark band by about 1 cm of pale brown, well-humified peat. The upper dark band in Trench E could be seen to consist of a series of very fine laminations, as indicated by colour alternations. There are some noticeable differences in the pollen spectra of Samples 3 (the lower black band) and 4 (the upper black band). In particular, 4 contains more tree and shrub pollen. Ericaceae and grass pollen decrease slightly while sedge pollen increases. The key to these changes may be held in the microscopic charcoal concentrations. As illus 6 shows, these are much higher in Sample 4 in all but the smallest size class, while the total pollen and spore concentration is similar to that for Sample 3. This points to local fires, and the presence of laminations indicates that at least some of the sediment has formed by the in-washing of material (the slope-wash over a disturbed and poorly vegetated land surface may have been accentuated). The heathland component was apparently reduced, but trees and shrubs have not been adversely affected. The most likely explanation is that much of the tree and shrub pollen is from the regional pollen rain which is better represented after the burning of the local heath had decreased flowering of heath plants. Although taxa which are sometimes said to increase after burning such as *Potentilla* (tormentil/cinquefoil) and *Pteridium* (bracken) do not appear to have expanded, this is not unusual in Scotland even where undoubted local burning has occurred (Edwards 1990; Hirons & Edwards 1990).

Sample 8, from the upper dark band in B, shows some marked differences from Sample 7 in the lower band. Grass pollen is far more numerous (11.7% TLP in Sample 7 and 64.3% in Sample 8), and herbs – particularly *Plantago lanceolata* (ribwort plantain) – are better represented. One cereal-sized pollen grain was noted in Sample 8 and is attributed to the *Hordeum* (barley) group as defined by Andersen (1979). Since this comprises both cultivated and wild species, it cannot be taken as unequivocal evidence of cultivation. The apparent decline in the percentage of Ericaceae pollen is likely to be an artefact of the large numbers of wild grass pollen and, in fact, the concentration of Ericaceae pollen is higher in Sample 8 than in Sample 7. Charcoal particles of all sizes are well represented in Sample 8 but are not nearly so highly concentrated as they are in Sample 4, from the upper dark band in Trench E. It is possible that while 8 and 4 represent the same broad event or series of events, the sample selected from location 8 contained, predominantly, a marginally later spectrum, or, alternatively, that Sample 8 was less affected by the fire event. The proposed regional pollen component is apparently smaller in Sample 8; tree and shrub pollen represents 22.2% TLP in 4 and 4.3% in 8.

Loss-on-ignition tests were undertaken for the upper black bands in Trenches E and B. The results were 55.2% and 87.6% respectively. Thus, more mineral matter (noted as silt-sized during pollen sample preparation) is present in the upper black band in trench E, and is thought to derive from in-washing. This evidence, together with the observed laminations and higher concentration of larger charcoal particles, suggests that Trench E was closer to the location of any fire event(s) than Trench B.

Environmental conditions after deposition of the upper black band

Sample 5 comes from the base of the humified peat immediately above the upper dark band in Trench E. Compared with Sample 4 there is less tree, shrub and Ericaceae pollen, while grasses, sedges and *Sphagnum* all increase, and *Potamogeton* (pondweed) and *Typha angustifolia* (bulrush) type appear, Potamogeton being present in relative abundance. Conditions had apparently become wetter, and there seems to be a change towards a more open heath with more grass and herbs than previously.

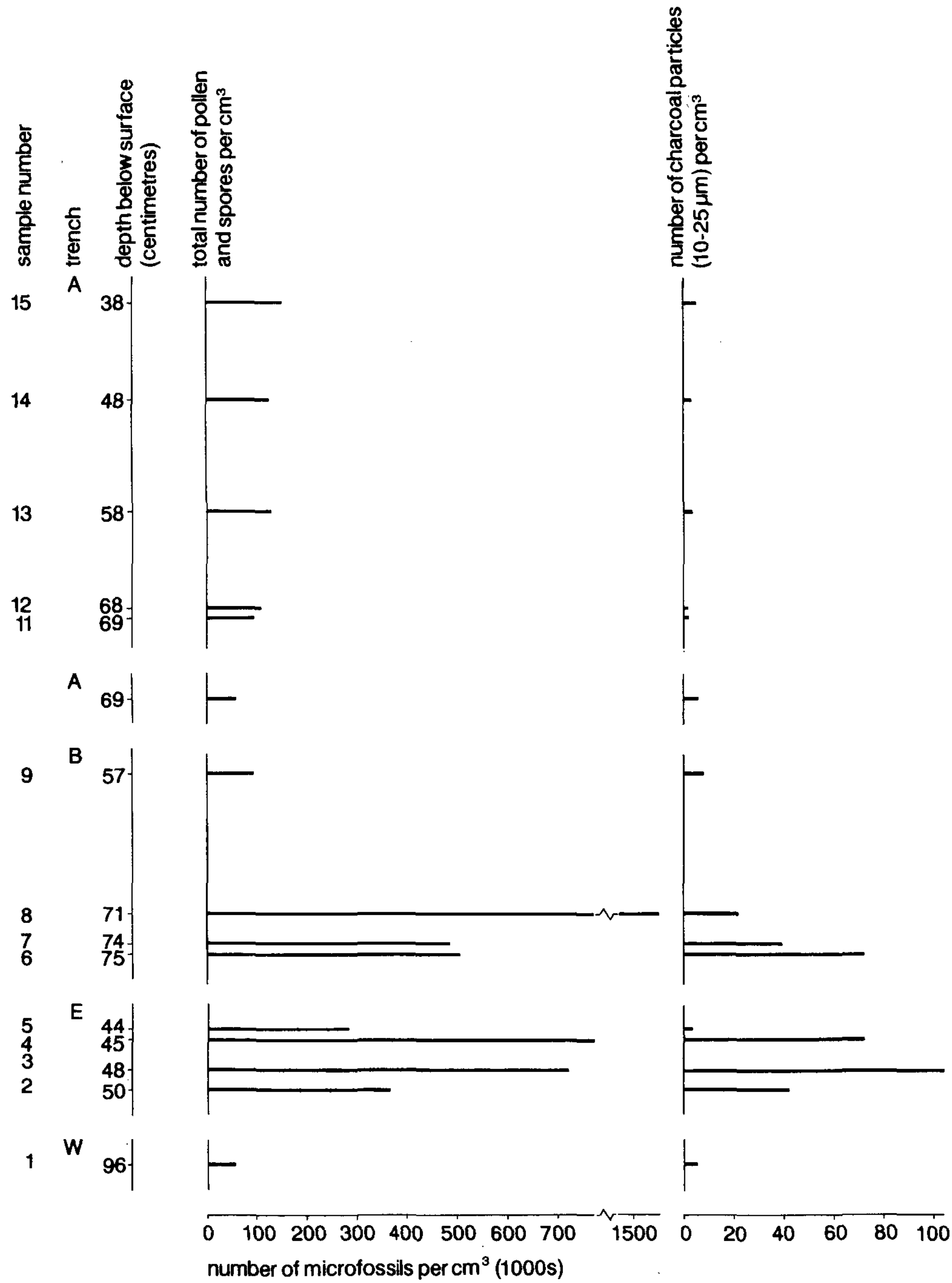
The open peat face profile, from above the basal black layer and below the stone bank, provides an indication of the relatively species-poor nature of the vegetational landscape between the middle and late Bronze Age, as well as the varying proportions of the heath/sedge/grassland co-dominants within the sampling locality. If there is a trend it is one of an initial sedge-rich assemblage giving way to a slightly drier heather-dominant period, before sedges, grasses and probably *Myrica* expand, with some *Sphagnum* in wetter patches. The dynamic nature of the immediately local environment is shown by the changing palynomorph concentration rates which are typical of variable mire growth. Although some of the taxa can reflect human activity (eg Compositae (daisy family) tubuliflorae (Asteroideae), *Plantago lanceolata, P. major/media* (great plantain/hoary plantain) and *Urtica* (nettle)), they are present in such low quantities that no local farming activity is suggested. This interpretation is also supported by the low charcoal representation. Apart from Coryloid and *Alnus* (alder), the consistent presence of tree pollen may reflect a regional background component (Bohncke 1988, Bennett *et al* 1990, Edwards 1990).

The environment after the creation of the stone bank

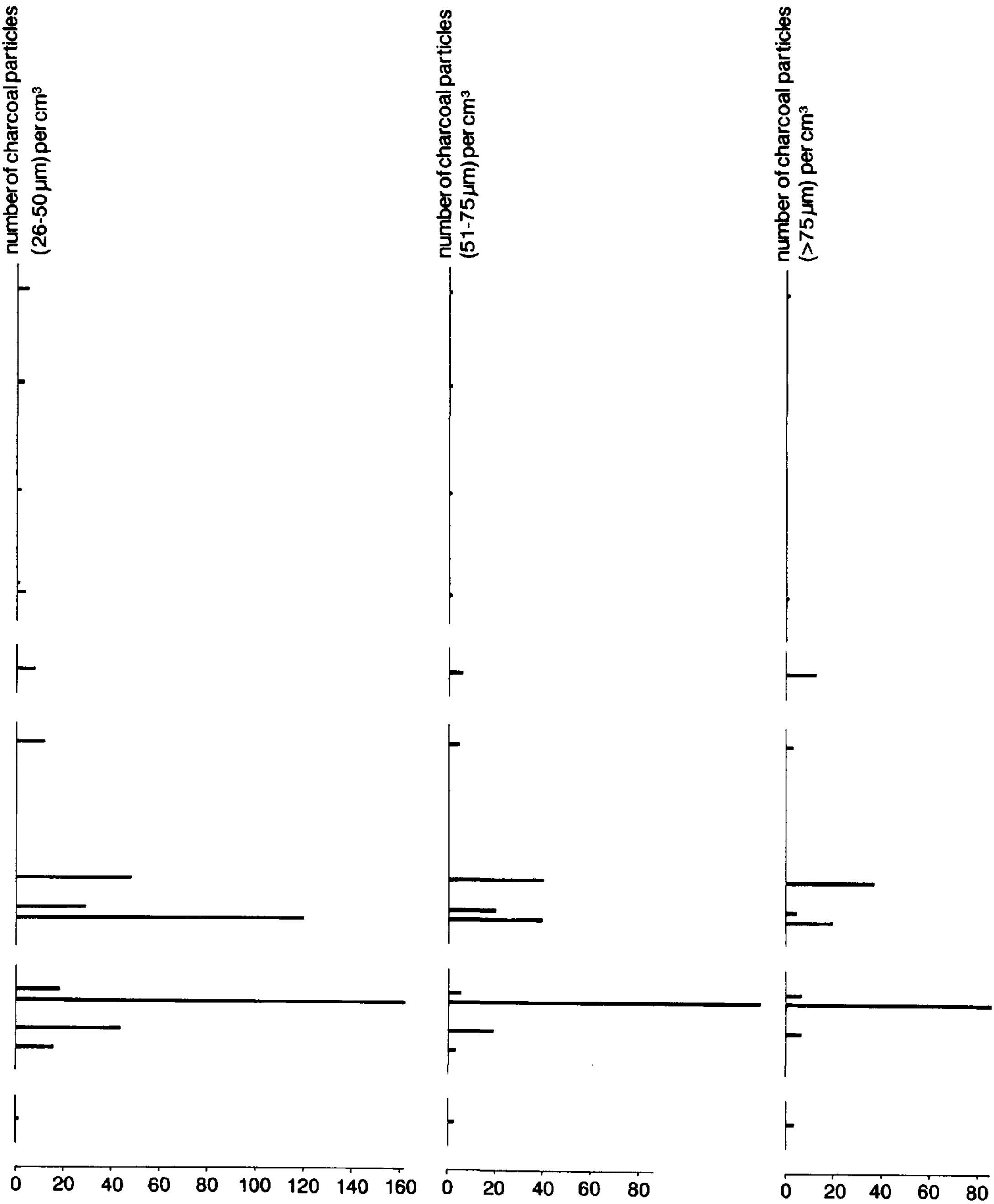
A series of samples from beside the bank in Trench A were examined to investigate changes in the environment after the bank was built. Stratigraphically, Sample 11 is at the same level as 10, and about 50 cm away, just to the west side of the bank. Sample 11 is from 69 cm below the surface while 12 is from just above at 68 cm depth. Between these two levels the peat shows a slight colour change from black below to dark brown above. It is likely that Samples 11 and 12 respectively represent the environment immediately before and after bank construction. However, this cannot be proved. Both represent a wet heath environment although 11 has far more *Sphagnum* spores. Charcoal concentrations are very low in both samples, and there is apparently no local burning at this time. There is no evidence for arable agriculture in either sample, and the local vegetation would have provided only poor pasture.

Sample 13 may be the first to represent the post-bank environment. Notable differences from Sample 12 are a reduction in ericaceous pollen and an increase in the tree and shrub component, suggesting that birch (*Betula*) and alder were within the pollen catchment area and perhaps hazel also, although the Coryloid pollen could derive from bog myrtle. There is also a rise in *Sphagnum* spores, a slight rise in grass pollen and a greater diversity in herb taxa. The changes are difficult to explain, but may represent some disturbance of the local heathland.

Regardless of whether Sample 12 or 13 is taken to represent the post-bank environment, the



ILLUS 6 Microfossil analyses of spot samples; concentrations of total pollen and spores, and of charcoal particles



number of charcoal particles (26-50 μm) per cm³
number of charcoal particles (51-75 μm) per cm³
number of charcoal particles (>75 μm) per cm³
0 20 40 60 80 100 120 140 160
0 20 40 60 80
0 20 40 60 80

ILLUS 7 Loch Portain: view from the south-west of the stone structure in the peat cutting, as it appeared prior to excavation

ILLUS 8 Loch Portain: a section (Z-Y, in Trench B) through the stone bank

palynological evidence indicates that the stone bank is very unlikely to have been an arable field boundary. Pastoral activity is possible, but the local grazing would have been poor and there is no evidence for pasture improvement by muir-burning.

Samples 14 and 15, from depths of 48 and 38 cm, probably represent the environment several hundred years after the bank was built. In Sample 14, heath is still the dominant vegetation type although there are more sedges and less *Sphagnum* than in Sample 13 below. One possible cereal pollen grain was found and its characteristics place it in the *Hordeum* group. In Sample 15, heath is still important but there is a great increase in Cyperaceae and *Sphagnum*, perhaps reflecting wetter conditions.

The two samples from above the bank obtained from the open peat face indicate continuing heath/grass/sedge dominance not very different from the site today, where *Calluna vulgaris, Erica tetralix* (cross-leaved heath), *Molinia caerulea* (purple moor-grass) and *Eriophorum angustifolium* (common cotton-grass) dominate. The higher concentration values for the sample immediately above the bank may be the result of slow peat growth arising from enhanced drainage encouraged by cavities in the bank.

THE LOCH PORTAIN SITE IN ITS BROADER CONTEXT

The deposits at Loch Portain began forming no later than Neolithic times and continued through Bronze Age and Iron Age times and beyond. These were all periods of proven occupation in the Outer Isles (eg RCAHMS 1928; Simpson 1976; Crawford & Switsur 1977; Shepherd & Tuckwell 1979; Barber & Magee 1985; Armit 1988) although monuments and finds of many of these periods are apparently lacking in the immediate area of the Loch Portain site.

The stone bank was possibly built soon after 2630±110 bp (680±110 BC uncal). The later end of this range falls within a flat section of the radiocarbon calibration curve (Pearson & Stuiver 1986). Using the one sigma level of confidence, calibration gives a date between 920 and 790 BC, while at two sigma the range is considerably larger: 1010–455 BC. In other words, the Loch Portain bank cannot be closely dated but was probably constructed in the earlier half of the first millennium BC.

Recorded evidence for early settlement in the Loch Portain area consists of three caves with associated middens, five island duns and two souterrains (NMRS NF 97 SE nos. 1–6, 8–9, 13, NF 97 SW 3; Beveridge 1911, 144–8). Although none of the duns or souterrains has been excavated, they belong to a range of monuments recently reclassified by Armit and thought to have been built no earlier than the late first millennium BC (Armit 1992, 126–7). There is no dating evidence for the occupation of the caves. On balance, it seems more likely that any settlement associated with the stone bank shared its fate and is now engulfed in peat, awaiting chance discovery, as does much of the Late Bronze Age archaeology of the Western Isles (Barber & Magee 1985, 46). It is also possible that human activity in the eastern moorlands was seasonal or occasional, with the main settlements being on or near the more fertile land of the western machair. Occupation sites of the first millennium BC are known from the machair of North Uist, for example at the Udal (Crawford nd) and at Baleshare (Barber forthcoming). The custom of moving livestock from the machair to the hill-land for summer grazing, which involved a temporary shift of settlement to summer shielings, survived on North Uist into the 20th century (Carmichael 1916, 364–9).

Although the pollen analysis did not elucidate the function of the stone bank, it has ruled out some possibilities. It has also provided some data for the vegetational history of North Uist. At the time of writing, there is no published research on the vegetational history of the island, and the palaeoecology of the Outer Hebrides as a whole is still poorly understood. Relatively close sites, from Lewis, present vegetational aspects for much of the postglacial period which are either open (Birks & Madsen 1979) or fairly well wooded (Bohncke 1988; cf Wilkins 1984). For South Uist, Bennett *et al* (1990), Edwards *et al* (1995) and Hirons (forthcoming) can demonstrate a considerable woodland cover through much of the postglacial. At Loch Lang (Bennett *et al* 1990), blanket peat development is evident from about 5500 bp (3550 BC uncal), and after about 4300 bp (2350 BC uncal) tree and shrub pollen taxa decrease markedly. The Loch Portain data seem to show that since about 4990 bp (3040 BC uncal), woodland has never been an important component of the vegetation in the area around the site. The predominance of mire taxa within the Loch Portain pollen record is, of course, to be expected from a peat site. On Benbecula (Whittington & Ritchie 1988) peat accumulation at the Rosinish III site began even later, at about 4345 bp (2395 BC uncal). In addition, the variety of pollen taxa displayed in the profiles from Benbecula and Grimsay (Whittington & Ritchie 1988) is a reflection of the considerable species diversity on calcareous machair sites. This, combined with the problematic taphonomy associated with such sites, makes comparisons with peat sites such as Loch Portain very difficult. Other pollen-analysed peat sites on Barra (Blackburn 1946) and South Uist (Heslop Harrison & Blackburn 1946) lack the detail required for useful comparisons with modern research.

Turning to the results of environmentally related archaeological research in other parts of the Outer Hebrides, that by Bohncke (1988) is of particular interest. He investigated deposits associated with sub-peat field-walls on a peninsula to the south of Callanish on the Isle of Lewis. Although he does not report a date for the peat immediately under the walls, his illus 3 and tables 1 and 2 indicate that the wall must have been built approximately midway between 3220±65 bp (1270±65 BC uncal) and 2355±65 bp (405±65 BC uncal). These field walls may, therefore, be approximately contemporary with the structure at Loch Portain. Bohncke's illus 3 shows a burnt layer at a little depth below the stone feature; this layer was formed just after 3220±65 bp (1270±65 BC uncal), which is very similar in age to the upper dark band at Loch Portain, as dated from Trench B (3300±50 bp; 1350±50 BC uncal). The environmental changes recorded by Bohncke for this period show very similar trends to those at Loch Portain. At Callanish, local zone CaN-3c is attributed to the period of c 3490–c 2520 bp (c 1540–c 570 BC uncal); early in the zone there is evidence of regional clearance and a peak in the charcoal curve. Grass and *Plantago lanceolata* pollen increase, and there is strong evidence for the formation of pasture (Bohncke 1988, 457). Cereal-type pollen appears and there are good indications of arable activity. Towards the end of the zone there is a temporary decrease in species typical of agriculture, and there is evidence that local conditions become wetter (Bohncke 1988, 457). This shows similarities with the changes observed under the bank at Loch Portain, although there is no conclusive evidence for farming at the North Uist site.

A sub-peat wall near Sheshader on the Eye Peninsula, North-East Lewis, was investigated by Newell (1989). Peat from immediately under the wall was dated to 2900±100 bp (950±100 BC uncal). Interpolation of a nearby radiocarbon-dated pollen profile indicated that the construction of the wall coincided with a period of grazing, and there was some evidence for cereal cultivation in the vicinity (Newell 1989, 89). Newell discusses the fact that a number of Scottish sites show evidence for enclosure in the first half of the first millennium BC (uncalibrated). Two of the present writers have also investigated sub-peat banks at Bharpa Carinish (NGR NF 837604) at the southern end of North Uist (Crone & Mills 1989; Crone 1993). Here a stone wall was built over a very thin layer of greasy peat over the mineral soil. This organic layer was sampled at two locations under the wall, and dates of 3180±50 bp (GU-2454; 1230±50 BC uncal) and 2750±50 bp (GU-2457; 800±50 BC uncal) were obtained. Thus at Bharpa Carinish, and possibly Loch Portain, there is further evidence of enclosure in the period identified by Newell.

There is a further similarity between deposits at Sheshader and those at Loch Portain. This is the occurrence of two thin dark bands of peat beneath the wall. Extrapolation from Newell's illus 6 suggests that the upper dark band would have been deposited at approximately 3300 bp (1350 BC uncal). Frequent carbonized plant remains were found in the dark bands at Sheshader, although these were also commonly found elsewhere at this site (Newell 1989, illus 6). Microscopic charcoal was not recorded.

A pattern may thus be emerging from some sites on the Outer Hebrides. Dark layers of peat, containing evidence of burning, and with very similar dates have now been found at three sites: Loch Portain, upper dark band, 3300±50 bp [1350±50 BC uncal] in Trench B, 3430±80 bp [1480±80 BC uncal] in Trench E; near Callanish, Lewis (Bohncke 1988), a single band deposited just after 3220±65 bp [1270±65 BC uncal]; near Sheshader, Lewis, (Newell 1989), upper dark band dates to approximately 3300 bp [1350 BC uncal]). If these bands relate to deliberate burning in this period, it may reflect a widespread practice. A note of caution should be observed, however, that even if of cultural origin, the presence of charcoal does not prove that burning of the local land surface took place (though this may have been the case at Sheshader). The charcoal could derive from wood (or peat) burnt for domestic purposes (Edwards 1990) or from natural fires which may have been started by lightning, perhaps following a period of drought (Edwards 1988).

CONCLUSIONS

Radiocarbon dating showed that the mixed peat and mineral matter in the base of a trench (W) to the west of the bank was formed before about 5000 bp (3050 BC uncal), more than two millennia earlier than the construction of the bank. The palynological evidence suggests that agricultural activity, if it existed at this stage, was restricted to rough grazing.

Investigations of microscopic charcoal provided evidence of fires in the locality during the second millennium BC (uncal). There is evidence from other sites in the Outer Hebrides that fires were a widespread phenomenon at this time. However, the likelihood of domestic or natural fires prevents unequivocal statements concerning the origin of the charcoal.

The long-term trend in the centuries following the local formation of the dark organic layers was towards wetter conditions at the site, and by the time the stone bank was built, perhaps around 2600 bp (650 BC uncal), the site was dominated by a wet heath community. Probing and excavation showed that the stone bank at Loch Portain is now an isolated linear structure buried beneath the peat. Pollen analysis provided no proof for arable farming at the time the bank was built. Cereals are low-pollen producers, so the absence of cereal-type pollen, from the samples believed to represent the environment just after the construction of the bank, could be due to low pollen productivity, perhaps exacerbated by non-contiguous sampling. However, the other pollen taxa present are not indicative of arable activity and, perhaps more convincingly, there is no physical evidence of contemporary disturbance to the peat in trenches dug on either side of the bank. This suggests that the bank was most probably not constructed for arable purposes; if it was, then this activity may have been extremely ephemeral and no trace has been detected. It is possible that the bank, originally, was higher and more extensive and that it was robbed out in antiquity. If so, it may fit into a more widespread pattern of enclosure in Scotland noted by Newell (1989) for the first half of the first millennium BC (uncal).

Since at least early Neolithic times to the present day, the environment at Loch Portain, as revealed by pollen analysis, has been a largely open poor heath-grassland in which woodland has played little or no part. It is evident that even with samples located in close proximity, there can be considerable local variation in species-poor mire habitats. Whatever the purpose of the stone bank, it was clearly not built within a fertile area.

ACKNOWLEDGEMENTS

Historic Scotland arranged and provided funding for the excavation and partially funded post-excavation analysis and publication of this paper. The Leverhulme Trust funded palaeoenvironmental work by Kevin Edwards. The authors would like to thank the Ministry of Agriculture & Fisheries for permission to investigate the site. Thanks are also due to John Barber, Finbar McCormick and Ian Máté who assisted in the excavation. Advice from Simon Butler and Richard Tipping on aspects of microfossil analysis is gratefully acknowledged. Thanks are also offered to Andrew Dugmore and Anthony Newton for their interest in this project. Their work on a relatively recent tephra layer found near this bank will be reported elsewhere.

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This paper is published with the aid of a grant from Historic Scotland