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A review of the Scottish Mesolithic: a plea for normality!

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INTRODUCTION

Any assessment of a particular period in Archaeology must be relative, through comparison with its equivalent elsewhere or with other periods of prehistory in the same region. Even if one allows for the fact that there are always problems and biases in recognition, recovery and survival of evidence, it must be admitted that the study of the Mesolithic of Scotland lags behind both the rest of Scotland's prehistory and much of the rest of the European Mesolithic. In fact, in the case of Scotland, it would appear that nature and man have conspired in every possible way to ensure that there was no relatively easy access to information about the Mesolithic. In essence, Scotland still lacks a workable Mesolithic chronology and any feeling for the type(s) of economy that was in use during early post-glacial times. What is even more worrying is that we cannot even presume that Scotland: (1) had a human presence, however sparse, from the Borders to Caithness (never mind Orkney and Shetland); (2) was an entity in which we could expect roughly the same types of artefacts to be used at the same time; (3) was an economic entity with equal emphasis on hunting, gathering or fishing throughout.

Any review of the Scottish Mesolithic has to be undertaken with the recognition of these limitations and so it would appear to be essential to examine how the study of the Mesolithic of Scotland developed and took on its particular form, as well as the various factors which may have biased the archaeological record and limited research in this period. These factors can be divided into two groups: (1) environmental factors which have limited the discovery of sites; (2) perceptual problems in which an apparently anomalous Mesolithic could be explained away as a very minimal and marginal phenomenon. However, even these factors have to be put in an historical context as it is only by understanding how research on the Scottish Mesolithic has developed that any suggestions can be made of how research should develop in the future.

This review has its own limitations. There are many problems which cannot be considered. These range from the problems associated with the beginnings of the Neolithic in Scotland and the potential contributions of the indigenous Mesolithic communities to the vexed question of the functions of artefacts such as microliths. This review will concentrate on: (i) how research of the Scottish Mesolithic developed to its present state; (ii) the problems associated with developing a typological and chronological framework for the Scottish Mesolithic; (iii) an examination of the evidence for the economic strategies of the Scottish Mesolithic; (iv) recommendations for further work.

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I DEFINITIONS AND BACKGROUND TO THE SCOTTISH MESOLITHIC

DEFINITION OF TERM MESOLITHIC

The term Mesolithic is usually applied to post-glacial hunter-gatherers. Unlike many of the other chronological divisions within European prehistory, the term Mesolithic is only a relatively recent phenomenon. Hodder Westropp had first suggested the term in 1866 (though not as a result of experiencing the Irish data as sugested by Nicholson (1983) as most of the Irish microlithic material was not discovered until later). However, it was left to the excavations of Edouard Piette at the Mas d'Azil (Piette 1895) to identify what was thought to be Mesolithic. Of course, we now realize that the Azilian is essentially Allerod interstadial in origin and as such predates the Holocene. The assumption, therefore, that the beginning of the Mesolithic can be equated with the onset of post-glacial conditions 10 000 years ago highlights a small contradiction. Many archaeologists have felt that the term Mesolithic has created a rather rigid and potentially misleading division within the Stone Age (Dennell 1983). As noted earlier, the Azilian does not fit comfortably into this division and so many French archaeologists use the term Epipalaeolithic to describe industries which can be found in early post-glacial times (Rozoy 1978).

Similarly in many parts of Northern Europe, the upper boundary of the Mesolithic is equally blurred. The Mesolithic is usually presumed to end with the introduction of a newer way of life in which domesticated crops and animals play an important role. In terms of a material culture, this is frequently associated with ceramics, new stone artefacts and in some instances burial monuments. However, many key elements are missing in cultures such as Pitcomb Ware Culture of the East Baltic or the Younger Stone Age of North Scandinavia.

However, while recognizing these weaknesses, it would still seem valid that, in Temperate Europe, the Mesolithic is defined by the onset of post-glacial conditions, 10 000 bp, as suggested by Mellars (1981). This effectively means the disappearance of arctic fauna and the final appearance of forests. The end of the Mesolithic is marked by the appearance of a distinctive economic and material culture package (Neolithic) which usually denotes the establishment of farming. Thus for simplicity's sake, the Mesolithic period should be regarded as having ended when a Neolithic presence can be clearly documented in the region. Throughout much of Scotland, it could be argued, therefore, that the Mesolithic period should end about 3300 bc (Kinnes 1985).

It would be grossly over-simplistic to presume that hunter-gatherers ceased to exist at that point in time. However, the term Mesolithic Survival should be used in a careful manner and confined to groups where we can document cultural and economic continuity from the preceding Mesolithic period. It should not be used to describe the economy, or portion of the economy, of Neolithic (or later) societies where there was, for various reasons, a simple hunter-gatherer adaptation to take advantage of local resources; see, for example, the concentration on seal-hunting at a later date around the shores of the Gulf of Bothnia (Broadbent 1979). Groups of material or sites which genuinely fall into the category of Mesolithic Survival are quite rare and claims are frequently based on contaminated C14 dates and/or the non-recognition of mixed assemblages and sites.

MESOLITHIC BACKGROUND

In north-west Europe, in regions adjacent to Scotland, the earliest phases of the Mesolithic are usually noted for a high incidence of simple 'non-geometric', obliquely trimmed microliths (in mainland Europe, these are often referred to as lanceolates). In general, it is difficult to find sites which date to earlier than 9500 bp. In many areas, a gradual change in microlith types and technology can be documented over the following 1500 years. Usually large isosceles triangles (and trapezes?) occur sometime after 9000 bp and these are then gradually replaced by scalene triangles by 8500 bp

(Bokelmann 1981; Brinch Petersen 1973; Gramsch 1987). However, in England, this gradual change has not been documented. Instead industries with numerous isosceles triangles and trapezes, eg Star Carr, are thought to be contemporaneous with other assemblages in which only non-geometric points occur (Jacobi 1978). So far, no convincing explanation for this apparent contemporaneity has been arrived at. In England, this complex of assemblages has been referred to variously as Early Mesolithic, Non-Geometric and Broad Blade. Similarly, many authors feel that, in Northern England, these assemblages are replaced suddenly by those in which narrow scalene triangles and backed bladelets dominate (Mellars 1976). These begin to occur for the first time after 8800 bp. These assemblages are frequently referred to as Later Mesolithic, Geometric or Narrow Blade. The abrupt change presents two problems: (a) the appearance of numerous scalene triangles is remarkably early; (b) the contrast between Early and Later assemblages looks most abrupt in Northern England in areas such as the Pennines. Are the high altitude sites with a narrow range of tool types only reflecting part of a broader range of activities and as such inadvertently exaggerating the differences? The earliest known assemblages in Ireland belong to the same general geometric techno-complex.

However, at some point after 8000 bp, the general European similarity between assemblages comes to an end. In mainland Europe, the small microlithic forms disappear and are replaced by forms such as trapezes in the Tardenoisian (Rozoy 1978) and further north in South Scandinavia broad trapezes followed by rhombic arrowheads (Larsson 1978). In Ireland, the distinctive macrolithic Later Mesolithic develops (Woodman 1978) so that it is only in Britain that extensive use of numerous microliths still continues.

Unfortunately, it has not been possible to make a pattern of the bewildering diversity of geometric microlithic forms to be found after 8000 bp in England. Jacobi (1979) has noted that there are distinct series of regional groupings but it has never been established if any of these groupings are confined to certain chronological horizons (Jacobi 1987). However, it would seem to be generally accepted that after 8000 bp there is a greater diversity of geometric forms, including rhomboids, quadrilaterals, isosceles tringles, trapezes and crescents. These can replace simple scalene triangle/backed blade assemblages.

THE HISTORY OF MESOLITHIC RESEARCH IN SCOTLAND

As noted above, the use of the term Mesolithic is relatively recent; in fact in certain areas, the idea of a Mesolithic was only gradually accepted and the terms Neolithic or Proto-Neolithic continued in use (Coffey & Praeger 1904). In some cases, these terms continued to be used to describe Mesolithic material as late as the 1920s. However, in many parts of Europe, archaeological investigations (excavations and collections) had already begun into material which we now know to belong to the Mesolithic. This included investigations at classic Mesolithic sites such as Svaerdborg in Denmark (Friis Johansen 1919).

Seen in this light, at the turn of the century, Scottish research into what was to be eventually recognized as Mesolithic differed very little from many other parts of Europe. In particular, material from two distinct regions was identified. First Grieve (1882) and then Anderson (1895, 98) and Bishop in 1914 identified what was to become the core of the Obanian culture as we know it today. The work on Oronsay was initiated with the hope of finding Neolithic or Bronze-Age burials in what appeared to be tumulus-like mounds. The inadvertent discovery of what is now known to be the Mesolithic is reasonably typical of research at that time. However, Anderson (1898) in his report on the Druimvargie cave at Oban alluded to the similarity between the Oban and Mas d'Azil material. Similarly on the eastern side of Scotland, whale skeletons associated with antler artefacts were reported as early as 1889 (Turner 1889). Besides the discovery of sites and artefacts, there was at this period some awareness of the broader European problems and the question of the transition between

the Palaeolithic and Neolithic was discussed by Munro as early as 1908. He uses Scottish as well as Continental European material to dismiss the notion of a hiatus between the Palaeolithic and Neolithic. Although such esteemed scholars as the Abbé Breuil (1922) were to continue the use of the term Pre-Neolithic with reference to Scottish material, others such as Callander (1927) were aware of the European counterparts of their Mesolithic and so used the term Tardenoisian to describe the range of stone tools which they were discovering.

Thus by the 1920s, a range of clearly comparable stone tools of a broadly European form was being recognized. Paterson (1912) had noted 'pigmy flint' in the Dee Valley, Aberdeenshire. In particular, the Tweed Valley microlithic sites were discovered and commented on by Corrie (1916) and Callander (1927), while Lacaille, who was to contribute so much to the Scottish Mesolithic, first reported microliths from Shewalton in Ayrshire in 1930.

Similar investigations were in train elsewhere. Amateurs such as Buckley (1924) and Petch (1924) were publishing the results of their investigations of Mesolithic sites in northern England. Rankine was beginning his work in southern England while Grahame Clark's *Mesolithic of Britain* was published in 1932. Armstrong's work in the Creswell area of Derbyshire was also being undertaken during this period (1924). This series of excavations may, however, have had an indirect and fatal effect on the development of Scottish Mesolithic research.

Up until the 1940s, it would seem that Scotland had kept pace with Mesolithic research elsewhere. In fact, it had managed to avoid some of the more extreme claims of antiquity which had been made in Ireland, eg Knowles (1914), Burchell *et al* (1929). The work of Lacaille and Callander in Scotland could be paralleled by Blake Whelan in Ireland, Mathiassen in Denmark, Nummedal in Norway and Coulanges in France.

At some point within the following 20 years, research in the Mesolithic of Scotland became stagnant. This again was not unique to Scotland. Various factors – the impact of the Second World War plus the completion of a certain phase of research – led to a quiet period in Mesolithic research throughout North-West Europe. The publication of Movius's *Irish Stone Age* in Ireland (1942) and Clark's excavations at Star Carr in England (1954) were typical contributions of their generations. They may have appeared too definitive or impossible to emulate and so caused a falling-off of research. Two phenomena are evident in Scotland. One is the role of Lacaille's *Stone Age of Scotland* (1954) while the other is that since 1954 there has been a relative lack of development of Mesolithic research in Scotland. This has only changed in recent years.

Undoubtedly Lacaille's *Stone Age of Scotland* had the dampening effect referred to earlier. However, being written on the edge of the C14 revolution, it neither enjoyed its benefits nor was it sufficiently distant from that revolution to be respected for what it was, a compendium of works in essence carried out before the 1940s. Certain ideas in this book have had a far-reaching effect on how the Mesolithic of Scotland is viewed today. In particular, the *Stone Age of Scotland* was influenced by Hallam Movius's *The Irish Stone Age* and it was presumed that Scotland's earliest post-glacial occupation was a product of a Larnian colonization. Movius had perceived the Larnian of Ireland as being Epipalaeolithic in derivation, coming ultimately from the Creswellian of Derbyshire which was itself of uncertain antiquity. Thus the Mesolithic of Scotland was seen as being equally, if not more, marginal than that of Ireland. As a result, much of the rest of the Mesolithic of Scotland had to be accommodated in a chronologically short time period, resulting in an established presumption that it was all very late.

An examination of any list of publications of Mesolithic research will show a rather worrying trend in Mesolithic research in Scotland, eg those listed by Morrison (1980) for the Mesolithic of England and Wales, Scotland and Ireland. In the case of Ireland, several early papers not referred to by Morrison could have been added but the bibliography indicates the trends noted earlier; that,

given the smaller populations in Ireland and Scotland, there was, up until the 1940s, a fairly similar trend in Mesolithic research throughout these islands. The immediate post-war pause can also be seen. Throughout the '60s and in particular the '70s there has been a significant increase in research in both England and Ireland but this trend has been much weaker in Scotland. In fact, the relative lack of development is very apparent when Morrison's (1980) section on Scotland is compared to Lacaille's *Stone Age of Scotland*. Therefore, in spite of the contribution of several small excavations such as Starr Cottages (Affleck 1986) or Auchareoch (Affleck *et al* 1988), we have already entered the era of long-term projects, eg Oronsay (Mellars 1987); therefore research in the Mesolithic of Scotland is in danger of proceeding, for the remainder of the century, on a very narrow base with intensive investigations at a few new sites such as Rhum. It also lacks a broadly-based chronology derived from either the typological consistence of large numbers of sites or the creation of a C14 chronology through re-investigation and re-excavation of older sites as has been done in Denmark (Brinch-Petersen 1973) or Sweden (Larsson 1978).

BIAS IN THE RECORD OF MESOLITHIC SETTLEMENT

As the Mesolithic is not usually associated with visible field monuments, it is not always very apparent that it exists in any region. Thus there is a much greater tendency to bias the archaeological record. If a researcher were particularly strict and looking for diagnostic traits such as microliths, then Scotland must have one of the lowest number of Mesolithic sites per km^2 in Western Europe, about 100 sites in roughly 80 000 km^2, or one site per 800 km^2. It is quite difficult to assess how many actual Mesolithic sites are known. In the absence of a definitive gazetteer of Mesolithic sites, any distribution map which purported to show all locations where Mesolithic material had been found would be totally spurious. In the south-west both Morrison (1980a) and Coles (1964) have listed numerous sites without clearly stating why these are to be considered Mesolithic. Even the recent survey of material from the Lough Doon area (Edwards *et al* 1983) lists concentrations of material with no stated reason why those where diagnostic artefacts were not found should be considered as Mesolithic. It is, of course, highly probable that many of these concentrations are Mesolithic. Perhaps the combined desire to find 'early material' and the tendency to list only by period is in danger of creating a situation where the same group of material could appear in lists of artefacts belonging to different periods! In many instances, no diagnostic artefacts have been found and, on the basis of site distributions in Ireland in Strangford Lough (Woodman 1978), it is known that many coastal sites can be Neolithic or Bronze Age. At the other extreme, there are a number of excavations of later sites which have produced Mesolithic material. Even in Ireland many more certain sites are known in the same area while in England many regions have a much higher density, eg the Pennines (Jacobi *et al* 1976) and Southern England (Mellars & Rheinhardt 1978). The second and more noticeable fact is that most Mesolithic sites are found in the southern half of Scotland and no unequivocal evidence has been found north of the 58° N latitude line.

The factors which have created this distribution are unlikely to be the activities of Mesolithic communities but are rather the product of nature and man. Most scatters of stone tools come from a few specific sources. The amateur archaeologist and collector is perhaps the greatest contributor to the basic substructure of Mesolithic research: collections of artefacts, either in museums or in private hands. This requires that only a tiny proportion of the population is prepared to go out to look for scatters of tools (these need not necessarily be Mesolithic sites). The ideal situation can be seen in Yorkshire where the activities of various archaeological societies and museums have resulted in a small but significant group of amateurs visiting convenient and adjacent localities such as the Pennines, Peak district and North York moors. Similar trends can be seen in other parts of England, while the County Antrim 19th-century antiquarians functioned at their best in the immediate vicinity

of their homes (Woodman 1978). This phenomenon can be found elsewhere, eg in Denmark where Andersen's work in the Aamosen area is a fine example of the contribution of a local amateur (1983).

In Scotland a high proportion of the population, over 50%, is found in the narrow midland belt. As a contrast, the Highlands and Grampian constitute over 40% of the land area of Scotland and yet contain only 5% of the population, of which half live in Aberdeen and Inverness. Amateurs will go to visit known localities but new sites are usually found adjacent to their homes (Woodman 1978). Therefore, much of Scotland has a reduced chance of producing Mesolithic sites.

However, other factors contribute to this biased picture. Artefacts have to have some visibility before they are found. While they can occasionally be recovered from under sand dunes or out of river-beds, they are normally found through collection on ploughed fields. The thin blanket peats of the Pennines are in exception. There erosion and deflation play an important role in exposing sites. Much of Scotland is covered with quite thick upland blanket peat or grasslands. These require a more active policy of investigation. Here the traditional field-walker will rarely discover sites. Only in Norway and Sweden have sites been found; here there has been a more consistent approach to discovering the full range of settlement through detailed survey and shovel testing. Here, the investment of the University of Umeå in opening up the archaeology of Northern Sweden is a striking example of a contribution which has received consistent academic support (Broadbent 1987). There is, of course, one form of ground cover which is growing in extent and precluding the discovery of settlement of many periods: forestry. One worrying aspect of this is that it is precisely the northern areas, where so little is known, which are being forested quite extensively. The irony is that in cutting the ditches for tree-planting and drainage, sites could be exposed, eg Starr Cottages at Loch Doon (Affleck 1986). But this information is only available for a limited period. Therefore, across much of Scotland, the ground cover significantly reduces the chance of numerous discoveries of Mesolithic sites. The accepted archaeological scale of priorities in which visible monuments are deemed to be the most important has also exaggerated this problem.

A final factor which is often felt to be a major source of bias is the availability of raw materials, namely flint. This is almost certainly not a problem in Scotland. Flint can be found in some significant concentrations around certain parts of the coast of Scotland (Wickham-Jones & Collins 1978) and chert artefacts have been found on the Tweed Valley sites. Other sources of raw material are beginning to be recognized, eg Rhum bloodstone, and many other raw materials, including many quartzites. These exhibit enough of the attributes of conchoidal fracture to allow any competent amateur to identify the presence of humanly-produced artefacts (Wickham-Jones 1986). Large quantities of usable raw materials will always leave an obvious presence in the form of industrial waste. Therefore, the absence of a known range of raw materials used by early societies in Scotland is mostly a reflection on the activities of archaeologists. It is also significant that with Buchan flint available in Grampian, so few Mesolithic sites have been found in that region, the Dee Valley being an exception.

ASSESSMENT OF EVIDENCE

The first and one of the most obvious aspects of the Scottish Mesolithic is the presumption, until quite recently, that much of Scotland might not have been inhabited during the Mesolithic and that the Scottish Mesolithic was of a comparatively short and recent duration. As noted above, some of these attitudes ultimately derived from Lacaille's *Stone Age of Scotland*. A second reason may have been the temptation of many authors to see material from Morton (Coles 1971) as being a derived and late version of one of the English Early Mesolithic assemblages. Irrespective of the validity of the attitudes that Scotland was occupied late (this phenomenon will be discussed in detail below), there is no doubt that there are no clearly unequivocal assemblages which parallel exactly the Early Meso-

lithic of England: assemblages with large numbers of non-geometric points with a possible lesser role for large isosceles triangles and trapezes. The presence or absence of Mesolithic core axes is irrelevant. Similarly no very early C14 dates (9000 bp or earlier) have been obtained in association with assemblages which might conceivably be considered as a Scottish equivalent of the English Early Mesolithic.

Therefore, the vast majority of Scottish Mesolithic assemblages fall into the narrow blade/Later Mesolithic type where numerous different forms of geometric microliths may occur in profusion. There are some assemblages which fall outside this category, notably the Obanian assemblages where no microlithic forms are usually found. Although the Obanian is noted for its bone, antler and pebble tools, the Obanian assemblages continue to make use of small bladelets. Traditionally in Scotland, certain groups of material have also been presumed to be later than the Mesolithic because, although they contain small microlithic(?) forms, there was no evidence of the use of the micro-burin: eg Culbin Sands (Lacaille 1944). This is an invalid distinction. Several other macrolithic assemblages, notably the early material from Freswick and some of the sand-dune sites in the Ardnamurchan Peninsula on the western seaboard, have always retained the possibility of being Mesolithic.

As in most parts of the west Atlantic periphery, the presence of acid soils means that there is a limited number of bone and antler artefacts. Aside from those associated with the Obanian sites and the carse clays of the Forth River, there are only the two antler barbed points from Cumston and Shewalton and the one bone(?) (Bonsall, pers comm, has suggested that it may also be made of antler) point from Glenavon.

The southern distribution of sites has already been referred to but within this region research has been very uneven. Many of the sites are casual collections or even quite old collections and detailed intensive investigations have been confined to a few areas. Only two regions can be said to have had adequate long-term investment. In the south-west in recent years, the work of Cormack (1970), Coles (1964), Truckell (1963), Ansell (1966–75), Affleck (1986) and Morrison (1980), backed up by the palaeo-environmental work of Edwards, have documented the presence of Mesolithic communities not only on the coast but in the southern uplands, particularly around Loch Doon. In the Loch Doon area, Ansell has documented over 60 possible (?) Mesolithic sites (Edwards *et al* 1983). Affleck has excavated sites at Starr Cottage as well as directing the excavations at Auchareoch on Arran referred to below. Excavations on the coast in the 1960s took place at Low Clone (Cormack & Coles 1968) where a rather enigmatic elongated hollow was found. This hollow was associated with a microlithic assemblage. At Barsalloch the site had been more or less obliterated by ploughing, but a C14 date of 6000±100 bp was obtained. At both these sites, a rather restricted range of artefacts was recovered. For some time, in spite of the numerous sites being found in south-west Scotland, there was no evidence of a Mesolithic occupation of any substantial length. Even today, the oldest evidence in the south-west is the date from the hearth at Redkirk Point (Masters & Langhorne 1976). In this region, the untimely death of Tom Affleck has unfortunately brought to an end a potentially very promising contribution to Scottish prehistory.

The second region is the central west coast where the earlier initial investigations on the Obanian sites have been supplemented by Mellars's long-term investigation on Oronsay and the series of excavations which J Mercer initiated on the neighbouring island of Jura (Mercer 1980). A more recent investigation by Rod McCullagh at Newton on Islay (forthcoming) has been a useful addition to Mesolithic studies in this region as have the investigations by Edwards, Affleck and others on the Isle of Arran (Affleck *et al* 1988), but perhaps the most important recent addition was the three seasons of investigations on the island of Rhum which have produced the earliest dates for the Mesolithic of Scotland 8500–8000 bp (Wickham-Jones & Pollock 1987; Wickham-Jones forthcoming). The most anomalous site in this region is Kilmelfort Cave where Coles (1983a) found a series of

large backed blades associated with small scrapers and scalar cores. Unfortunately, most of this cave was obliterated by quarrying.

In contrast, the east coast of Scotland has seen comparatively little recent work on the Mesolithic. John Coles's excavation at Morton (1971) still remains the major recent investigation in this region but Kenworthy's (1981) three seasons of excavations at Nethermills Farm on the Dee River should make an important addition. Besides these sites, there are surface collections of the Valleys of the Rivers Dee, Clyde and particularly the Tweed (Mulholland 1970). The only other recent discoveries have been residual concentrations of material found during the excavation of more recent settlements, eg the Roman site of Elginhaugh (Clarke, pers comm) and during urban excavations in Aberdeen (Kenworthy 1982), Inverness (Wordsworth 1985) and in the Border burghs.

II TYPOLOGICAL AND CHRONOLOGICAL PROBLEMS

THE COHESION OF THE SCOTTISH MESOLITHIC

Ideally the question of the antiquity of man in Scotland should be tackled first, but problems of interpretation and organization of the main body of Mesolithic material have been inclined to influence our interpretation of other questions which have a bearing on this problem. In particular, does the present evidence really point to a later colonization of Scotland? Much of the consensus that Scotland was only occupied at a relatively late date in the Mesolithic derives from the work carried out at Morton (Coles 1971) and Mercer's proposed chronological sequence for Jura (1980). In both areas, there is a presumption that microlithic assemblages which resemble the English non-geometric assemblages have been found in a significantly later context.

Morton is a raised ridge underlying Tentsmuir Sands. Two areas were investigated. Site A was an area on a ridge which at one point was on an island. This site was a scatter of stone tools, hearths and flimsy structures. Site B was a shell midden which overlay transgression deposits. In the case of site B the C14 dates from the midden would suggest occupation between 6000 and 6500 bp. The fact that the midden overlies transgression deposits would seem to confirm this date range. However, in spite of the substantial area of Site B excavated, only one microlith was recovered. The majority of the material and C14 dates come from Site A where most dates lie between 7000 and 6000 bp.

As has recently been highlighted by Myers, the usual interpretation of Morton as having a comparable assemblage to Star Carr but being up to 3000 years more recent has had incalculable influence on interpretations of the Scottish Mesolithic. If an apparently early type of assemblage could be dated to mostly between 7000 and 6000 bp, then much of Scotland's Mesolithic could be interpreted as recent, retarded and, as a result, of only marginal significance. This crucial parallel has been based on the proposition that because a number of non-geometric points (58, or roughly 25%, large triangles and a maximum of three trapezes) exist out of a total of 226 microliths, they parallel the Yorkshire Star Carr assemblage (Clark 1954) which would seem to date to about 9500 bp (these are early dates with large standard deviations). In essence, Myers (1988) has attempted to resolve this apparent conflict by suggesting that the assemblages are early and the C14 dates belong to a second, more recent phase of occupation. On the basis of changes in sea level, Bonsall (1988) suggests two phases of occupation even further apart: a first phase associated with the so-called non-geometric forms pre-dating 9300 bp, when the sea level was initially quite high, and a second phase associated with the later marine transgression dating to about 6200 bp.

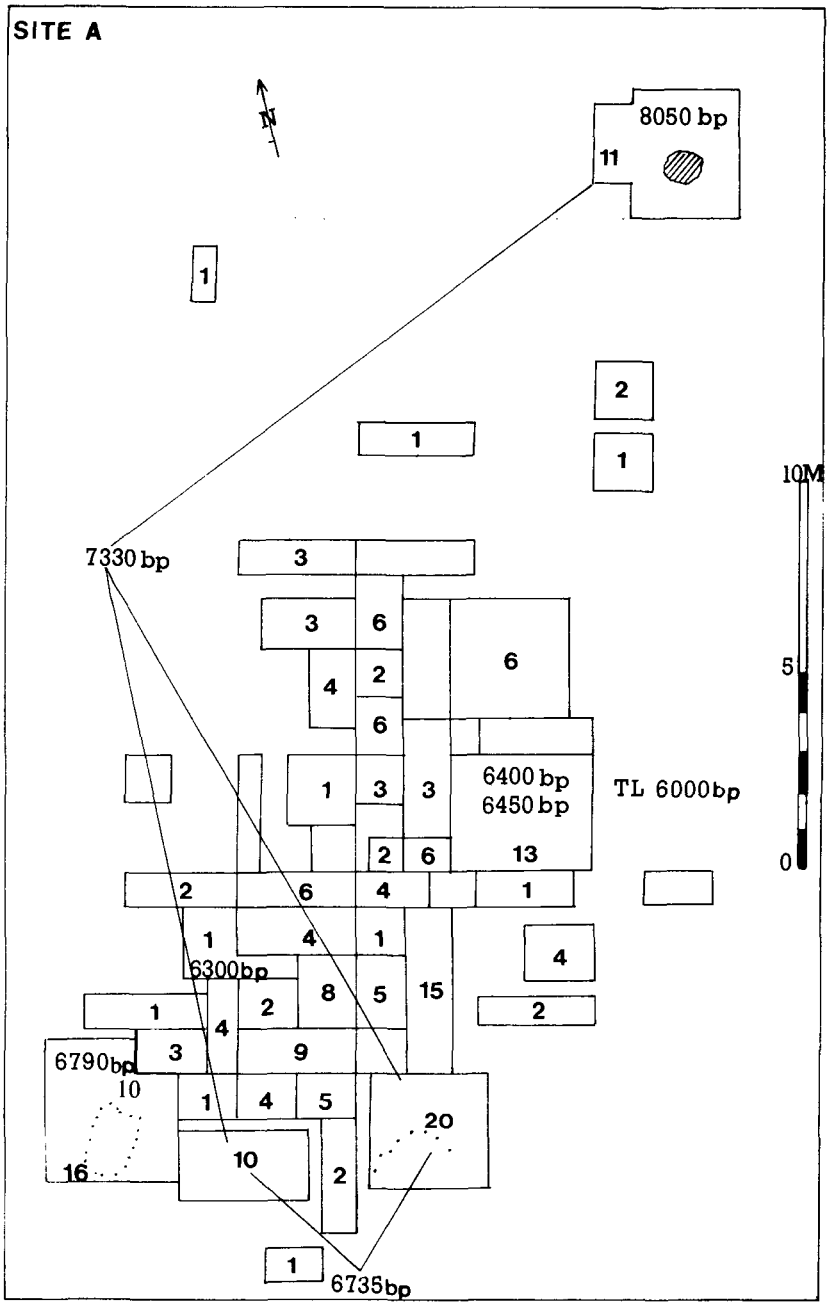
The problems are: (i) Is the Star Carr assemblage from one specific phase or might it represent a multiplicity of occupations? As noted earlier, the oft-quoted parallel with South Scandinavia is difficult to match exactly (see Bokelmann 1981). (ii) A second weakness is that many other aspects of

Star Carr cannot be paralleled at Morton. Can the absence of blade scrapers, core axes and blade awls at Morton be entirely explained away as functional variability? Functional variability can be surprisingly difficult to find on Mesolithic sites (the Pennine sites' low burin, scraper, axe element is one of the few exceptions and that assemblage group is associated with one particular environment, not a large region).

The problems of the Myers solution have already been discussed elsewhere (Woodman 1988; Clarke & Wickham-Jones 1988). In essence, the Myers hypothesis is based on an examination of a few illustrated pieces. There has been no attempt to show that the presumed early pieces, even the non-geometric point, cluster in one area and could be argued as belonging to an early specific phase of occupation. Similarly the suggestion that a significant number of non-geometric points must mean an early date has yet to be proven in Scotland. At Mt Sandel (Woodman 1985), a small but significant number occurs alongside scalene triangles while a range of similar forms occurs with geometric assemblages in the Isle of Man (Woodman 1987).

On Site A, unfortunately, there is a, claimed, poor correlation between the richest areas for artefacts and the areas which produced charcoal. However, Myers's ingenious argument that there are two phases, one associated with an early industry and a second associated mostly with charcoal and a later occupation is not necessary. The dates have their own integrity (illus 1). The most southerly, NZ1192 6790±150 bp from Trenches 55-56-47 and Q948 6735±180 bp from Trenches 43-44. A second date of NZ1302 7330±200 bp lies suspiciously close in date to be considered significantly different but in this case charcoal from Trench 46 has been added. Again the later dates associated with the centre of the site (T42 GAK2404=6300±150 bp and T53 NZ1193=6400±125 bp and Q989 6450±80 bp) are not closely associated with diagnostic artefacts. To the north, charcoal from T46 NZ1191 gave a date of 8050±255 bp. Though this represents charcoal from all levels, Coles felt that the multiple phases of use of that feature in T46 belonged to a short period. The microliths are rather undiagnostic but one from the earliest occupation could be a scalene triangle or backed blade. On the basis of the west coast date, this would be compatible with the C14 dates. Two points about the C14 dates are worthy of consideration. While much has been made by Myers (1988) of the fact that combined charcoal samples have been used for dating, with the exception of NZ1304 7300±200 bp which includes charcoal from both ends of the site, it seems unlikely that the particular range of dates from roughly 6800 to 6300 bp could be produced by combining substantial quantities of charcoal from the two suggested discrete phases of occupation. The addition of charcoal from an early phase of occupation, ie 9000 bp, in order to produce dates which mostly lie in the range 6300–6700 bp would have to contain charcoal from a phase significantly later than the 6300–6700 date range and thus be later than site B. Secondly, with reference to Myers's point about differences in charcoal and artefact concentrations, the area around T46, which is associated with slightly older charcoal, is also not associated with a large concentration of artefacts. In fact, on many Mesolithic sites charcoal and artefact concentrations have a complementary distribution. At Morton, as noted earlier, much of the charcoal is concentrated at the southern end of the site in the aea of some of the little structures found by Coles. Many of the stone tools were found in the area where they would be expected to cluster on a temporary encampment, ie around the area of shelter and heat, which was limited in size, rather than on top of it (Binford 1983, Chapter 7).

While we cannot assume that prehistoric communities will either leave their sites in a pristine condition for the benefit of archaeologists or that re-occupation will not take place (see Mt Sandel, Woodman 1985), Myers feels that a second additional set of factors may have obscured the two phases of occupation, ie scavenging of raw material between sites. However, if the possibility of different microlithic forms belonging to totally different phases is to be advanced, then the fact that *all* microlithic forms are made from the same range of raw material would suggest the opposite. It would



ILLUS 1 Morton, Site A. Plan of trenches showing numbers of microliths recovered, location of charcoal for C14 dates and the position of structures

be surprising if two *ad hoc* episodes of scavenging of raw materials up to 3000 years apart came up with the same range of raw materials.

Therefore, most of the Morton assemblage makes sense if it is associated with the date range 6790±150 to 6300±150 bp, which would probably be at a time when the sea was at its highest relative

level and the Morton area may even have been an island. Thus the Morton industry, according to Coles, can be seen as being dominated by large triangles, mostly isosceles, with oblique forms being only of secondary importance and trapezes in fact quite rare.

The fact that so-called early non-geometric forms have been found in what could be argued as late (albeit poorly recorded) contexts must also be taken into consideration. At Shewalton large trapezes and triangles would seem to have been found in a post-transgression context (Lacaille 1930) while one large trapeze was also found at Barsalloch with a C14 date of 6000±110 bp (Cormack 1970).

Therefore, in spite of the apparent similarity to the 'non-geometric assemblages', the case made by Myers and Bonsall is in itself by no means conclusive. However, certain factors in the Jura area must also be taken into consideration.

The development of the excavations on Jura, which were initiated by John Mercer and are being continued by Susan Searight, have produced quantities of artefacts which can rarely be matched anywhere in these islands. Initial publications by Mercer would seem to support the idea of a Mesolithic chronology begun at a late date with microliths similar to Star Carr and Morton (see in particular Mercer 1980a). In essence, Mercer's chronology was based on C14 dates from three sites: Lussa Wood (1980b), North Carn (1972) and Lussa River (1971). Mercer's chronological succession was as follows:

PHASE 1A A Late Glacial phase which Mercer claims is characterized by a selection of tanged points. These are usually individual artefacts rather than total assemblages.

PHASE 1B *Lussa Wood* (Phase 1) (C14 dates: 8194±350 bp; 7963±200 bp). Large triangles, trapezes and non-geometric points (Mercer 1980a).
Lussa Bay Pre-dates? marine transgression and is associated with isosceles triangles and trapezes (Mercer 1970).

PHASE 2 *Lealt Bay* Scalene triangles, backed bladelets, lesser importance quadrilaterals. Associated with maximum transgression (Mercer 1968).
North Carn (C14 date 7414±80 bp) Apparently somewhat similar industry in part associated with C14 date but not clearly separated into different stratigraphic components. The early level is thought to resemble Phase 1B (Mercer 1972).

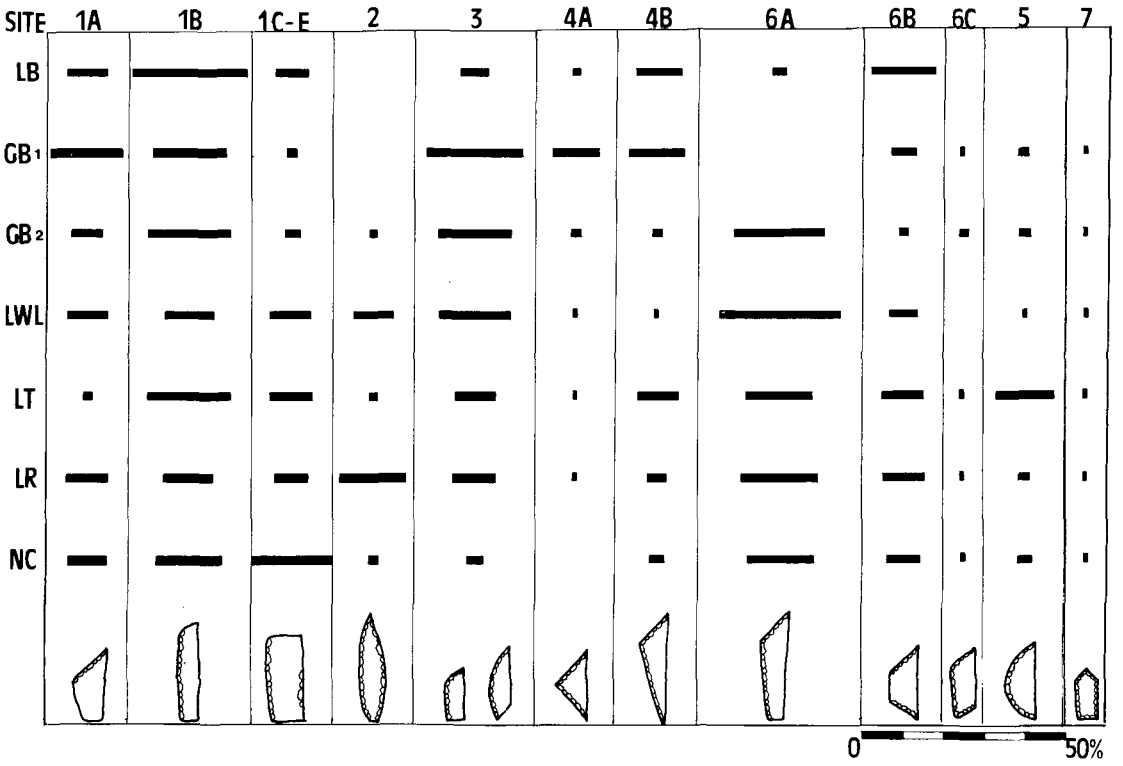
PHASE 3 *Lussa River* Post-transgression site. Quadrilaterals and needles more important (the C14 dates from this site are presumed by many authors to date a Neolithic phase of occupation) (Mercer 1971).

In retrospect, the Lussa Wood dates were used by many, including the author (Woodman 1978, 82), to support the idea of a late (approx 8000 bp) broad-blade tradition surviving in Scotland. However, the publication of Lussa Wood has left many authors questioning whether Mercer was correct in justifying the attribution of the C14 dates to a so-called broad-blade assemblage. Here at the base of a series of gravels were three circular stone settings. Bonsall (1988) has correctly noted that the gravels are unlikely to have been of marine origin as Mercer suggested but rather they and the artefacts in them have washed downslope as a product of erosion. These are associated with two C14 dates and the artefacts from the lowest levels are thought to be associated with these dates. Inspection of Fig 8 (Mercer 1980b) shows that this so-called early assemblage at Lussa Wood is in essence narrow blade in character in which single- and double-backed bladelets are the dominant element. Only two trapezes and a few non-geometric points occur in the lowest level at Lussa Wood. However, the case for early non-geometric assemblages being found on Jura was made by Jacobi (1982) who noted that

the Glenbatrick (Mercer 1974) Waterhole concentration G1 did contain numerous microliths which resembled those found in certain early non-geometric contexts in England.

It required the excavations on Rhum to expose the paradox, as a backed blade, triangle-dominated industry has been clearly documented before 8000 bp (Wickham-Jones & Pollock 1987; Wickham-Jones forthcoming). Here C14 dates range from 8600 to 7600 bp. It is possible that the areas associated with scalene triangles date rather early in the sequence while the area where slightly later dates were obtained has a higher incidence of small crescents (Wickham-Jones, pers comm). This has again been confirmed by the excavation of a similar type of assemblage in Islay. Here an exploratory excavation carried out by McCullagh at Newton has produced two C14 dates: 7765±225 and 7805±90 bp (McCullagh, forthcoming). At Auchareoch on Arran, Affleck *et al* (1988) obtained similar C14 dates for a geometric microlithic assemblage. Two AMS dates of 7300±90 bp and 8060±90 bp were obtained. Therefore the earliest clearly documented assemblages from the west of Scotland, including those on Jura, would suggest that a classic narrow blade technology was established at or before 8000 bp.

Part of the problem is that too much emphasis has been placed on inspection of drawings looking for type fossils rather than considering the overall distribution of microlithic forms. As the Jura material has formed the largest component in this comparative study, a simplification of Mercer's own typology has been used (illus 2 and 3 are rough estimations and simplifications of information in publications. They should be regarded as estimates of relative importance, not



ILLUS 2 Schematic chart of main microlith forms from Jura: LB – Lussa Bay; GB1 – Glenbatrick 1; GB2 – Glenbatrick 2; LWL – Lussa Wood Lower Level; LT – Lealt Bay; LR – Lussa River; NC – North Carn

definitive statements). If the North Carn assemblage, which, by Mercer's own admission, is two-phase, is excluded, then many of the assemblages from Jura do seem to form one group. These assemblages can also then be compared to other sites.

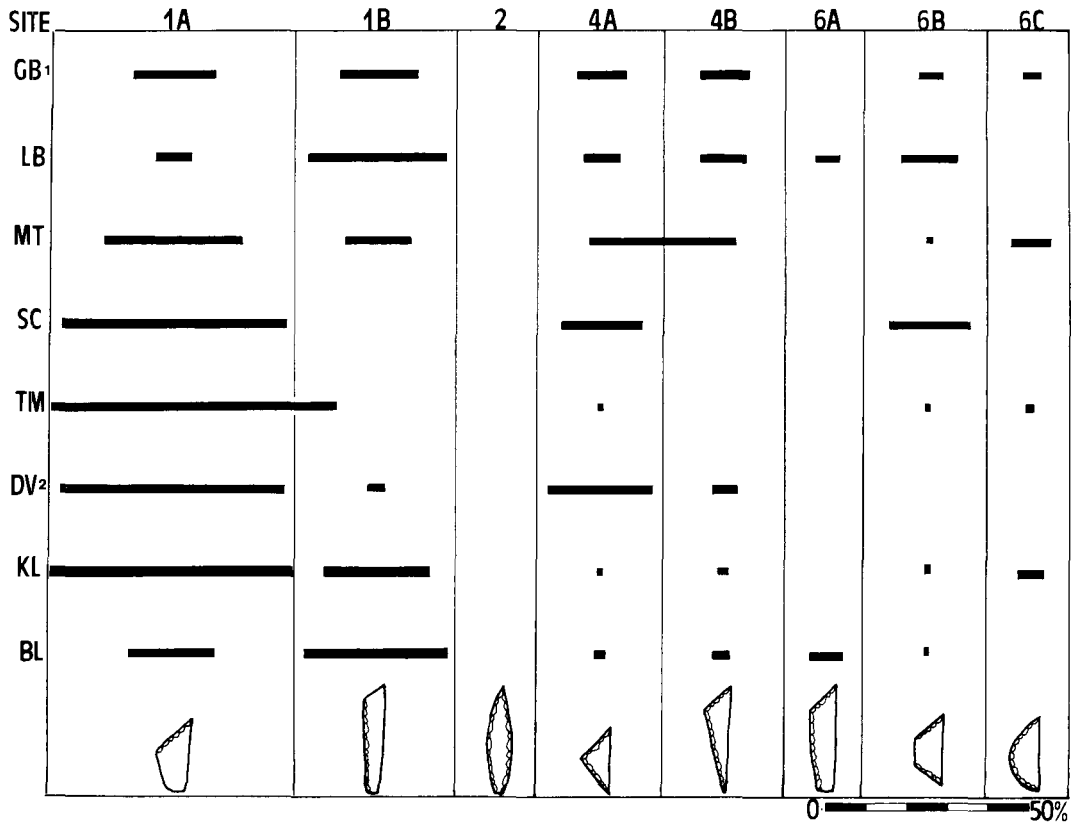
It is immediately apparent from illus 2 that the presence of a few trapezes is no indication of period as they occur at all sites. It is apparent that the lower levels at Lussa Wood, Lealt Bay, Glenbatrick (2) and even Lussa River are all remarkably similar. In essence, besides the ubiquitous trapezes, they all have a low incidence of isosceles triangles and simple lanceolates. Scalene triangles and what Mellars described as subtriangles (Mercer Subtrapezoid 6A) are the dominant forms. All these assemblages could belong to one short phase in effect post-dating both the Lussa Wood and North Carn dates. The only minor difference would seem to be that Lussa River and Lussa Wood have a higher incidence of double-backed needle points (Mercer Class 2).

Glenbatrick (1) and Lussa Bay stand out as being different. Isosceles triangles and short scalene triangles are much more frequent while subtriangles and double-backed needles are rather rare. In both cases, non-geometric points occur in relatively restricted numbers. It would, therefore, seem reasonable to accept Jacobi's suggestion that these sites represent an early non-geometric phase. The position of Glenbatrick is of limited use for dating as the steep drop below the site means that its location would have been ideal at any time after the early transgression. However, Lussa Bay could, following Bonsall's (1988) suggestion, be dated to the regression between the early and mid Holocene transgressions, ie after 9000 bp but before 8000 bc.

Of course, using evidence from the east, Morton provides contradictory indications of age. Using Coles's 1971 Fig 11, it is apparent that some of his straight retouch forms could be considered as non-geometric points. Therefore, in illus 3, Group 1A from Morton has been increased slightly and Group 1B reduced. Aside from the larger concentration of non-geometric points (1A) and the reduced numbers of 1B, which could be a simple bias built in by this author, there is no doubt that the Morton assemblage is very like Glenbatrick 1 and Lussa Bay. There is the same lack of double-backed needle forms Type 2 and subtriangles while isosceles and short scalene triangles are very common.

Comparison with England does not offer any immediate exact parallels. Both Star Carr (Clark 1954) and Thatcham (Wymer 1962) have very large numbers of non-geometric points while Star Carr also has isosceles triangles and trapezes. The absence of a good, securely dated, chronological sequence of assemblages in England provides little help as even yet the English material can only be grouped into a non-geometric microlith complex which equals pre-8800 bp. If Scotland and South Scandinavia are seen as two arms of a large bay, then perhaps some other parallels can be drawn. In a broader European context, these Scottish assemblages can be seen to be similar to those around 9000 bp. Klosterland (Brinch Petersen 1967, 73) in Jutland would be thought of as earlier like Thatcham, ie 9500. In this instance, non-geometric points dominate totally. Closer to 9000 bp, though with a charcoal date of 9420±130, Duvensee 2 (Bokelman 1981) in Schleswig Holstein has the addition of substantial numbers of isosceles triangles. A similar trend can be seen at Friesack in East Germany around 9000 bp. It is interesting that assemblages such as Bollund and Sonder Hadsund (Brinch Petersen 1967) probably date to after 9000 bp and resemble most closely the Lussa Bay/Glenbatrick material. Only significantly later than 9000 bp do substantial numbers of scalene triangles appear, eg Duvensee 13.

Within the Irish Sea context, comparisons are not particularly good. The scalene triangle-dominated Mt Sandel assemblage at 9000 bp is a good example. In Wales, Mercer has always drawn parallels with the Caldey assemblages (Lacaille & Grimes 1955) where similar large geometric forms have been found; however, this type of assemblage has never been dated in Wales. Assemblages dominated by non-geometric points and without the trapeze/isosceles element have been dated at Abberfraw and Rhuddlan in North Wales to after 9000 bp (Morrison 1980). At Nab Head an



ILLUS 3 Schematic chart of main microlithic forms of selected Scottish and other European sites: GB1 – Glenbatrick 1; LB – Lussa Bay; MT – Morton; SC – Star Carr; TM – Thatcham; DV2 – Duvensee 2; KL – Klosterlund; BL – Bollund

assemblage dominated by non-geometric points and containing about 10% short isosceles triangles has produced dates of just before 9200–9100 bp (David, pers comm). The early dating of the Mt Sandel assemblage, with its scalene triangles at about 9000 bp, still remains an anomaly in north-west Europe.

There would seem to be three choices. (i) Accept the typological comparisons of the major assemblages and identify the Glenbatrick/Lussa Bay/Morton Site A material as an early phase of the Scottish Mesolithic. Lussa Bay is then associated with the low sea level before the mid-Holocene transgression. (ii) Accept that Morton Site A and its microliths are associated with the main batch of C14 dates and place the whole complex late in the Scottish Mesolithic. However, as will be seen from the following section, this could cause other problems. (iii) Accept that two remarkably similar groups of material exist at different dates and that Scotland may have a high degree of regional diversity.

In the context of proposition (iii), can one argue that eastern Scotland lagged behind or differed so radically? However, the recovery of narrow blade assemblages, most importantly at Nethermills on the Dee, must be of crucial importance in interpreting the Mesolithic of the east of Scotland. The assemblage from Castle Street, Inverness is of great significance (Wordsworth 1985). This is not a

particularly large assemblage but the dominant type of microlith is the backed blade. This assemblage is stratified *below* deposits of the maximum marine transgression which Wordsworth has noted was dated in adjacent parts of the east cost of Britain to between 6800±250 bp and 5140±60 bp. The assemblage is associated with two C14 dates: GU-1376 Lower Horizon 7275±235 bp and GU-1377 Upper Horizon 7800±85 bp.

HOW DOES THE OBANIAN MATERIAL FIT INTO THE OVERALL STRUCTURE OF THE SCOTTISH MESOLITHIC?

The one group of material in which artefacts made from bone and antler exist is the Obanian. As noted earlier, this material is associated with a series of shell middens in one small part of the coastal region of the Scottish Highlands, namely Oban in Argyll, the island of Oronsay, and Risga Island in Loch Sunart (Mellars 1987; Morrison 1980).

These sites contain some of the best economic information on lifestyles to be found in Britain but they are perhaps best known for the series of small awls and pins, antler mattocks and slivers of bone, antler and stone bevelled at the end and usually called 'limpet hammers, scoops'. However, perhaps the most distinctive group is the harpoons. These are usually biserial antler harpoons, though two uniserial harpoons of bone were found at Druimvargie. The middens themselves are not usually associated with the normal range of microliths to be found in Scotland although there are reports of microliths from beneath the midden at Risga (Mellars, pers comm). The other distinctive artefact is the scalar core/*lame écaillé/piece écaille.* These forms are small pieces of flint, often quite thin and rectangular in shape, which have flakes and blades removed from each end, frequently with the bipolar technique. The functions of these forms is one of the most controversial topics in lithic technology; they can be regarded as a form of core or as tools in their own right. They occur sporadically from the Acheulian in Africa to the Neolithic of these islands. They seem to occur most frequently where small nodules of flint are the common raw material.

Therefore, the Obanian material is distinctive not only in its bone and antler work but also in the absence of microliths. Many shell middens, although attractive in the number of shells and in the likelihood of finding faunal remains and bone and antler artefacts preserved, produce very low numbers of stone tools. However, in the case of the Oronsay middens, surprisingly large quantities of flakes, bladelets and scalar cores were found or presumed to be present from sampling strategies (Mellars, pers comm). Therefore, the absence of microliths is even more noticeable when their profusion on the adjacent island of Jura is taken into consideration.

A simple behavioural explanation initially appears attractive. Shell middens may sometimes be associated with a narrow range of economic strategies, therefore the absence of some artefacts from a particular group of shell middens should not be too surprising. Some shell middens, such as those associated with the Asturian, do seem to have a narrow range of artefacts though, in this case, the reasons are not clearly understood (Bailey 1983; Clark & Strauss 1983). Yet this is not necessarily so as both the Ertebølle middens (Andersen 1986) and those of the Irish later Mesolithic have the same range of stone tools as other sites (Woodman 1978). In fact, only in a highly expedient technology would one necessarily expect a discard pattern which would fully reflect all the activities carried on at that location and such a total dichotomy between tools types at different sites.

Mellars has shown that although the island of Oronsay would have been tiny at the time of occupation, it was used at a number of different seasons of the year. Therefore, it is difficult to believe that the Obanian sites represent just a very narrow range of extraction sites where microliths were not needed. They are also absent from MacArthur's Cave (Anderson 1895) and Druimvargie Cave (Anderson 1898) at Oban, where in a mainland context the same specialist function cannot be pleaded. At Oban, a greater land-based mammal-hunting contribution would be expected. This would seem to point to other explanations (although these are old excavations, that all the microliths

were missed is highly unlikely). Similarly, their absence from within the shell midden on Risga must be significant. There would seem to be some reason to believe that they may have been found below the shell midden (Mellars, pers comm). Even from Lacaille's limited publication (1951), it is apparent that a broad range of resources was exploited from Risga.

It has been suggested that the use of microliths increases in England with the abandonment of barbed bone and antler points (Myers 1987). Therefore, where barbed bone and antler are still in use then the need for microliths as components in composite tools might remain low. The small bladelets produced from the scalar cores would provide one substitute but the use of barbed points would be another factor. These bone and antler points are not only numerous, but we must remember that, as microliths can be replaced without having to replace the projectile point itself, each barbed point could be the equivalent of not 6–8 but rather 30–50 microliths used through several phases of retooling (see evidence for retooling and large-scale replacement of microliths at Mt Sandel, Co Derry: Woodman 1985).

The dichotomy between the microlith-rich sites on Jura and the Obanian sites until very recently could have been entirely explained as a chronological phenomenon in which the use of microliths died out before the end of the Mesolithic. The argument for this final chronological phase depends on the date of the beginning of the marine regression in the southern Inner Hebrides. This is based on sites in the southern Hebrides and adjacent areas as microlithic assemblages can be found quite late further south in Scotland, eg Smittons (Edwards *et al* 1983). The Oronsay sites, in particular, are known to post-date the maximum Holocene transgression while the position of the Oban caves has been less clear. The argument for the continuing use of microliths through to the end of the Mesolithic is based on their occurrence at Lussa River on Jura. Here the two C14 dates, which would suggest continued use of microliths into the Neolithic (4620±140 (BM 556) and 4200±100 (BM 555)) are usually now considered to belong to a later Neolithic phase of occupation. However, the Lussa River material lies at 33 ft OD and post-dates the maximum transgression.

Jardine has suggested that the maximum Holocene transgression on Oronsay is most likely to date 6600–7200 bp (Jardine 1987) and a somewhat similar date range could be ascribed to the transgression on Jura. If one accepts Bonsall's (1988) comments that the main Holocene marine transgression on the north-eastern side of Jura did not reach as high as 55 ft, as suggested by Mercer, then there is a significant period of possibly more than 1500 years between the beginning of the recession and the likely date of the beginning of the Neolithic.

In this case, is it possible that Lussa River pre-dates the Oronsay sites which Mellars has shown date to after 6000 bp (Mellars 1987). Table 1 could be argued as showing a trend at Lussa River away from microliths and for a greater use of scalar cores. The fact that this is the one site which clearly post-dates the transgression must be of significance. Mercer (1971) had noted this trend towards scalar cores. This would not, of course, imply that this phase is any less Mesolithic than any other or that it is some form of Early Neolithic as suggested by Jacobi (1982).

TABLE 1

	Glenbatrick				
	G1	G2	Lussa Wood Lower	Lealt Bay	Lussa River
Platform Cores	54	15	21	129	30
Microliths	189	239	289	1283	254
'Chisels' (Scalar Cores)	6	37	1	106	334

However, this potentially neat chronological explanation has been confounded by some recent radiocarbon dates. Bonsall and Smith (1989) have recently published a series of C14 dates obtained

through the use of the Oxford accelerator. These are published as part of a programme dating barbed points and mattocks and include

OXA 1948	7810±90 bp	Uniserial barbed point	Druimvargie rock shelter
OXA 1949	6700±80 bp	Biserial barbed point	MacArthur's Cave
OXA 1947	5840±80 bp	Biserial barbed point	Shewalton
OXA 1959	5920±80 bp	Antler mattock	Meiklewood

The Druimvargie date in particular has called into question one aspect of the Obanian which has remained implicit in many discussions, ie that the Obanian assemblages dated to the very latest phases of the Mesolithic. Therefore, perhaps the very definition of the Obanian should be reconsidered. Bonsall and Smith have already noted that the idea of the Obanian as a simple short chronological phase, as suggested by Woodman (1989), or even being regarded as a part of the Early Neolithic (Jacobi 1982), is improbable.

When Movius (1940) originally proposed the term Obanian, he saw it as a contrast to the 'Larnian' of flint-rich areas. But they were both seen as marginal adaptions on the edge of Europe. Many authors, including Clark (1954), have had problems placing it within a broader context. These problems include: (1) its restricted geographical area; (2) the absence of other sites of roughly comparable age where a range of similar artefacts could be expected to survive, ie other shell middens or caves; (3) in an even broader context, namely Ireland, the Later Mesolithic shell middens are rather lacking in bone and antler artefacts.

Therefore, in spite of some foreign parallels, the Obanian assemblages should be defined from within themselves and by examining each artefact type. Some of the main forms are listed in table 2.

TABLE 2

	Cnoc Coig	Cnoc Sligeach	Caisteal nan Gillean	Druimvargie	MacArthur's Cave	Risga
Uniserial point				2(B)		
Biserial point	2(?)B	1(A) 6(B)	10(B)		7(A)	4(B)
Mattocks	10	4	8	1	—	3
Bevelled forms: bone, antler, stone	400	2000	150	18	140	100+
Other stone tools	xxxx	xx	xx	x	xx	xxx
Dates	5430±130 bp ↓ 5645±80 bp	5426±150 bp	5450±50 bp ↓ 6190±80 bp	7810±90 bp	6700±80 bp	

B=Bone point
A=Antler point
x=Frequency of stone tools

(a) Barbed Points

Virtually all the Obanian sites have produced barbed points though only the earliest site, ie Druimvargie, has produced uniserial forms. In general, there would seem to be a preference for bone forms, though the MacArthur's Cave and one example from Cnoc Sligeach are made from antler. In general, the points are broad and flat with, in many cases, the barbs cut almost flush with the main body of the point. Only one example has a perforation at the base while none shows any clear evidence of being used as harpoon heads. Even at individual sites, their size varies.

(b) Mattocks

Complete mattocks are a rare occurrence, though fine examples are known from both the Priory midden (Mellars 1987) and Cnoc Sligeach (Clark 1954). Usually only fragments have survived,

either as perforated pieces or as portions of functional edges. Where sufficient has survived, the mattocks could be described as Antler Beam type (Smith 1989) but two, Risga (Lacaille 1951) and Priory Midden (Mellars 1987), resemble the T-shaped antler mattocks of the Ertebølle and the Meiklewood mattock.

(c) 'Limpet hammers'

All sites, with the exception of Druimvargie, have produced numerous 'limpet hammers' (2000 at Caisteal nan Gillean). These bevelled forms vary in raw material from bone through antler to stone. While most are quite small with bevelled ends 3 cm or less across, many sites have produced occasional larger forms which might have a different purpose.

(d) Pins and awls

Perhaps the least documented pieces are the bone pins and awls which occur on virtually all sites. These are more than casual bone splinters, having been ground-down to form points.

These assemblages can be examined for parallels within the north-west European Mesolithic. However, exact parallels are difficult to find. In most adjacent areas where large barbed points occur, those of the Later Mesolithic are usually uniserial, eg the forms from Svarthalle Viste, Norway (Bang Andersen 1983). These may date as early as 8000 bp. Similarly Andersen (1971, 75) has documented a series of large, distinctly barbed, uniserial harpoons which occur from Late Kongemose through Ertebølle and into the Neolithic. The close parallels tend to be other British forms such as Shewalton and Cumston from Scotland along with the Whitburn, Co Durham example and the Victoria Cave specimen from Yorkshire. Unfortunately these are all strays. Bonsall (1989) has rightly suggested that the Glenavon example is morphologically different and may be earlier.

The one possible chronological marker might be the T-shaped antler mattocks. These resemble the Ertebølle examples. This type of mattock has a perforation through the junction of two antler tines with a cutting edge in the same plane as the perforation. In the Ertebølle, they occur as a result of contact with the German Neolithic to the south. At Ringkloster, Andersen (1974) has documented their occurrence only after 5700 bp, therefore the Meiklewood date is quite early. However, the Danish examples are a product of contact, therefore they need not necessarily occur early.

Therefore, in the light of the new C14 dates, how can these assemblages be best explained. Druimvargie, which has the earliest date, remains the least satisfactory of the Obanian sites. It contains the least Obanian elements and the only uniserial points. It must be considered as atypical. On Anderson's observations (1898), the stratigraphy was poorly recorded and the possibility of a long or multiple phase of use must remain.

The other sites make what appears initially to be a more cohesive group. One can only speculate on the functions of the pins and awls but the bevelled pebbles or limpet hammers have been the subject of a lot of speculation. In spite of the argument of Roberts (1987) that these forms were used as knapping tools, in Scotland and Ireland there is a strong correlation between bevelled tools and middens, particularly those where limpets occur.

The barbed points remain the most enigmatic group. They could be considered as sea mammal hunting tools but they occur as frequently in Oban, where sea mammals do not occur, as on Colonsay. Yet at Cnoc Coig on Colonsay, where seal occurs with some frequency, only two fragments occur (Mellars, pers comm). Although it is only circumstantial, the absence of examples which would function as separate harpoon heads must also be of importance.

Perhaps the most interesting group are the mattocks. In spite of their near contemporaneity with Danish examples, their function may be entirely different. Andersen (1974) has noted their occurrence in large numbers at the inland site of Ringkloster, Jutland, but in Scotland there would

seem to be an *a priori* case for associating them with sea mammals. Not only is there the classic Meiklewood association with whale but they occur in large numbers on the Oronsay middens, eg at Cnoc Coig where Grigson (1987) has noted large numbers of seal bones and has argued for the butchering of seals. Again seal and mattocks occur at Risga while only one mattock fragment has been found in the Oban caves where no seal occurred.

Perhaps the Obanian should be seen as a product of several factors which need not be mutually exclusive.

(a) Due to fortunate circumstances, the Obanian sites have preserved a range of material which was in use on many more Mesolithic sites. This does not, of course, explain the absence of a microlithic component on the Obanian sites.

(b) The Obanian represents the maritime adaption(s) of the Scottish Mesolithic and at these sites there was no requirement for a microlithic component. This would imply that the manufacturing strategies were highly expedient and totally related to each particular site in a manner which would be regarded as unusual. Similarly the absence of microliths on Obanian coastal sites is not matched by an equivalent absence on other coastal sites on Jura or Kinloch, Rhum.

(c) There was a shift in procurement strategies in certain marine locations which led to the development of the distinct set of equipment known as the Obanian. In particular, the use of the biserial points and the mattocks led to the diminution in the use of composite tools with microliths. The shift cannot be clearly defined chronologically, ie should the Druimvargie assemblage be considered as part of the Obanian and similarly should the other biserial points from Scotland and Northern England be integrated?

Finally the very distinct difference between the Obanian and the Irish Later Mesolithic should not be overlooked. Middens occur in both areas and these regions are virtually within sight of each other. In both regions, there is a marine element in the economy but the surviving organic artefactual material in the middens differs radically. Simple envionmental and economic factors are not enough to explain this difference.

AT WHAT DATE AND TO WHAT EXTENT WAS SCOTLAND COLONIZED?

Much of the preceding discussion implies that the narrow blade industries represent Scotland's earliest unequivocal evidence for human settlement, but in spite of that, the possibilities of an earlier and also a more extensive occupation must be considered. Scotland's Mesolithic at the moment resembles that of Ireland in that there is no clear evidence for either an equivalent of England's Early Mesolithic (Jacobi 1976) or for a Late Glacial occupation.

The absence of an earlier Mesolithic may in part reflect the nature of the biases discussed earlier. In spite of the Dee, Tweed and Loch Doon sites, Scotland's Mesolithic is essentially coastal and that coastline has mostly been uplifted only since 6500 bp. While there were earlier Late Glacial shorelines and very early Holocene (Pre-Boreal) strandlines above present-day levels, many early Holcene strandlines would have been inundated after 8500 bp when the main Holocene transgression took place: thus there is a gap in shoreline records. Therefore, early coastal settlement contemporary with the earliest stages of England's Mesolithic would frequently be lost. A similar gap is recorded in south-west Norway (Bjerk 1986).

It is very noticeable from Jacobi (1979a) that the earliest Mesolithic of England is almost entirely inland and upland. This can again be seen further north with a significant number of sites such as Deep Carr, Warcock Hill and the Cleveland Hill sites (Jacobi 1978). England has, of course, lost most of its Mesolithic coastline but, while Scotland has only lost its early Holocene coastline, it has not had the compensation of a well-explored interior.

The absence of such an early stage of the Mesolithic from Ireland can, of course, be blamed on the existence of a sea barrier, though the role of this narrow stretch of water as an inhibitory factor to colonization is almost certainly exaggerated. However, in the case of Scotland, there is not only a

substantial early Mesolithic not too far south but also a significant Late Glacial occupation in parts of northern England, eg Flixton (Schadla-Hall 1987).

There may have been a certain classic 'Centre Versus Periphery' attitude about the human colonization of Scotland, an area which has been presumed by some outsiders to be vegetationally and climatically too daunting for early colonists. However, many palynologists have now established that in both the pine and birch forest areas of northern Scotland, tree cover was effectively present by 9000 bp (see Price 1983). As most of Scotland was effectively ice-free by 13 000 bp and remained so even during the Loch Lomond re-advance, an interesting comparison can be made with northern Scandinavia. Sites such as Gjaraselet, Norland, Sweden indicate movement into northernmost Sweden just after the ice finally wasted away (Broadbent 1987). However, there is now growing evidence that human groups moved up along the Norwegian coast adjacent to the ice sheets well before 9000 bp; in fact, some would argue for a presence in the Arctic Circle close to 10 000 bp (Sandmo 1987). In these instances, human societies existed within 50 km of a much more substantial ice sheet than those of the Loch Lomond advance and existed in an area of poor soils and vegetation. Should the recent discovery of a flint end scraper from under the North Sea at 60° 42′ N (Long *et al* 1986) be regarded as part of the early colonization of Norway or is it an outlier of an early phase of Scottish settlement? At the other extreme, the recent discovery of a Mesolithic in southern Ireland well outside the established area of known Mesolithic in Ireland illustrates how we are frequently measuring archaeological activity rather than the full range of activities of Mesolithic societies (Woodman 1986).

Based on the Norwegian parallel, it is highly probable that the sea would have played an important role in the transport and economy of Mesolithic north-west Europe; therefore, the occurrence of the oldest C14 dates for the Scottish Mesolithic on the island of Arran, Islay, Jura and Rhum must, in some sense, reflect the use of the sea as the main vector by which early societies spread throughout this region.

Seen in the broader context of north-western Europe, the absence of a certain Late Glacial occupation of Scotland is rather curious (Lawson & Bonsall 1986) but the absence of both an early Mesolithic and the total absence of a clearly documented Mesolithic north of 58° (including the Orkneys and Shetland) is, in a European context, anomalous and (to the author at least) unbelievable. In fact, in this context, the present evidence for no pre-9000 bp settlement in Ireland is not much less anomalous.

Clearly some criteria must be established for identification of potentially Late Glacial settlement in Scotland. Nothing offered so far is very convincing. The tantalizing evidence of Inchnadamph, with its concentration of shed antlers dating to 10 080±70 (SRR-1788), is not conclusive and, as the cave has been completely cleared out, this could become a sterile academic cul-de-sac whose indications cannot be validated. Therefore, Bonsall's excavations on Ulva in the Hebrides offer us fresh hope but, given the track record of Scottish caves in not producing evidence of early occupation, the absence of Late Glacial occupation from the Ulva cave would not indicate the total absence of Late Glacial societies from Scotland.

If material does not come from a conveniently sealed deposit then typological analogy is the only recourse. However, here, as in Ireland, only coherent assemblages could be accepted (Woodman 1986). It is important to remember that lithic tool production is frequently a rapid and continuous process which will occasionally produce 'sports', as many artefacts are a product of only tens of seconds. Therefore, a close look at any large assemblage could possibly produce artefacts from all industrial traditions ranging from the Middle Palaeolithic to the end of the Mesolithic. In the case of Late Glacial colonization, the temptation is to simply look for tanged points or some acceptable variation. It was, therefore, very instructive for the author to find two 'tanged points' with a

microlithic assemblage at Cass Ny Hawin, Isle of Man in an assemblage dated to 7700 bp. Therefore, although the occasional tanged point has been found in Scotland (Livens 1956), these should be treated as no more than possible indicators (Woodman 1986), while those from Jura should also be considered as some possible variant within the Mesolithic. Morrison and Bonsall (1989) feel that the point from Tiree can be considered as a genuine Ahrensburgian point and that the only question is whether the provenance ascribed to it can be relied on.

SUMMARY OF CHRONOLOGICAL EVIDENCE

Phase 1(?)

There is as yet no clear unequivocal evidence for occupation of Scotland close to or before 9000 bp. Ideally this would be signalled by the presence of assemblages with non-geometric points. With the absence of either dated or coherent assemblages, the identification of remnants of early assemblages must be regarded as optimistic. One assemblage should be noted. The assemblage of large isosceles triangles and trapezes found at Glenbatrick G1, Jura, is very distinctive, so much so that the possibility must remain that this assemblage could be early. It is unfortunate that the Lussa Bay assemblage was found out of context on the intertidal beach of Lussa Bay. Could it date to the recession in relative sea level but also pre-date the narrow blade assemblages?

Phase 2

This is the earliest certain phase of human occupation in Scotland. It is characterized by the appearance of substantial numbers of scalene triangles. On the basis of the dates obtained at Kinloch, Isle of Rhum, this phase could have begun by 8600 bp. Sites such as Newton on Islay, on Arran (Affleck *et al* 1988) and possibly Nethermills on the Dee (Kenworthy 1981) could belong to this phase. These assemblages can be seen as part of the same complex as Broomhead Moor V in Yorkshire and Broomhill in Hampshire. With Mt Sandel in Ireland, it is possible to argue for a late, virtually simultaneous first colonization in the so-called 'peripheries'.

Phase 3

At some point after 8000 bp, a series of local developments took place. Increased numbers of crescent and double-backed needles occur. Many of the assemblages from Jura would fit into this category as would many of the Tweed Valley sites (though the Tweed sites as surface collections would have a tendency to be mixed). A certain amount of regional diversity should be expected. Therefore, it is possible that distinctly different forms could exist at the same date in different parts of Scotland. The most important question about this phase is whether assemblages with large isosceles and trapezes, such as those found at Morton, should be seen as local late developments.

Phase 3A(?)

In parts of Argyll, a case can be made for a final phase in which composite tools using microliths are lacking. Could this be a general phenomenon in Scotland? In particular, the virtual absence of microliths from the midden at Morton, which dates to about 6200 bp could be a behavioural or a chronological phenomenon.

III THE ECONOMY OF THE SCOTTISH MESOLITHIC

An unspoken presumption of marginality tends to affect judgements of Scotland's potential for early settlement. This so-called daunting raw environment was probably created in our minds by

modern literary figures. Therefore, archaeologists have been inclined to presume that only the margins of this area could be effectively occupied. Instead, palynologists have shown that Scotland had a rich variety of ecological niches with differing vegetation from early in the Holocene. This attitude has been helped by the problems of exploration referred to earlier. Therefore, it is hardly surprising that this is the one aspect of the Scottish Mesolithic where problems seem to be at their worst and the problems may be exacerbated by the fact that the only sites where there is any reasonable organic preservation are the coastal Obanian sites and Morton. Unfortunately, the large shell middens investigated by Sloan (1984) in the Forth Valley are likely to belong to the Neolithic or are Mesolithic Survival. The only C14 dates which appear to date to the Mesolithic are those from Polmonthil (MacKie 1972) where shells were dated. As Switsur and Mellars (1987) have shown, there would seem to be a roughly 400-year bias in shell dates in Scotland, therefore it could be presumed that they are Neolithic in age. The Forth Valley middens (made up mostly of oysters) excavated by Sloan have usually produced C14 dates contemporary with the Neolithic. They, unfortunately, contain virtually no diagnostic artefacts and so it is impossible to ascertain whether they are a product of a Neolithic society or represent activities of a surviving Mesolithic society. These middens, which are of exceptional size, are very reminiscent of those investigated by Burenhult (1984) on the Knocknarea Peninsula, Co Sligo in Ireland. These middens are probably contemporary with much of the actvity associated with the Carrowmore passage grave cemetery and they may represent a highly specialized seasonal component of a Neolithic society whose main economic base was elsewhere. In both cases, it is highly probable that this was a Neolithic society. The presence of domesticated animals in the Forth middens would at least indicate knowledge of economically viable domesticated animals and hunted species are comparatively rare.

As a contrast, the Oronsay middens and Morton are undoubtedly Mesolithic but in spite of the accelerator dates referred to earlier (Bonsall and Smith 1989), the age of all the mainland Obanian material must remain slightly uncertain. Unfortunately, as 19th-century excavations, they are of limited use. The range of artefacts from Druimvargie rock shelter and MacArthur's Cave (Anderson 1895, 98) are basically the same as those from Oronsay but there has always been a slight doubt as to whether the age of all the fauna pre-dated the arrival of the Neolithic in Argyll. The occurrence of two domesticated cattle bones, which may be intrusive, in the lower layers of the MacArthur's Cave middens is an indication of these problems. However, the probability remains that much of the fauna could pre-date the Neolithic. In particular, the lower layers of occupation at MacArthur's Cave are stratified between layers which would seem to be a product of the maximum marine transgression. At Druimvargie no Neolithic material was found.

In spite of the limited nature of the surviving evidence, several interesting facts emerge from the study of the Oban faunas. While fish were obviously under-represented, saithe was tentatively identified at MacArthur's Cave. This species was, of course, of crucial importance on the Oronsay middens. However, the virtual absence of sea mammals from the Oban sites is rather more striking as rorqual and dolphin had been found during early investigations on the island sites.

Of course, the major contrast in economic information is between the excavations at Morton at the mouth of the Tay in eastern Scotland and the Oronsay project. The Morton shell midden (Site B) represented to Coles (1971) a seasonal occupation in which the sea was only a significant but not *the* main contributor of food. Coles originally suggested that shellfish only contributed about 25% of the total food while fish may have contributed about the same, but a more recent paper (Coles 1983) would appear to be emphasizing even more the role of the mammalian fauna, in particular red deer and auroch. Coles felt that Morton was occupied on a short-term basis by a Mesolithic community whose major base camps were elsewhere. He noted specifically the importance of the large ungulates even though he felt that occupation took place at a time when at high tide Morton would have been a

tiny island. Deith (1986), in her analysis of the shells, has suggested that the occupation would have also been marginal and intermittent and not confined to one specific season of the year.

Mellars (1987), on the other hand, has masterly documented a highly complex use of a micro-environment, the island of Oronsay, which was less than 5 km long. This has been more than adequately covered by Mellars and others who have shown that the area of shell middens on Oronsay may have been occupied at different seasons: Priory midden – winter; Caisteal nan Gillean II – early summer; Cnoc Coig – autumn; and Cnoc Sligeach – mid summer. In each instance, the sea had provided the major part of their resources, fish, notably saithe, being of crucial importance but shellfish and seals also played an important role. Does this represent, as Mellars notes in his introduction (1987, 3), continuous occupation by a small group or is it part of an intermittent pattern of occupation by groups based elsewhere? One cannot avoid extending the conclusion implicit in Mellars's work on Oronsay (1987), ie that each Obanian site represents its own particular set of economic strategies which may be highly visible but are little more than accumulations created by short-term events.

With the limited range of economic information, it is of course tempting to see marine resources being of paramount importance and so presuming a continuous occupation on both Oronsay and islands such as Rhum. At the moment, we know too little about the potential of the sea in terms of marine productivity. In particular, can we presume the same level of productivity and range of resources round the whole of Scotland's coastline? However, as noted earlier, there are indications in both the Oban and Morton material that land sources could have been of greater significance. At this point, the absence of a reliable estimate of the extent of Mesolithic occupation in the interior of Scotland is of crucial importance (illus 4). In particular, the more mountainous regions, such as the Grampians and the Cairngorms, remain a total unexplained enigma. Edwards has, however, noted the occasional microlith at the upper reaches of the Dee. Could this indicate, as in the case of England, an extensive upland settlement in Scotland's mountains where no-one has made a serious effort to look for sites? The material from Woodend Loch (Davidson *et al* 1949) as well as the Biggar Gap and Loch Doon (Edwards *et al* 1983) in southern Scotland could also be an indication of a more extensive inland occupation but, with reference to the Highlands, to parody the famous statement on Paranoia, 'Just because we have not looked doesn't mean they actually *were* there'.

The role of salmon in Scotland should not be forgotten. The concentration of sites on the Tweed and Dee and at Loch Doon must be of some significance. In particular, sites such as Rink Farm have a location that is strikingly reminiscent of Mt Sandel. Freshwater and migratory fish must have played an important role, one which has not been recognized as yet.

The nearest objective search for an inland land-based Mesolithic economy has been through the use of palynology. Edwards and Ralston (1984) have reviewed the evidence from Scottish vegetational history. Their persuasive proposition, that sixth-millennium bp impact on vegetation should only be accepted as Neolithic where cereals or other diagnostic elements occur, would suggest that Mesolithic communities were having some, but not a very extensive, impact on the landscape away from coastal zones. Two of the questions which must be tackled are: (a) Do these vegetation disturbances necessarily represent forest clearance in association with mammal exploitation? Osteological evidence is remarkably lacking. (b) Are we looking at specialized inland hunting communities as is suggested by Broadbent (1987) for Norland in Sweden or is there any evidence to suggest that we are looking at a complex set of seasonal movements and adaptations?

In recent years, Edwards and others based at Birmingham have examined many of the problems associated with identifying pre-Neolithic vegetational disturbances and their causes. This project has concentrated on several carefully chosen areas. In south-west Scotland the Loch Doon area, having produced numerous Mesolithic sites, was an obvious choice, therefore cores were

removed from the loch itself. As a control, nearby Loch Dee was also sampled. Here fewer Mesolithic sites have been found. Detailed investigations were also carried out at Kinloch on Rhum in conjunction with the excavation of the nearby Mesolithic site. Other cores from South Uist and Islay were also examined (Edwards, pers comm).

This project has revealed significant concentrations of charcoal at a number of sites while rises in grasses, bracken etc could indicate human action. There are, however a number of problems. There is as much evidence for anthropogenic changes to the vegetation at Loch Dee as at Loch Doon yet there is very little evidence of Mesolithic settlement around the former loch. Similarly the extensive evidence at Kinloch post-dates the Mesolithic settlement. This does not, of course, mean that all settlement sites have been found (Edwards 1989).

A second set of problems lies in the area of interpretation of the cause of the charcoal (Edwards 1989). The charcoal could come from: (a) a natural source such as forest fires caused by lightning strikes; (b) a build-up from domestic fires for cooking and heating; (c) the use of fire for either hunting or the creation of browsing (eg Mellars 1976a). If it can be shown that fires were being used to manipulate the environment in even a coastal context then it would be possible to argue that their habitual use indicated a reliance on large game and that Mesolithic communities could have exploited the interior of Scotland.

In the absence of either clear evidence from the pollen record or substantial quantities of mammal bones from inland sites, the only other possible indication could be the location of substantial numbers of Mesolithic sites in the interior of Scotland.

Therefore, in summary, we should recognize the importance of the marine environment, particularly its role in stimulating colonization, but we may have underestimated the role of the Scottish land mass, particularly if its carrying capacity was not as low as is often implied. Perhaps most importantly, we have underestimated the role of Scotland's rivers and lakes and not taken seriously the limited but real indications of the riverine distribution of Mesolithic sites.

IV FUTURE RESEARCH

While more large excavations of carefully selected sites should take place, due to the limited finance available and the fact that excavations now take so long, it would seem appropriate to recommend a series of short-term measures which would allow some assessment of the state of Scotland's Mesolithic. One person whose career was fully devoted to elucidating some of the problems, preferably someone based in Scotland, would make a significant difference. It is perhaps symptomatic of the manner in which early research developed that Lacaille was based in London.

It would be Utopian to hope for numerous excavations to take place before the end of the century. Since 1960, on average, there has been one major project every five years. However, it is apparent by looking at research in south Sweden, Denmark and Ireland that much can be gained from reassessing the existing evidence. Good quality sites which will make a significant contribution are relatively scarce. Therefore, the reviewer feels that the following research programmes could contribute.

GAZETTEER

As will have been apparent from the introductory section, there is a need for a definitive gazetteer including all known Mesolithic sites and descriptions of the range of artefacts found at each site. Ideally, and to avoid potential duplication of effort, this should be a gazetteer of all locations producing stone tools, irrespective of age. The present tendency to gazetteer Palaeo/Mesolithic sites smacks slightly of elitism.

DATING

(a) Some attempt should be made to find sites where the non-geometric points/isosceles triangles/trapezes dominate. Perhaps other sites can be found in the Tentsmuir area or even on Jura. It is essential that the chronological position of these assemblages be established. Even the discovery that they were not a coherent chronological group belonging to one phase would be a positive step.

(b) In association with this, dates should be obtained from some of the other eastern Mesolithic sites, including some of the urban sites (providing, of course, that the samples are discrete and have no likelihood of later contamination). In particular, C14 dates should be obtained from the Nethermills excavation. Without some dating evidence, the vexed question of potential chronological differences between eastern and western Scotland still remains. At the other extreme, there is the danger of a 'blitz' strategy of excavation just to obtain samples for C14 dating. This usually proceeds from the assumption that each site represents only one phase of occupation – a very dangerous assumption. Limited excavation should only be undertaken where there is good reason to believe that the site being examined is of limited extent in itself; such a site is being investigated by Mithen on Islay (Mithen, pers comm). The chronological conundrums will only begin to sort themselves when there is a well-documented data base deriving from recent excavations. A 'Torquemada'-like 'inquisition' of assemblages for typological orthodoxy based on parameters established elsewhere is a poor substitute.

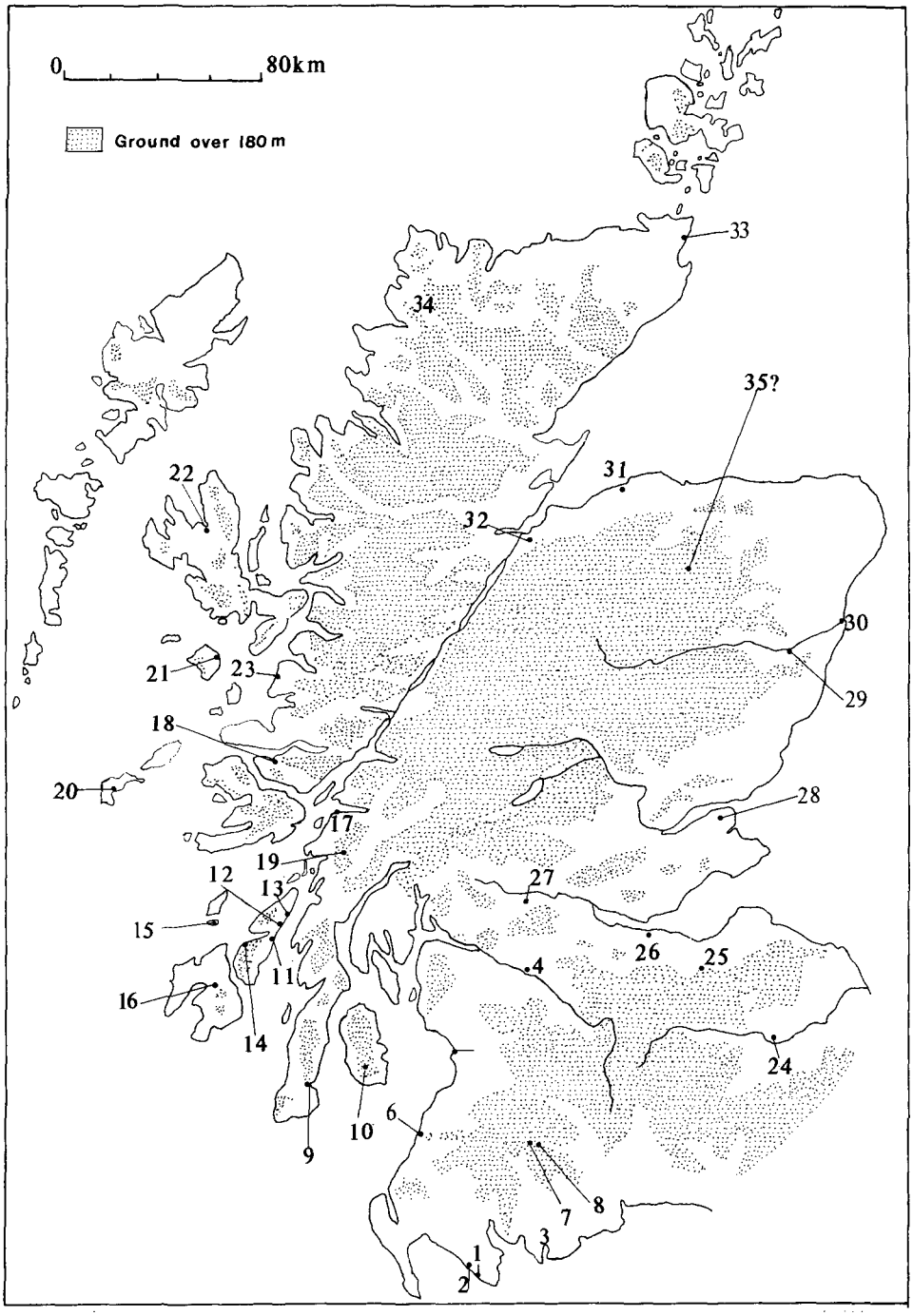
(c) With the development of a programme for dating mattocks and barbed points, some better quality chronological information is becoming available. For stray finds and recent well-documented excavation, a limited use of this relatively costly procedure produces good results but in the case of the older excavations this procedure has limitations. Can all these sites be considered as the product of single short phases of occupation? Consideration should be given to obtaining more than one date from certain sites.

(d) The protection and careful examination of mainland caves in the Oban area should become a matter of the highest priority. The Obanian is more than a simple short chronological phase or economic strategy, therefore the loss or casual examination of any more caves in the Oban area should be regarded as the loss of a major component of both the Scottish and European Mesolithic.

EXTENT OF OCCUPATION

This, as noted earlier, is one of the most anomalous aspects of the Scottish Mesolithic. The discovery of one site on the north coast of Scotland and on any of the outer islands would change this impression. Of course, it is not easy to find a site when those most likely to make the discovery live in the extreme south of Scotland. Therefore again, the first stage should be to reassess available evidence (illus 4). Sites such as Loch Snizort on Skye would seem to be Mesolithic (Lacaille 1954). The association of Mesolithic material with Bronze-Age monuments is known elsewhere. It could be presumed that the Loch Snizort material was in a secondary context. Freswick Sands (Lacaille 1954) would again be worthy of re-investigation, in particular the lower level at this site, where Lacaille noted the material was in a derived context in post-glacial beach deposits.

Similarly, the artefact assemblages of Orkney and Shetland should be re-examined. The occasional artefact of Mesolithic character which has been found (including at least one microlithic form seen by the author in the Royal Museum of Scotland) may indicate areas worthy of investigation. However, the rather odd artefacts published by Lacaille 1935, which differ from the normal range of artefacts found in the rest of these islands, should also be examined with the possibility that the Orkneys and/or the Shetlands developed their own particular local industrial traditions. Lacaille (1935) would seem to have selected-out certain distinctive artefacts which looked as if they could be



ILLUS 4 Map of sites referred to in text: 1, Barsalloch; 2, Low Clone; 3, Cumston; 4, Woodend Loch; 5, Shewalton; 6, Girvan; 7, Loch Doon; 8, Loch Dee; 9, Campbeltown; 10, Auchareoch; 11, Lussa sites; 12, Lealt Bay; 13, North Carn; 14, Glenbatrick; 15, Oronsay sites; 16, Newton; 17, Oban sites; 18, Risga; 19, Kilmelfort; 20, Tiree (unlocalized tanged point); 21, Kinloch, Isle of Rhum; 22, Tote, Loch Snizort; 23, Shieldaig; 24, Rink Farm; 25, Elginhaugh; 26, Inveravon; 27, Meiklewood; 28, Morton/Tentsmuir; 29, Nethermills; 30, Aberdeen; 31, Culbin Sands; 32, Inverness; 33, Freswick; 34, Inchnadamph; 35, Glenavon

Mesolithic and it is, of course, essential that only coherent assemblages containing a range of artefacts should be accepted as a clear indication of a Mesolithic presence. So often lithic assemblages by their very nature contain forms which inadvertently resemble artefacts typical of another period.

OCCUPATION OF THE INTERIOR

It is, of course, impossible to build up a total picture of the occupation of Scotland's inland and mountainous regions. One small area of typical Scottish Highland landscape should be selected for investigation with the primary purpose of establishing whether occupation took place outside the river valleys, though again outside the south-west the absence of sites from strategic locations on loch shores distinguishes Scotland from most other regions in the Temperate Zone.

Like Ireland, the economic potential of the interior remains an unknown quantity, therefore ideally an inland site with some potential for organic preservation should be found.

V SUMMARY

As noted at the beginning, the study of the Scottish Mesolithic has suffered from numerous obstacles, but perhaps the greatest weakness has been in the perception of Scotland as a marginal area. Seen in a broader European context, it is highly improbable that Scotland was only partly occupied and at a late date by groups who continued to cherish long-outmoded lithic traditions. There is a very significant difference between a presumption of time lapse for the spread of lithic traditions to the north and our present knowledge of the emergence of a common, virtually synchronic north-west European industrial tradition, from which a series of vibrant local technologies develop.

In certain areas, in particular the Obanian, the problems of the Scottish Mesolithic are of international interest although they are usually discussed in a local context. Therefore, seen from an optimistic view, the problems of Scotland's Mesolithic can be accepted as a challenge and the solution to many of them lies within the capacity of present-day Scottish archaeology. The real question is: is there the will to tackle these challenges?

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The excavations at Ulva have revealed a substantial shell midden which has produced C14 dates from c 7650 at the base to 5680 at the top (these have been corrected for sea water effects). Artefacts have been found stratified below the midden (Bonsall, C, Sutherland, D and Lawson, T, *Archaeol J*, 146 (1989)).