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Muirtown, Inverness: preliminary investigation of a shell midden

A M Myers* & R B Gourlay†

ABSTRACT

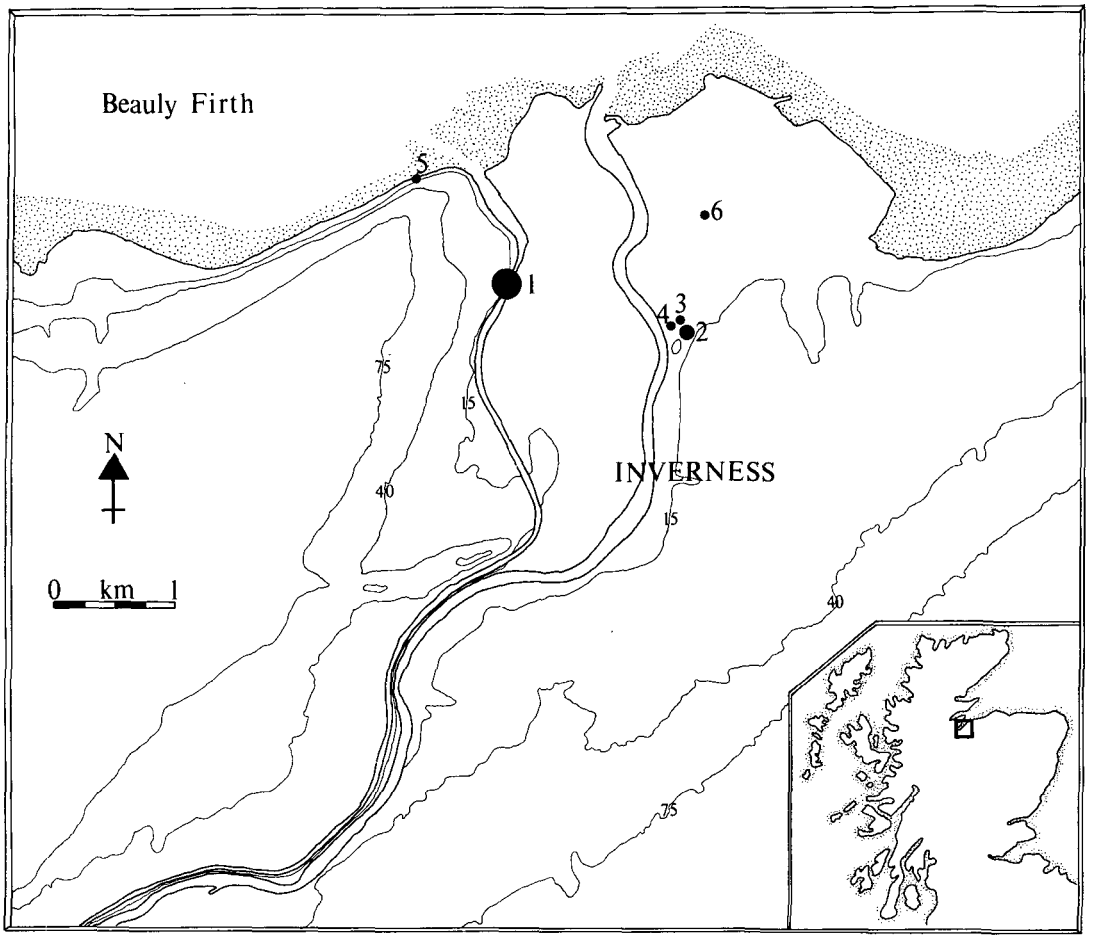
The discovery, excavation and analysis of a shell midden are presented and discussed. The site provides evidence for exploitation of the sheltered coastal environment in the Inverness area during the mid fourth millennium bc and suggests similarities with Later Mesolithic and Neolithic shell middens elsewhere in Scotland.

INTRODUCTION

The site (NGR NH 652 457) is located approximately 1 km south of the present shoreline of the Beauly Firth (illus 1). It was first identified by District Council Staff in May 1977 through test bores and service trenches dug in connection with a building development adjacent to the Caledonian Canal in Muirtown. The trenches exposed a deposit of marine shells between 9 and 11 m OD which, upon examination by one of the authors (RG), appeared to consist of a variety of species intermixed with flecks of charcoal and small fragments of poorly preserved bone. Of the latter the majority were so fragmented that species could not be determined. However, the base of a red deer (*Cervus elaphus*) antler was identified. No worked lithic artefacts were recovered.

Buried beneath some 1–1.5 m of overburden, most of which appears to have been derived from upslope, the deposit rested upon a surface of unconsolidated rounded pebbles and gravels which have their origin in the extensive deltaic deposits laid down in the area by a sub-glacial river (Synge 1977). At the time when the shell was deposited, the gravels at Muirtown may have formed part of an east-facing early post-glacial shoreline. Nowhere in the exposed sections did the shell deposit exceed 0.6 m in thickness yet its presence was recorded from sections and bore holes over a distance of at least 100 m north/south. On the information available it seemed that the deposit was intermittent, possibly consisting of a series of semi-discrete deposits. Immediately overlying the shell was a dense black (7.5YR–2/O) sediment forming a layer varying between 0.09 and 0.3 m thick. This layer was present in all sections and immediately overlay the unconsolidated pebbles and gravels in those areas where there was no shell. Both in its black colour and its slightly sticky texture this layer was quite distinct from the overlying brown loam.

* Dept of Archaeology & Prehistory, University of Sheffield
† Highland Regional Council, Inverness

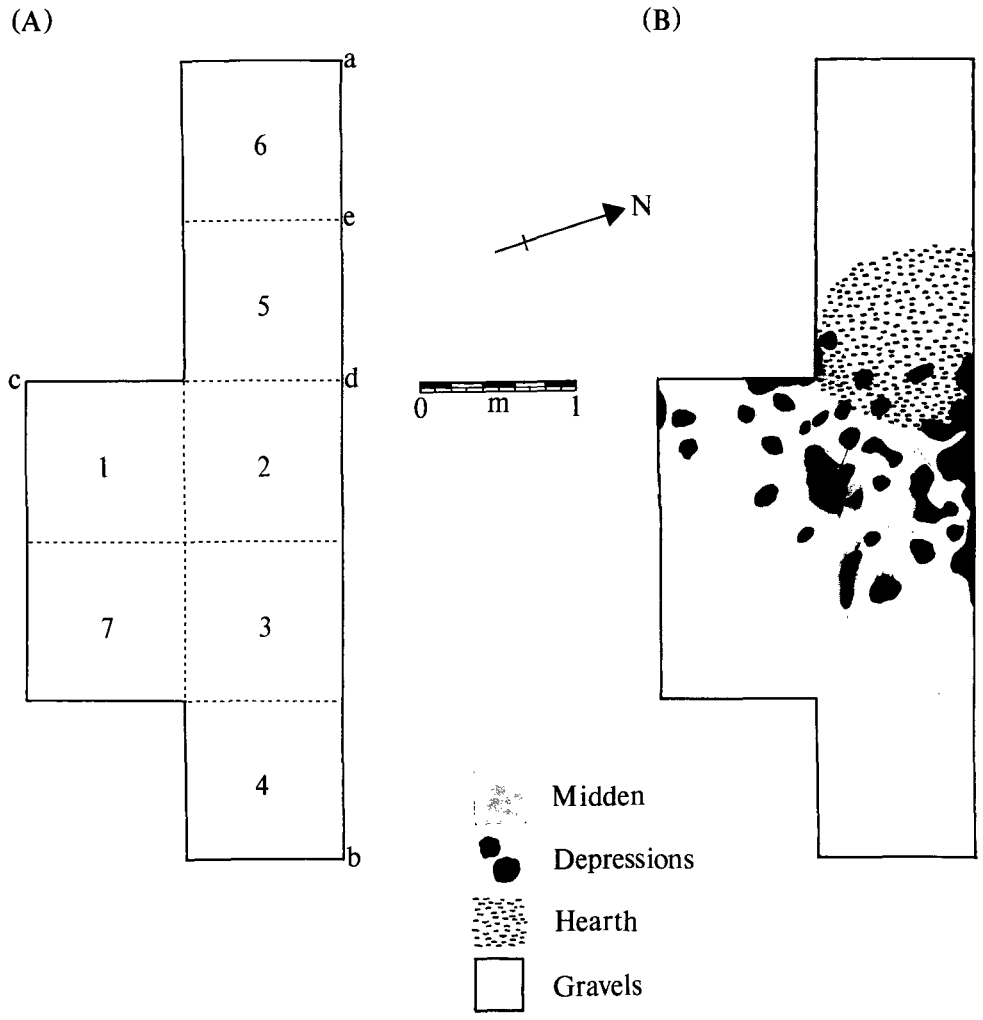


ILLUS 1 Location map showing the position of the Muirtown midden (1) in relation to Castle Street (2), two previously discovered shell middens in the centre of Inverness (3,4) and one to the north-west of Muirtown (5), and Inverness fire station (6).

EXCAVATION

As the site was to be developed, a small area was selected for excavation in order to obtain more detailed information on the content, structure and age of the shell deposit. The overburden was removed using a machine, then the surface of the shell deposit was exposed by hand and cleaned over a total of 7 m^2 (illus 2). The brown loam contained a large proportion of well-rounded quartzite cobbles but very little sandstone. In contrast, the black sediment and the surface of the shell deposit contained numerous rotted sandstone blocks but very few quartzite cobbles. At the interface between the brown loam and the black sediment there was a narrow (c 0.04 m) band where the former appeared to be stained a dark grey-brown. There were some localized instances where shell was mixed with the black sediment.

In certain areas the surface of the shell deposit appeared to be pitted with depressions 10–20 cm deep. These features were concentrated in squares 1, 2 and 3 (illus 2A), and varied in size and shape, some being small (c 0.1 m diameter) and circular while others were larger (c 0.4 m



ILLUS 2 Plan of the excavated area: (A) square numbers and section letters referred to in the text; (B) sketch plan of the midden, hearth and depression features found in the midden surface.

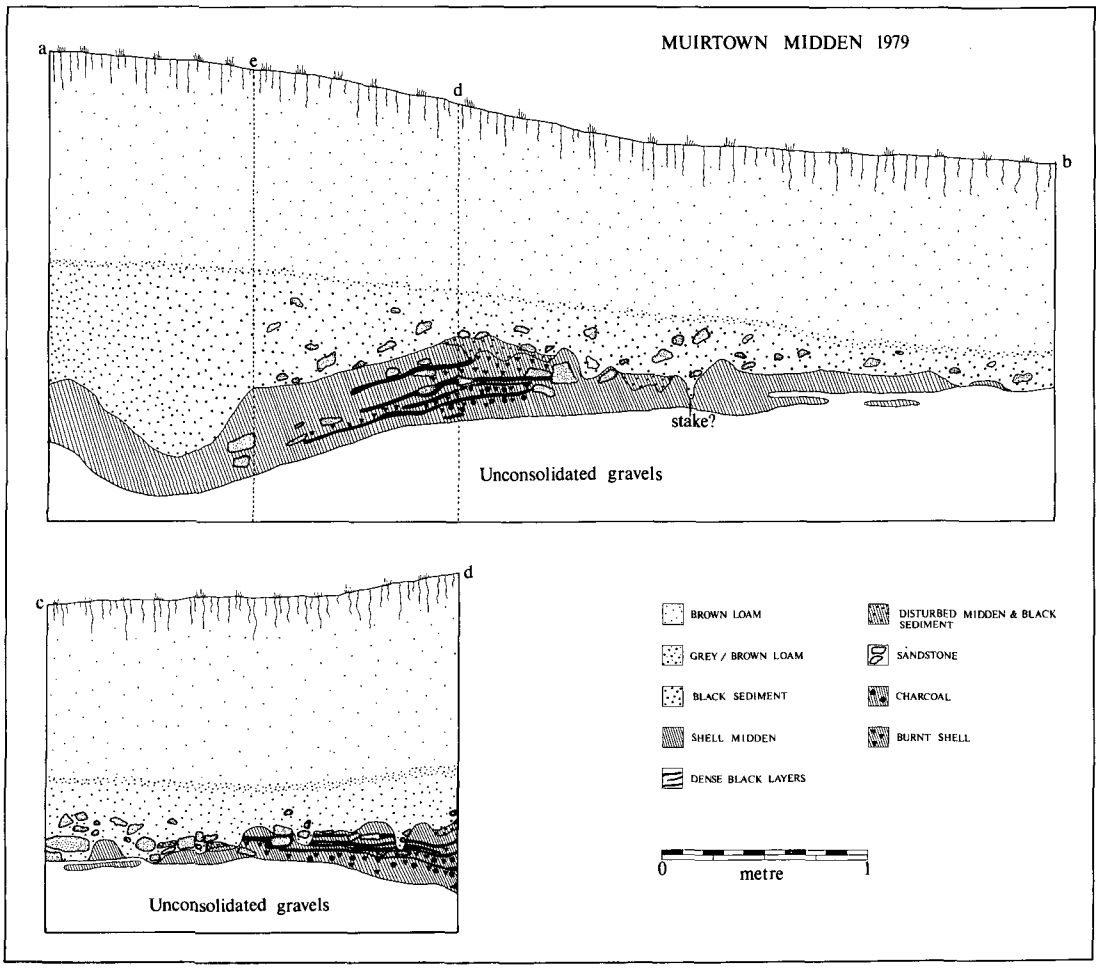
across) and more irregular. The features were filled with black sediment which, in some cases, contained shell. Two large, irregular depressions in square 1 were found to be points in the midden where the unconsolidated pebbles of the beach directly underlay the black sediment fill. In squares 4 and 7 an edge of the shell deposit was found and, once again, the black sediment immediately overlay the unconsolidated pebbles and gravels. Here there was no evidence for the mixing of beach material with the black sediment. Whatever the origin of the depression features it seems unlikely that they were formed after the black sediment had been deposited.

In squares 5 and 6 the shell deposit followed the contours of a depression in the underlying beach whilst in square 2 the shell deposit was seen to contain an area of grey, highly comminuted shell and small flecks of charcoal. Squares 1, 2 and 3 were selected for careful excavation of the shell deposit. All excavated material from these squares was bagged for storage in Inverness Museum & Art Gallery apart from small samples taken for detailed

examination at Sheffield University. Once the squares had been bottomed, a 5 m section was opened up through the deposit (illus 3 a–b). However, owing to the instability of the section in square 6 this part of the 5 m section (a–e) was not recorded in as much detail as the rest.

It soon became apparent that square 2 contained part of a hearth which extended into square 5 and the north section (illus 2 & 3) and comprised at least four dark, compact lenses of burnt shell surrounded by loose deposits of grey, comminuted material and small pieces of charcoal. Some sandstone blocks within the shell deposit had been exposed to heating. The sandstone blocks appeared to be most numerous in and around the hearth, a number of the blocks lying within the dark lenses. While the sandstone is available locally (within square 4 large slabs were found lying buried in the unconsolidated pebbles and gravels) it would seem that material had been deliberately brought to the hearth either in connection with activities undertaken there or as part of a structure. The connection between the sandstone within the shell midden and that within the overlying black sediment remains unclear.

In square 1 the midden appeared truncated while throughout the hearth deposits in



ILLUS 3 Muirtown midden: sections a–b and c–d.

square 2 the depression features observed in the midden surface appeared to cut through the lenses. Whether these features and truncations were formed during occupational activities connected with the midden, or represent modifications by natural or anthropogenic agencies at some time following the midden's formation is unclear. One such feature in the 5 m section (illus 3) is deep and narrow and may be a stake hole. However, the four main lenses of burnt shell within the hearth appeared substantially undisturbed and *in situ*, the lenses being sharp and well defined. Both the lenses and those sandstone blocks lying on or within them followed the slope of the underlying beach into the hollow in square 6. Lumps of charcoal were recovered from within the shell material beneath the lowermost of the main lenses and submitted for radiocarbon determination; they were identified as oak (*Quercus*), possibly from mature timbers, and provided a date of 5635±65 bp (GU-1473), which calibrated (Stuiver & Reimer 1986) gives a range of 4675–4350 BC at 2σ with a mean of 4469 BC.

MIDDEN CONTENTS

During the excavation several poorly preserved fragments of what appeared to be bird bone were identified at the base of squares 1 and 2. No fish bones or otoliths were recognized in spite of careful examination of the excavated material. Small pieces of crab shell, mainly claws, were recognized but they were not numerous. Of those shellfish species represented (table 1) oyster (*Ostrea edulis*) was dominant. However, other species, such as mussel (*Mytilus edulis*) and cockle (*Cardium edule*), occurred in small localized concentrations; one such concentration of mussel shells removed from the lowest level in square 3 consisted of approximately 130 valves, the majority of which were virtually intact. Given the fragility of mussel shells the presence of so many intact valves would suggest that this area suffered little disturbance following deposition. Less pronounced variations were also noted during the

TABLE 1
Shellfish species representation and habitat

Ostrea edulis
most abundant, sheltered/sandy

Mytilus edulis
locally 100%, open coast or sheltered/rocks

Cardium edule
locally 100%, sand burrowing

Littorina littorea
present throughout but locally numerous, open coast or sheltered

Buccinum undatum
one broken spiral, deep water

Ensis sp.
few fragments, sand burrowing

Venerupis sp.?
one valve, estuarine

Patella sp. (vulgata?)
very rare, open coast or sheltered rocks

Nucella lapillus
very rare, open coast or sheltered

Littorina littoralis
very rare, open coast or sheltered/seaweed

excavation: at the base of the midden in square 2 and the northern half of square 1, for example, winkles (*Littorina littorea*) were particularly numerous.

Consideration of the habitat preferences of those species represented in the midden suggests that cropping was from a predominantly soft-shore, relatively sheltered coastal environment containing rock outcrops not unlike the present conditions found along the Moray and Beauly Firths. Not only are soft-shore species dominant but hard-shore species, such as limpets (*Patella* sp), are all but absent. The presence of mussels in some numbers does however, suggest access to rock outcrops. The three complete dog-whelk (*Nucella lapillus*) shells recovered have a mean shell-length to aperture-length ratio of 1.45 ± 0.05 which would also support the interpretation of cropping from a sheltered environment (Crothers 1975).

No worked lithic artefacts were found during the excavation or in the subsequent examination of material. It is not clear to what extent this accurately reflects the content of the whole site. Mellars (1978, 389) has drawn attention to the presence within the Obanian midden of Cnoc Coig of two types of shell deposit, 'shell heaps' and 'occupation surfaces', and noted that the former contain relatively few artefacts. The investigated area of Muirtown midden may represent one such deposit. However, the presence of a hearth might suggest that at least part of the excavated area was once an occupation surface. The 'shell heap' explanation for the absence of lithic artefacts is difficult, therefore, to reconcile with the structural evidence. Furthermore, during the initial examination of the site a series of exposures failed to yield lithic artefacts. On balance, it seems unlikely that the absence of lithic artefacts can be explained simply in terms of spatial variation in the content or structure of the midden.

MATRIX SAMPLES

A series of matrix samples was taken from various points for further analysis. Weight-loss on ignition (LOI) tests, using Ball's low-temperature method (Ball 1964), were carried out to assess the organic content by weight. A test for manganese concentration was also performed (Hodgson 1976, 62). The results for both tests are given in table 2.

None of the matrix samples from within the midden produced a high LOI, but it is worth noting the very low value obtained for the hearth sample (no 8). The most striking result from the LOI test is the very high organic content indicated for the black sediment. With an LOI of 25% the black sediment has a markedly higher organic content than any of the samples from the overlying brown loam (samples 3–5) or the stained loam (sample 2). The manganese test broadly implies that the lower stratigraphic units have higher concentrations. Strongest reactions were obtained for the black sediment and one of the midden matrix samples. The results might suggest some concentration of manganese as a result of fluctuating water tables in the area, although it is not clear if the concentration could account for the dark coloration in the black sediment. The black sediment appears to be quite distinct in composition from the overlying deposits suggesting that the midden has undergone *at least* two phases of burial. Furthermore, the highly organic content and extensive spread of the black sediment suggests that its depositional history may be connected with a major phase of clearance activity, itself of considerable archaeological interest and worthy of further study. There are indications that it may be a more widespread phenomenon, as a 0.1 m layer of similar composition interbedded with water-deposited, perhaps marine, sands has been noted beneath Inverness fire station (NH 6686 4618; illus 1), c 1.6 km from the Muirtown shell midden.

TABLE 2
Matrix analysis results

Sample No. & Location	Colour Before & After Drying	L.O.I. %	Manganese Test
1 Black Sediment	7.5YR–2/0 7.5YR–5/4	25.0	very strong
2 Stained Loam	10YR–3/2 7.5YR–5/6	8.0	weak
3 Brown Loam Lowermost	7.5YR–2/3 5.0YR–5/6	10.5	quite strong
4 Brown Loam Midprofile	10YR–3/2 7.5YR–5/6	9.0	quite strong
5 Brown Loam Uppermost	2.5YR–4/2 7.5YR–5/6	4.5	none
6 Hearth	10YR–5/4 10YR–6/2	1.0	strong
7 Midden Uppermost	7.5YR–3/2 2.5YR–5/4	8.0	very strong
8 Midden Lowermost	7.5YR–3.5/2 5.0YR–4/6	5.5	quite strong

DISCUSSION

The shallow and seemingly patchy nature of the shell deposit suggests a series of short-term occupations. There are some indications that we may be dealing with small numbers of individuals. The well-defined concentrations of particular shellfish species in the midden might represent the refuse from individual gathering trips or meals. The absence of stone tools and waste, combined with the very limited evidence for exploitation of food resources other than shellfish, suggests a restricted role for the site, while the superimposed layering of burnt deposits in the hearth points to some reuse over an unknown period. Given the presence of well-preserved fragile mussel shells around the hearths it is hard to envisage sustained or intense human activity in this part of the midden. Perhaps we must think in terms of frequent and not necessarily seasonal short-term visits by a few individuals at any one time who made use of particular hearth areas on a number of occasions. Non-intensive exploitation of local shellfish stocks would seem to be the implication.

Other sites in Inverness (illus 1) and elsewhere in Scotland have provided evidence relevant to the interpretation of the Muirtown site. The absence of industrial evidence for shell middens along the eastern coast of Scotland is far from unique. Middens which accumulated through the exploitation of soft-shore shellfish communities (primarily oyster) and containing features such as hearths, some faunal remains, but little or no industrial evidence have been excavated along the Forth Valley (Mackie 1972; Sloan 1982, 1984) and dated to the Later Mesolithic, the Neolithic and later. The single date obtained from Muirtown suggests that the activity represented by the lowermost deposits of the excavated area dates from the fourth millennium bc, the final stages of the Later Mesolithic (*sensu* Jacobi 1973; Mellars 1974). This

is significantly later than the Mesolithic evidence recently uncovered at Castle Street, Inverness (Wordsworth 1985). However, the two deeply buried shell middens discovered previously in Inverness would, as Wordsworth has noted (op cit, 90), appear to post-date the Castle Street assemblage and, inasmuch as they probably post-date the main marine transgression in the area (Sissons 1976), may be broadly contemporary with Muirtown. A third shell midden recorded by the Ordnance Survey (Record Card NH64NW2) 1 km to the north-west of Muirtown and centred on NH 645 465 cannot be located and no dating evidence is available.

Bearing in mind the lateral extent, shallowness and indications of breaks in the spread of the shell midden, the information gained from the area investigated may only be representative of a fraction of the total site. Further investigation of the Muirtown midden might establish the presence of Neolithic or later activity although as the site is now covered by low-density housing access might prove difficult. Given that the charcoal used for dating may have come from mature oak timber it must be acknowledged that the date obtained may be some hundreds of years too old. Consequently the absence of lithic technology or other potentially diagnostic artefacts presents a significant obstacle to establishing with confidence the broader cultural association of the midden. This problem is compounded by our present uncertainty over the precise chronology of the Mesolithic to Neolithic transition (Kinnes 1985, 18; Woodman 1989, 22). However, the evidence from Muirtown does confirm that the Inverness area provided a focus for communities seeking to exploit the coastal environment during the mid-fourth millennium bc. Whilst the Muirtown midden is far shallower than those in the Forth Valley the similarities in composition are noteworthy. It is possible that a pattern of soft-shore exploitation common to the firths of eastern Scotland was established during the later stages of the Mesolithic and continued into and beyond the Neolithic. How the pattern of exploitation represented by these enigmatic sites meshed with the wider range of economic and settlement activities during the Mesolithic and the Neolithic is a subject for future research. Clearly a more balanced and detailed picture of chronology, settlement and economy along the east coast of Scotland during the fourth millennium bc will be critical to our understanding of Muirtown and similar sites.

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REFERENCES

Ball, D F 1964 'Loss-on-ignition as an estimate of organic matter and organic carbon in non-calcareous soils', *J Soil Science*, 15 (1964), 84–92.

Crothers, J H 1975 'On variation in *N. Lapillus* (L): shell shape in populations from the South Coast of England', *Proc Malacological Soc*, 41 (1975), 489–98.

Hodgson, J M 1976 *Soil Survey Technical Monograph* (5). London.

Jacobi, R M 1973 'Aspects of the "Mesolithic Age" in Great Britain', *in* Kozlowski, S K (ed), *The Mesolithic in Europe*, Warsaw, 237–65.

Kinnes, I 1985 'Circumstances not context: the Neolithic of Scotland as seen from outside', *Proc Soc Antiq Scot*, 115 (1985), 15–57.

Mackie, E W 1972 'Radiocarbon dates for two Mesolithic shell heaps and a Neolithic axe factory in Scotland', *Proc Prehist Soc* (1972), 38, 412–16.
Mellars, P A 1974 'The Palaeolithic and Mesolithic', *in* Renfrew, C (ed), *British Prehistory*, London, 41–99.
Mellars, P A 1978 'Excavation and economic analysis of Mesolithic shell middens on the island of Oronsay (Inner Hebrides)', *in* Mellars, P A (ed), *The Early Postglacial Settlement of Northern Europe*, London, 371–96.
Sissons, J B 1976 *The Geomorphology of the British Isles: Scotland*. London.
Sloan, D 1982 'Nether Kinneil', *Curr Archaeol*, 84, 13–15.
Sloan, D 1984 'Shell middens and chronology in Scotland', *Scott Archaeol Rev*, 3 (1984), 73–9.
Stuiver, M & Reimer, P J 1986 'C14 calibration program', *Radiocarbon*, 28 (1986), 1022–30.
Synge, F M 1977 'Land and sea level changes during the waning of the last regional ice sheet in the vicinity of Inverness', *in* Gill, G (ed), *The Moray Firth Area Geological Studies*, Inverness, 83–102.
Woodman, P C 1989 'A review of the Scottish Mesolithic: a plea for normality!', *Proc Soc Antiq Scot*, 119 (1989), 1–32.
Wordsworth, J 1985 'The excavation of a Mesolithic horizon at 13–24 Castle Street, Inverness', *Proc Soc Antiq Scot*, 115 (1985), 89–103.

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