A study of marine exploitation in prehistoric Scotland, with special reference to marine shells and their archaeological contexts

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Abstract

The history of the study of marine exploitation in Scotland is outlined prior to the presentation of an overview of the evidence for its practice in both earlier and later prehistory. This overview is based on a corpus of Scottish prehistoric sites known to include evidence for marine exploitation. Marine shells are found on a variety of archaeological sites, many of which cannot be described as shell middens. They are defined in this work as sites given over to the primary processing and consumption of marine resources, most obviously represented by marine shells. A simple classificatory system is introduced in order to allow further discussion of the similarities and differences between various types of deposits.

The material culture related to marine exploitation is discussed and ethnohistorical sources are used to demonstrate some of the ways in which similar elements of material culture have been utilised in more recent times. Issues discussed here include not only shellfish exploitation but also whaling, fishing and the use of seaweeds. The utilisation of various kinds of raw materials, of both terrestrial and marine origin, are discussed and their contextual relationship to marine resource residues considered.

Discussion will then move on to focus more closely on a number of aspects relating to marine exploitation in both early and later prehistory. The 'Obanian' sites in Oban and Oronsay are used as a case study to examine the implications of shell middens being used over long periods of time and as places for burial. The results of survey and excavation work carried out on the 'Obanian' shell midden on Risga are used to supplement a discussion on the nature and role of shell middens. Discussion of the later period is centred upon a contextual study of settlement sites and the relationship between marine and terrestrial resources is discussed.

This work draws to a close by considering the role of marine resources in prehistoric ritual practice. The implications of the deposition of marine shells in chambered tombs and the construction of chambered tombs over shell middens are discussed. In the later period the redeposition of midden material appears to play an important part in the development of substantial settlement complexes and may represent a change in the nature of ritual behaviour. The concluding chapter isolates what are felt to be the most important issues raised by this work.

N.B. note on radiocarbon assay citation

All radiocarbon results cited in the text are uncalibrated (BC). Lab numbers are quoted where possible.

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Thanks goes to the staff of the Royal Commission of Ancient Monuments and Historic Buildings for Scotland for their help in providing access to the Sites and Monuments Record and advice on obtaining information on sites. Graham Ritchie of that department should be singled out for special thanks for providing access to document archives and information not available elsewhere. Various regional archaeologists have also been very helpful in allowing access to local SMRs and providing information on sites not yet published: Bob Gourlay and Dorothy Low of Highland Region, Roger Miket on Skye and Raymond Lamb in Orkney have all been most accommodating. A number of people assisted in fieldwork carried out during the course of writing this thesis, all of whom put in a good deal of time and effort: Iain Banks, John Atknison, Michael Donnelly, Andrew Jones, Gavin MacGregor, Kevin Taylor and Colin Wall. Dr Hanson of the Geography Department, Glasgow University, was most helpful in providing information on the nature of the Scottish coast. Alison Sheridan of the National Museum, Edinburgh; Euan MacKie of the Hunterian Museum, Glasgow and Colleen Batey, of the Hunterian Museum, Glasgow were all very helpful in providing information and/or access to material. Jane Downes introduced me to the archaeology and people of Orkney. I would also like to thank my collegues at GUARD for their understanding and encouragement during the the final phase of writing up.

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Chapter 1

Sea shells on the sea shore: an introduction

It was a bold man who first swallowed an oyster

James I

This thesis has undergone a number of major transformations prior to reaching its present, final form. It was originally the writer's intention to expand upon work previously carried out for an undergraduate dissertation (Pollard 1986), which reconsidered the Oban cave sites, and to further investigate the relationship between early prehistoric terrestrial and marine exploitation in northwest Scotland. One of the major aims of that work was to examine the concept of 'marginality' as related to early agricultural practice in Scotland and in so doing to discuss the role of marine resources in the prehistoric economy of this area. However, it soon became apparent, while seeking source material for this work, that a general work on prehistoric marine exploitation in Scotland, which would provide both a benchmark and useful starting point, did not exist. The absence of such a work became even more surprising when it became apparent that a rich body of evidence for prehistoric marine exploitation has long been known to exist in Scotland, with some of these discoveries dating back to the first glimmerings of archaeology as a serious subject of study, well over a century and a half ago.

This failure to fully accommodate evidence related to marine exploitation, of shellfish in particular, within the consideration of prehistoric economic and social practice was recently identified elsewhere when an anthropological paper posed the question: "Why are shellfish under valued in most ethnographic accounts and neglected by many archaeologists when they are so prominent in archaeological sites?" (Moss 1993, 631). The present writer has much sympathy with this expression of puzzlement and regards Scotland as a prime example of this disregard. In Scotland the exploitation of the sea, and of shellfish in particular, is evidenced on a large number of sites (the corpus includes over 450) distributed over an area which is extensive not only in geographical but also in chronological, morphological and contextual terms. Despite the variation exhibited by this material and its apparent ubiquity throughout prehistory it has, for the most part, managed to avoid the serious attentions of archaeologists. Interest, when it has been shown, has generally been concentrated on a limited number of sites which are perceived to represent a specific mode of existence practiced at a specific time.

It was the desire to do something about this neglect which led to the expansion of the remit of this thesis to encompass a general overview of marine exploitation, with particular regard to shellfish, in prehistoric Scotland. It is hoped that in doing so this work will prove of help to those wishing to carry out more specific studies related to marine exploitation, as was originally intended here. Though the scope of the work has been broadened substantially, both temporally and spatially, many of the issues which would have been discussed in the more specific study are approached here. The consideration of the relationship between marine exploitation and other forms of subsistence is only one of the aims maintained from the originally proposed work. A continued interest in the north-west of Scotland is reflected in a programme of fieldwork which has led to a reappraisal of the 'Obanian' shell midden on the island of Risga in Loch Sunart, Ardnamurchan (chapter 8).

Having provided a general overview of the evidence for marine exploitation in prehistoric Scotland this thesis will go on to examine the implications of the wide variety of archaeological contexts from which it has been recovered. Though this work is especially concerned with shellfish the discussion also encompasses the wider spectrum of marine exploitation practices, including fishing, whaling, the hunting of seabirds and the collection of seaweeds. The decision to cover the entire prehistoric period, which in Scotland extends from the Mesolithic to the Iron Age, within a region so large, has been made in an attempt to provide an insight into the rich and varied nature of material which has all too readily been written off as 'refuse' or simply filed under 'shell midden'.

It is this latter term which usually comes to the mind of the archaeologist when shellfish in archaeological contexts are discussed. The 'classic' image of the shell midden is of substantial mound of marine shells resulting from the collection and consumption of shellfish on the same site over a considerable period of time. However, to describe this thesis as a work on shell middens would not only create a false impression of its subject matter but would also misrepresent the character of the evidence itself. In a previously published discussion of the deposits recovered from Raschoille cave in Oban the present author suggested that the small quantity of shells recovered from the site "barely merited the term shell midden" (Pollard 1991, 68). In hindsight this statement, off hand as it may seem, can be regarded as the catalyst for an important aspect of this work, in that it prompted the author to think more deeply about what we actually mean when we refer to 'shell middens'. A considerable amount of the evidence for marine exploitation referred to in this thesis originates from contexts which cannot be regarded as shell middens. This first became apparent during the compilation of the corpus of sites known to include evidence for marine exploitation, which represents an important component of this work. It is obvious from even the briefest of glances that many of the contexts from which marine shells have been recovered cannot be described as 'shell middens', as have variously been defined elsewhere (see chapter 8).

For a long time there was been a tendency to associate shell middens with the earliest inhabitants of Scotland, with terms such as "shell mound period" being used prior to the adoption of the term Mesolithic (eg. Smith 1895). These sites were seen to represent the refuse of people living a hand to mouth existence who, in the absence of 'civilised' modes of existence such as agriculture, were forced to utilise resources which required little technology in the getting of and provided equally limited nutritional returns in the eating thereof. This image of shellfish as 'primitive' resources has been reinforced by various scholars, some of whom have even noted the consumption of shellfish by non-human primates, with monkeys in Burma observed using stones to open marine bi-valves (Carpenter 1890, 53).

In the same paper in which she ponders archaeologists neglect of shellfish Moss goes on to recognise that marine shells are to be found in a wide variety of contexts, "The majority are found in a variety of ethnohistorically reported sites, including winter villages, seasonal villages, temporary camps, forts and fish camps" (1993, 635). Despite this contextual variation, which is nowhere more strikingly apparent than in Scotland, little or no attempt has been made to discuss the wider implications of this variation. The majority of works concerning themselves with the role of shellfish exploitation have in the past been limited to littoral sites, described as shell middens, which for the most part appear to stand in isolation from other elements of the archaeological record, with little effort being expended in integrating them within a broader picture of prehistoric life.

Perhaps the seminal work on 'shell middens' is Bailey's PhD (1975a) which for the first time explored the economic implications of these particular components of the archaeological record. However, this work concentrated on sites in Australia and the western sea-board of continental Europe. Likewise, the majority of shell midden studies published since then have been carried out in places far removed from Scotland, either in Australia (eg Meehan) or North America (eg Sanger 1981 and Stein 1993). It is notable that the last major work to collect together papers concerned with marine exploitation, entitled: *The archaeology of prehistoric coastlines* (Bailey and Parkington 1989) included contributions on work carried out in places as far-flung as Scandinavia, Japan, Tasmania, New Zealand, Peru, South

Africa, Greece and the United States. Needless to say there was no contribution on work carried out in Britain, or Scotland.

Studying the archaeological literature published over the last 150 years it became apparent that archaeologists in Scotland had long been interested in marine exploitation. The excavation of the shell middens on Oronsay by Paul Mellars perhaps represents only the best known manifestation of this interest, being the most intensive and 'scientific' of a series of excavations on these sites, with the first of them taking place just into the second half of the nineteenth century. However, this interest in the Oronsay sites, along with apparently similar shell midden sites in Oban has served to stereotype deposits of marine shells as the result of Mesolithic activity. Though the excavation of shell middens in the Forth Valley established that shell middens were not artefacts of the Mesolithic, providing a series of radiocarbon dates which suggested Neolithic rather than Mesolithic activity, there has been little attempt to consider the role of these resources in later periods.

The coastline of Scotland is well populated with archaeological sites, some of which appear to sit some distance back from the shore, while others are so closely situated that they gradually disappear into the sea. It is in these eroding sites that marine shells make their most common appearance, particularly in places such as Orkney and the Outer Hebrides, where marine erosion is most acute. Their presence on other sites may not be so obvious, perhaps remaining undetected on many as yet to be discovered or unexcavated sites. Those post-Mesolithic sites which have been found to include marine shells display a good degree of variety, and include chambered tombs, Bronze Age cairns, caves, wheelhouses, duns, brochs and hillforts. On some of these sites marine shells appear in very limited numbers, sometimes with only a single shell being present, while on others they are found in accumulations more suggestive of the classic shell middens.

While a number of shell middens have been the subject of detailed excavation and analysis (eg. Coles 1971, Mellars 1987, Sloan 1982) marine shells on these other types of sites, in later contexts, have been largely overlooked. There has certainly been no attempt to provide an overview of this material, with analysis being carried out very much on a site specific basis (see next chapter). The majority of work so far carried out on this material has been done by specialists in the field of marine ecology or archaeozoologists with a particular interest in marine fauna. It is not uncommon for discussion of these deposits to be limited to the appendices of excavation reports - especially in the case of excavations where deposits of marine shells represent only a limited component within sites which may also include impressive architectural features or artefact assemblages. The present writer is not a 'specialist' and believes that much can be accomplished through a more contextual approach. This non-specialist approach will place a premium on viewing the evidence within its wider archaeological context, examining relationships between different subsistence residues and the elements of material culture utilised in their procurement and processing. Marine resource residues and related material will be discussed in both the context of the site on which it was deposited and also the wider context of the environment within which that site was located and within which marine exploitation took place.

The writer has spent a considerable amount of time on the coasts of Scotland, and as a child played in the cave beneath Dunnollie castle in Oban, which only later as a student did he discover to have contained a shell midden and human remains. The fieldwork undertaken as part of this work also required direct contact with the sea and its immediate environs. The experience of being on or near the sea has played as much a part in developing this thesis as the many hours sat in the library reading excavation reports. It is hoped that the insight into the nature of the marine environment provided by this first-hand experience has helped to provide a fresh insight into an important component of the archaeological record which has for too long been neglected.

ii. Layout of thesis

Chapter 2 - Reeling in the years: Places the material introduced in the preceding chapter and corpus within its intellectual and historical context. The history of discovery and excavation of these sites is discussed with reference to the history and development of archaeology as a discipline in Scotland. It is suggested that sites which have included evidence for marine exploitation have played a central and influential role in the definition of a concept of prehistory in Scotland, albeit one that has been subject to stereotyping and over simplification. The approach of the present work is also discussed in the light of that which has gone before.

Chapter 3 - shell mounds and burnt mounds: Introduces the corpus of sites known to include evidence for marine exploitation, marked in the first instance by the presence of marine shells. This corpus is presented here as an appendix. This corpus has been used as the foundation for a simple system of classification which will serve to order the discussion of such a large number of sites. The basis of, and reasoning behind, this classificatory system are also outlined in chapter 3. It is suggested that there are close similarities between 'shell middens' and 'burnt mounds' and shell middens, with both appearing within a variety of contexts. For the purposes of this work Scotland has been broken down into a number of study regions and these are also introduced in this chapter.

Chapter 4 - Time and tide: Places the evidence within its environmental context. The nature of post-glacial changes in sea level and their implications for prehistoric human activity are also discussed. This chapter also introduces the marine species commonly identified in archaeological contexts and discusses them in relation to behavioural and nutritional characteristics which influence their importance to prehistoric economic practice. The concept of tide and time is also introduced here laying the ground for further discussion in chapter 8.

Chapter 5 - Different kettles of fish I: Provides an overview of the evidence for marine exploitation as evidenced on early period sites (Mesolithic and Neolithic). This discussion utilises the classificatory system outlined in chapter 3 while also treating sites on a region-by-region basis.

Chapter 6 - Different kettles of fish II: Follows the same pattern as the previous chapter but deals with evidence related to the later prehistoric period (Bronze and Iron Ages).

Chapter 7 - You are what you eat: Discusses the nature of material culture related to marine exploitation and considers its role in the procurement and processing of marine resources. This discussion draws upon ethnohistorical observations in the discussion of the nature of marine exploitation practices.

Chapter 8 - Down through the ages part I: Focuses on a number of aspects related to the nature and role of marine exploitation in the early period. Issues discussed include the use of shell middens as places for burial and what exactly is meant by the term 'shell midden'. The results of the fieldwork carried out on Risga are outlined here and used to examine the relationship between settlements and shell middens.

Chapter 9 - Down through the ages part II: Continues the approach adopted in the preceding chapter in a discussion of later period evidence. Central to this discussion is a consideration of marine resource residues on settlement sites.

Chapter 10 - Food for thought: This chapter is given over to a consideration of the implications of marine resources in ritual contexts. The role and function of chambered tombs are discussed here.

Chapter 12 - all at sea: a conclusion. This chapter closes by summarising some of the more important issues raised in the previous chapters.

Appendix - corpus: This section includes a summary of prehistoric sites known to include evidence for marine exploitation. This information is presented in spreadsheet form while map sheets display the distribution of sites.

Chapter 2

Reeling in the years: a brief history of discovery and enquiry

i. Introduction

Before the evidence for marine exploitation in prehistoric Scotland can be discussed any further it is important that the subject be placed within its historical and intellectual context. Such an approach is especially germane when one considers that much of the material first came to light over a century ago and was then to play a central role in the development of a descriptive and explanatory framework for archaeology in Scotland. Most of the sites mentioned below will be discussed more fully in the chapters which follow. This section is primarily concerned with the intellectual implications of their discovery and treatment thereafter as components of the archaeological record.

ii. Societies and Journals: dissemination and publication

Much of the evidence for marine exploitation, collated in this work as a corpus, was first published in one or more of the archaeological journals which have played a vital role in archaeology for well over a century now. Of these publications the *Proceedings of the Society of Antiquaries of Scotland* has perhaps been the most important, and, in one guise or another, has certainly been established longer than any other Scottish archaeological journal.

The first volume covers the society's *Proceedings* for the year 1849 (though this did not appear until 1851). The main aim of publication was to establish a respected journal in which Scottish archaeology could voice its existence and establish the worth of its scholarship, and as such was as much a symbol of the independence of Scottish intellectualism as a vehicle for the dissemination of knowledge. This event can be seen as a perhaps inevitable consequence of the founding of The Society of Antiquaries of London in 1717, which for some considerable time afterward was responsible for the centralisation of archaeological discussion and debate.

The Scottish society was founded as early as 1780, in response to what Hibbert Ware described as a "growing taste for the subject of antiquities." (Clarke 1981). This

growing taste was further stimulated by the founding of what was eventually to become the National Museum in 1782. These learned societies and institutions were largely the offspring of that period of intellectual expansionism known as *the enlightenment*, an era which was to reach its apex during the 18th century.
The Royal society had been founded in 1660 and the Royal Academy in 1768. These august bodies were originally the domain of a social élite and in their earliest form functioned as much as a gentlemen's club as a medium through which new contributions to the arts and sciences could be exhibited and aired - the term *proceedings* for a long time meant just that; the transcription of papers previously presented orally to an audience of society members.

There were various attempts to publish the proceedings of the society prior to 1849, latterly under the title *Archaeologia Scotica*. But its appearance was, if not erratic, somewhat infrequent, an irregularity not wholly conducive to the growth of a new discipline. The arrival of the annually published *Proceedings* marked an important watershed in the history of Scottish archaeology. For the first time new ideas found a wide audience, albeit an audience still largely consisting of a social and intellectual élite (many of the contributors to the *Proceedings* were landowners reporting upon investigations carried out upon sites discovered on their land - in short, these people owned the archaeology). National circulation was made possible through the increasing efficiency of the postal system (Clarke 1981). Indeed many members of the society found that they could not attend meetings in Edinburgh and so contributed by submitting written papers for publication - a practice which is now the norm - and were thus known as corresponding members. Many of those who were to make contributions to the study of marine exploitation lived in the north of Scotland, hence their status as corresponding members. Without the distant but nevertheless accessible vehicle of the *Proceedings* it is doubtful that many of the discoveries made in these remote parts of Scotland would ever have been published. Common themes and fields of interest could now be established; antiquarians who had previously worked in isolation could now voice their opinions and join in debate.

It is in a report published in the first volume of the *Proceedings*, on the excavation of a Pict's house (broch) at Kettleburn, Caithness (Rhind 1854), that we find the earliest evidence for an awareness of the importance of certain types of evidence relating to prehistoric economy. This excavation was of an unprecedented scale for its time and was carried out over a period of three months by workmen in the employ of Henry Rhind, a local landowner and member of the society. The finds recovered from this excavation included various faunal remains, among them the bones of a whale, and it is with regard to these that Rhind made the following observations: "scarcely less important than the articles which belong more particularly to the province of the archaeologist, are the osteological remains; and the value of these has been enhanced by their already having been classified by so excellent an authority as Mr Quekkett....Without them no accurate picture of primaeval times can possibly be portrayed. But they will doubtless receive a much greater share of attention, now that the science of comparative anatomy has attained such a degree of perfection as to render the dicta of its most successful cultivators unerringly precise" (1854, 268-269).

It is clear, then, that by the time the first volume of the *Proceedings* came to be published it was understood that the recovery and analysis of faunal remains from archaeological sites would play an important part in furthering the understanding of human activity in the distant past. This report is especially important as it was the first to utilise the services of a non-archaeological specialist, in order to enhance the body of evidence available to the archaeologist. In doing so Rhind had effectively laid the foundation for a relationship that was not to be fully cemented for over a hundred years - when the development of processual archaeology re-emphasised the need for a scientific rigour which could only be achieved through a multi-disciplinary approach.

Though the *Proceedings* represent perhaps the most regular means by which excavations, discoveries and interpretations have been published, the contribution of local journals should not be underestimated. Local antiquarian societies and field clubs represented an important adjunct to the national society, as they still do, and many of them, such as the Dumfriesshire society, publish their own journal; which themselves have been a valuable source in the compilation of the present work.

iii. Kitchen middens and continental influences

The term *kitchen midden*, is a direct translation from the Danish *kjökkenmödding*, and is one which appears regularly in the pages of the *Proceedings* throughout the nineteenth century, and is still used today by some archaeologists. The term generally refers to deposits which consist of animal bones and other refuse but are usually visually dominated by marine shells. It is the presence of marine shells which brought about the adoption of the term *shell mound* or *shell midden.*

The work on Danish shell middens, or *Kjökkenmöddings*, was well known in Scotland and greatly influenced endeavours related to the excavation of apparently similar sites in this country. Strong links had been forged between the Scottish and Danish archaeological communities throughout the first half of the nineteenth century, a bond evidenced by events such as the presentation to the Scottish society of the report of the Royal Commission for Antiquities of Denmark. This gesture was to prompt Sir George MacKenzie to call for closer links with similar societies in Denmark, a reciprocity which was secured in 1815 when MacKenzie was made an honorary member of the Copenhagen Antiquaries (Stevenson 1981).

The systematic excavation, by 1869, of a sample of over 40 of some 150 shell middens then known to exist in Denmark (Munro 1884), sometimes considerably removed from the shores of sheltered bays and fjords, was nothing if not advanced for its time. The *Kjökkenmödding research committee* had been founded as early as 1850 and was headed by respected representatives not only of the archaeological community but also by both the geological and biological fields: Dr Worsaae, M. Forchmmer and Professor Steenstrop, respectively. The excavation of these sites resulted in the identification of a period, previously unrecognised in Denmark's prehistory, when human groups existed without recourse to agriculture. This mode of existence was seen to correspond to the earlier part of what had come to be known as the *Stone Age*, at a time when the marine species resources were envisaged to have played an important role in subsistence practices based exclusively on the exploitation of naturally available foodstuffs.

In the light of similar discoveries in Scotland the advances made by the Danish Committee were of considerable interest to Scottish practitioners and its results were soon broadcast to a wider audience. Lubbock visited Denmark in 1863 and was to see for himself several of the *kjökkenmödding* sites. In the *Prehistoric Times* of that year he published a description of a section which had been cut through one of these mounds. That same year he also published a paper entitled: *A visit to the ancient shell-mounds of Scotland* (1863), in which he described a number of mounds in the Moray Firth.

The importance of the Danish work was later reiterated by Munro in a paper which summarised the main findings of the Committee (1884). This summary gives some idea of how far Danish archaeology had advanced by that time, with Munro claiming that the shell mounds had "been forced to disclose the salient features in the social life of a bygone people" (ibid 216). In it Munro describes how Steenstrop had compared bones recovered from the middens, which exhibited evidence for gnawing by animals, with examples of modern bones which were known to have been chewed by modern dogs. This is clearly an example of *Middle Range Theory* being applied some 80 years prior to Binford advocating its use by archaeologists (1967). The identification of certain animal species within the deposits was also used as evidence for an all-round use of these sites and so weakened the argument that they had only been visited at certain times of the year by nomadic hunters (Munro 1884). The issue of nomadism and seasonality can still be seen to characterise studies of shell middens and, particularly the Mesolithic, to this day (eg. Mellars and Wilkinson 1980).

The efforts of the Danish researchers were held up as an example of what could be achieved in Scotland. In *Annals* Wilson notes, "Similar accumulations of the refuse of ancient feasts are not unknown on some of the mainland and island coasts, though they have not been subjected to any such systematic exploration as those of Denmark" (1851, 37). This statement can perhaps be viewed as an invitation to right such a shortcoming, and one which was soon taken up.

During the 1860s, in the wake of Wilson's work, there were a number of investigations carried out on Scottish shell midden sites. These included Dalrymple's excavation of two shell mounds in the vicinity of the Ythan estuary on the coast of Aberdeenshire (1866) and investigation of shell mounds on the links between Meikle and Little Ferries, Sutherland, by Lawson Tait (1868). A paper entitled "The kjökken - moddinger of Denmark and their similitudes on the Elginshire coast" in the *Proceedings of the Royal Physical Society of Edinburgh* (Gordon 1866, 84-92) further demonstrates the influence of work carried out in Denmark. Among the most important of these excavations were those undertaken in Caithness by Samuel Laing. The results of this work were published in both the *Proceedings* (1868) and earlier in book form (Laing and Huxley 1866). Laing's work must again be viewed in the light of developments in Denmark. The introduction there of the *Three Age System* in the 1840s was soon adopted by workers in Scotland. This system of ordering prehistoric cultural development under the broad headings of Stone, Bronze and Iron had originally been formulated by Thomsen while sorting the material held in the recently founded National Museum of Denmark - some of which was later to find its way to Scotland in the form of gifts and museum acquisitions (Stevenson 1981). However, it was Worsaae, a member of the *kjökkenmödding* Committee, who refined and popularised this chronological scheme.

Laing's main priority was to either verify or negate the applicability of the *Three Age System* to Scotland, a concern which prompted him to initiate one of the first research oriented excavations to take place here. Laing was well aware of both the complicated nature of archaeological evidence and the difficulties inherent in the universal application of locally derived systems of classification, articulating his understanding of these problems thus: "The fundamental distinction of a Stone, Bronze and Iron period has never been either conclusively established or exclusively negatived. Every day we hear of relics which in Denmark would be assigned to without hesitation to the stone period, being found in connection with Bronze and Iron...The refuse heaps which have been the means of throwing so much light on the Pre-historic periods of Denmark and Switzerland appear to afford by far the best chance of ascertaining the habits and conditions of life of the Pre-historic populations; but they require, even more than the ancient tombs and dwellings, the most accurate and systematic investigation, not only to give us the truth, but to escape giving us any error" (Laing and Huxley 1866, 3-4).

Laing rapidly excavated five sites, of varying nature, but most of them loosely classified as kitchen-middens or refuse heaps. Unlike others working at the same time he would not be satisfied with merely substantiating the physical nature of these sites - he expressed disappointment that Lubbock, while working on sites in the neighbourhood of Elgin, had succeeded in finding only shells and bones (Laing and Huxley 1866). It was his intention to establish the period to which these 'refuse heaps' belonged. One of these sites, 'the graveyard mound', was found to include a thick deposit of marine shells, and so resembled a kjökkenmödding. On top of this shell deposit Laing identified a heavily denuded broch, which at the time were known as burgs or picts towers. The same elements were also present in the nearby 'Harbour Mound' at Kiess, though much of the shell deposit here was within the structure rather than beneath it (fig.1).

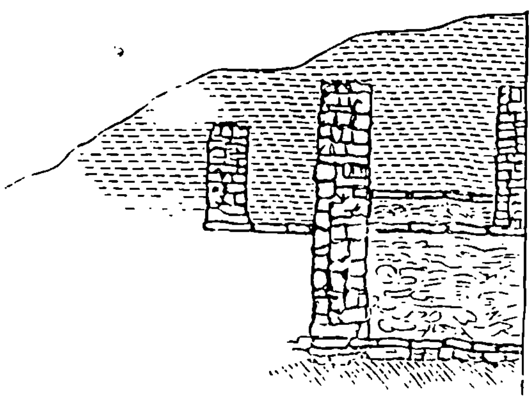
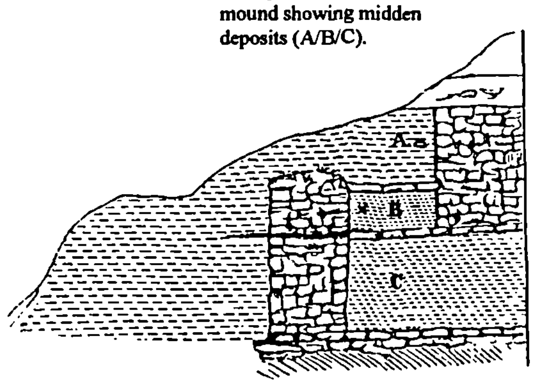


fig 1. Laing's sections through the harbour mound showing midden deposits (A/B/C).



Laing was, despite his research agenda and claims to objectivity, somewhat over eager to demonstrate that these sites evidenced a successive cultural development equitable with the *Three Age System*. He relied upon the stringent application of simplistic dating criteria, which centred upon a small and possibly atypical selection of artefact types. To these artefacts, which included smoothed and roughly chipped stones, he applied established tool typologies, describing coarsely chipped stones as arrow and spearheads and a crude flaked point as a battle axe. This assemblage, some of which originated from what appear to have been Iron Age extended burials, as well as from the brochs, was viewed by Laing as highly impoverished and so obviously the result of early human activity which could only be assigned a 'stone age' provenance. Recourse to resources such as shellfish, which Laing viewed as a sign of cultural impoverishment, was also seen as further evidence of very early activity, despite the fact that at least some of these finds were related to substantial architectural forms. Laing even went so far as to suggest that human jaw bones found within the shell midden deposits were indicative of cannibalism! (1866, 29). As well as comparison with the Danish sites Laing also saw a suitable analogy in the 'savages' of Tierra del Fuego which Darwin had described as mainly subsisting on shellfish (1859). This reference to Darwin is another example of the eagerness of archaeologists to utilise, though usually uncritically, the results of scientific work taking place outside archaeology.

Laing would have done better to have applied the rules of superposition, as propounded by geologists such as Charles Lyell, himself a champion of Darwin (1853). Application of the laws of superposition, which provided the foundation for archaeological stratigraphy, establishes the shell deposit, which lies beneath the Iron Age broch (which were known to be late, hence the term *pict's house*), to be the oldest of the two elements, and therefore represented the only element which could have been deposited during the stone age. However, Lyell himself, when considering the Danish *kjökkenmöddings*, utilised reasoning similar to that used by Laing to argue for an early date for these sites, stating, "Scattered all through them [the shell mounds] are flint knives, hatchets, and other instruments of stone, horn, wood and bone, with fragments of coarse pottery, mixed with charcoal and cinders, but never any implements of bronze, nor of iron" (1873, 12). Moving on from material culture to resource residues he noted, "No traces of grain of any sort have hitherto been discovered, nor any other indication that the men of the kjökken-moddings had any knowledge of agriculture" (ibid).

Despite Rhind's earlier optimism about the potential of faunal analysis it is evident in Laing's work that such considerations were limited to cursory observations which appeared to substantiate the primitive and therefore pre-agricultural character of the economy. The bones of oxen, goat and horse were interpreted as relating to wild species which had been hunted for food, while the apparent lack of evidence for cereal cultivation was used to bolster this proposal (1866, 55). It is obvious that Laing was concerned with an analysis of subsistence only as a means of establishing the *primaeval* nature of the social groups responsible for the deposition of those material remains. In short the shell middens were used merely as *fact mines* with their deposits exploited as a source of evidence to be used in verifying ideas which were to an extent preconceived.

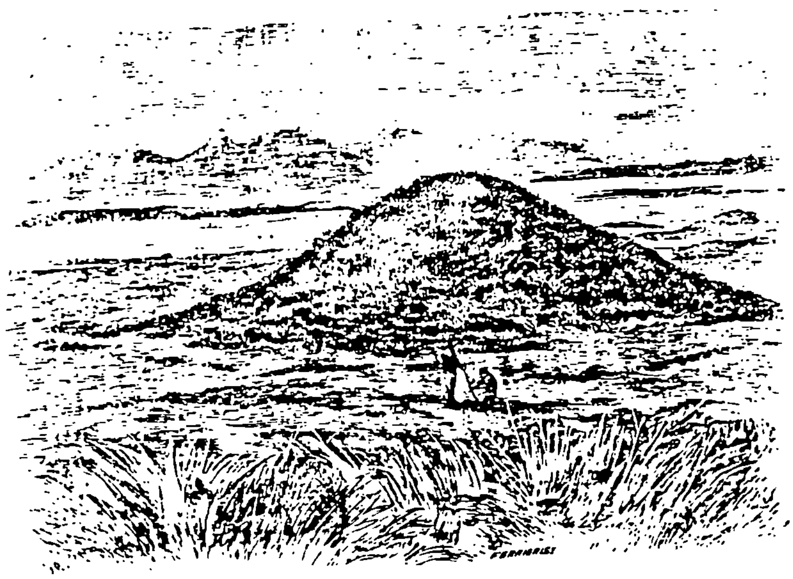
iv. Further developments

From the 1880s up to the end of the century papers concerned with the description or excavation of shell middens were to appear regularly within the pages of the *Proceedings* and other journals. There was, in the latter part of the 19th century, a general increase in the number of excavations being carried out in Scotland, particularly in the north, where impressive upstanding monuments such as the brochs acted as a powerful magnet to archaeologists. By this time it had become possible to detect some basic differences in the nature of sites related to marine exploitation, further suggesting that a complex and widespread phenomenon had been recognised. The most basic realisation was that apparently similar phenomenon were not limited to any one period. As early as 1866 Laing was well aware of the protracted history of such sites: "The shell-mound, or midden, is of itself a formation of no particular period. I have seen many a 'Kjökkenmödding' accumulating at the back door of an Orkney cottage, where limpets were largely used for bait." (1866, 4). Such enlightened observation is perhaps a little surprising when viewed in the light of his insistence on an early date for the Caithness sites - it is doubtful whether Laing would have come across any iron artefacts if he had excavated one of these contemporary Orkney sites, an absence of évidence which does not make them stone age.

Despite his failure to take on board the implications of his own observations it would be unfair to burden Laing's shoulders with the responsibility for the sometimes unconscious assumption that shell middens necessarily relate to early prehistoric activity. Recent excavations at Smoo Cave, Sutherland have established that midden deposits previously thought to be Mesolithic (Keiller 1972, 41) were in fact Iron Age at the latest (Pollard 1991). Similarly a shell midden in the vicinity of the well known Mesolithic shell midden site at Morton proved to be Pictish (Wickham-Jones 1992).

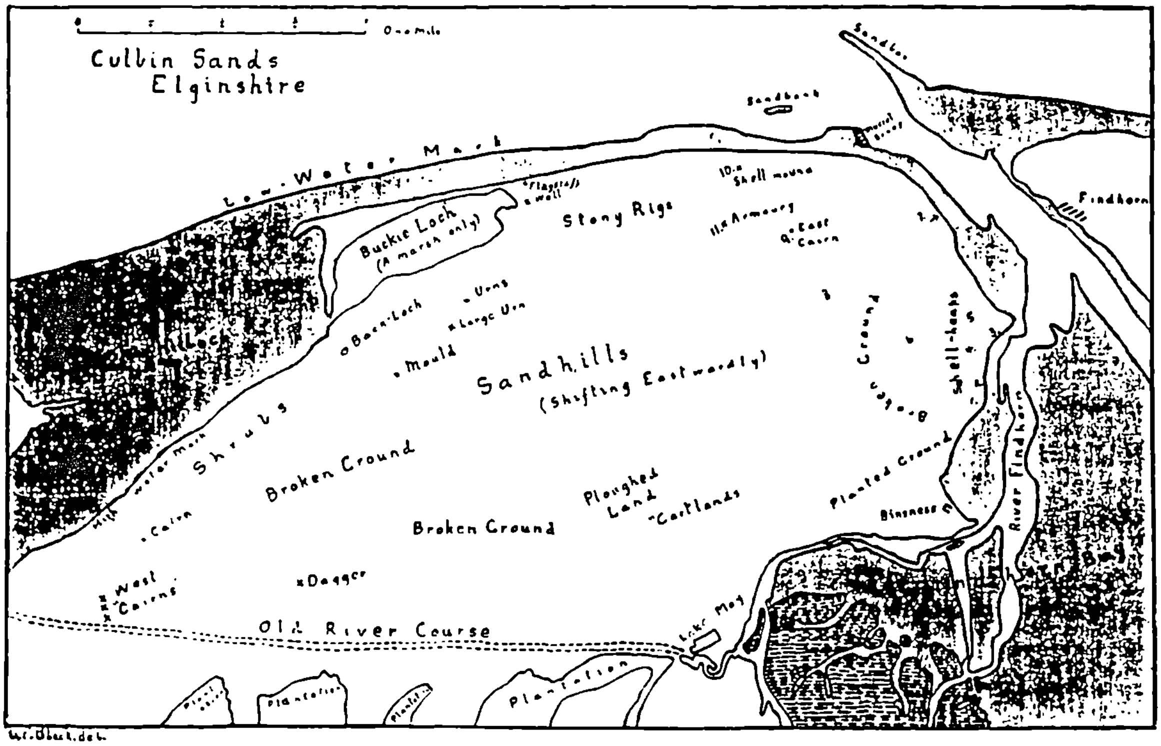
Throughout the 19th century the terms most commonly used to refer to archaeological manifestations of marine shells were *kitchen midden* and *shell midden*. The latter especially came more and more to imply a site which appeared to exist independently from other obvious elements, in short the shells were the site. These features often appeared as mounds, sometimes of impressive dimensions, and were commonly situated away from recognised settlement sites while displaying no structural elements within their stratigraphies. It was common for such mounds to appear in groups, as on Oronsay and Coll (Grieve 1883, Ross 1881), where they were sometimes of such impressive dimensions as to become the subject of local folk tales as evidenced in the Gaelic names attached to them. On Oronsay these names include Caisteal-nan-Gillean which translates as 'the fort or the castle of the young men, servants or followers'; these sites were also generally known as 'Sithean' meaning 'of the fairies' or 'of the magicians'(see fig.2)

fig.2. Caistail-nan-Gillean, Oronsay
from a woodcut in Grieve 1882
(taken from Lacaille 1954).



Substantial accumulations of shells also appeared as linear deposits, perhaps sealed beneath a considerable overburden of topsoil or blown sand, as at Inveravon (Grieve 1871), Inchkeith (Grieve 1872), Urquhart, near Elgin (Morrison 1872) and Stannergate, near Dundee (Mathewson 1879). As more sites were identified so it became clear that they existed within specific contexts; including the back of raised beaches related to major estuaries, such as those in the Forth Valley, or within sand dune complexes like those on Culbin sands (see fig.3), Elginshire (Black 1891), and the deposits on the Rhodes Links, North Berwick (Richardson 1900). An unfortunate side effect of the increased interest in these sites, largely spurred by their reputation as a rich source of artefacts and curios, was a distinct acceleration in their destruction. As early as 1911 Callander lamented the fate of sites in Culbin Sands: "It is to be regretted that this fine series of kitchen middens has been so ruthlessly destroyed by irresponsible collectors" (1911,167).

fig.3 Sketch map by Black (1891)
of Culbin sands showing "shell heaps"
and other features



Caves were another specific context within which shell midden deposits were often identified. Undoubtedly the best known of these are the Oban cave sites (discussed below). Outside Oban, excavations undertaken at a cave in Borness, Kirkubright (Corrie, Clarke and Hunt 1874), revealed not only considerable deposits of shells but also fish and mammal bones, worked stone, fragments of bronze, iron implements, bone comb's, spindle whorls and net sinkers. Evidence of agriculture took the form of numerous charred cereal grains which were recovered when they floated to the surface of water used for washing bones - an occurrence which may represent the accidental discovery of wet sieving. The cave therefore appeared to have been occupied by groups using marine resources and other forms of subsistence for a considerable period of time. A similarly protracted history of use was also evidenced by caves such as the Crystal Spring Cavern, Colonsay (Smith 1883); St Ninian's Cave, Wigtownshire (Maxwell 1887) and Uanmh Phort Luinge Mhic-ruaridh, Islay (Mitchell 1898). Again, these deposits were generally used as *fact mines* with the primary objective of excavation being the recovery of artefacts which could be used to date the related but poorly understood activities, most strikingly evidenced by the accumulation of marine shells and other faunal remains.

Caves provided an obvious focus for the archaeologist and an increasing number of them were investigated in the later part of the nineteenth century. Despite the temptation to view cave dwelling as feature of the distant past it was quite normal in Scotland, until very recently, to find people utilising caves as shelters, in preference to bricks and mortar (Leitch and Smith 1993). Such places have also earned a secure place in popular literature and folk lore as the hiding place of great treasures, as in the works of R.L. Stevenson, or as the dwelling place of hideous cannibals, as in the stories which have grown up around Sawney Bean. The National Monuments Record lists a dozen or so caves which take their name from national heroes such as Bonnie Prince Charlie or Robert the Bruce, who supposedly took shelter within their rock walls. Few people can resist the urge to explore, however tentatively, the shadowed reaches of a cave newly come across, even if it is only to pause for a moment at the entrance before thinking better of pushing on into the darkness.

Very few archaeological writers have attempted to define or describe the hold which caves have over the popular imagination. A rare attempt to describe what it is that invites such curiosity, or more accurately what it is to experience such curiosity, was made by Grieve in his preliminary report on investigations carried out in the Crystal Spring Cavern, Colonsay: "I passed my hand with the lighted candle into the aperture and peered into the gloom, trying to see the limit of the lead, but could not, so I crept back into the wider portion of the tunnel, where getting out my magnesium, I fixed it in a holder for the purpose, and moved forward to the aperture once more, then lighting the wire held it at arms length into the opening. As the burning metal shed forward its brilliant rays it was seen clearly the obstruction was only a few feet in thickness, and that a chamber was beyond." (1880, 321).

v. The Oban caves

The various discoveries of cave sites in Oban, both in the nineteenth and twentieth centuries, have in general been by-products of the constant process of economic transformation which has brought to light much evidence for prehistoric activity in Scotland, while also being responsible for so much of its destruction. During the earlier part of the nineteenth century Oban existed as a small fishing village which also served as a trading centre for the local rural communities. However, as the century progressed the community began to undergo a process of growth, at first prompted by its role as a centre of trade but later by the demands of a burgeoning new industry: tourism. The most dramatic period of this growth was to be heralded by the completion of the West Highland Railway in the 1880s, when a direct link with

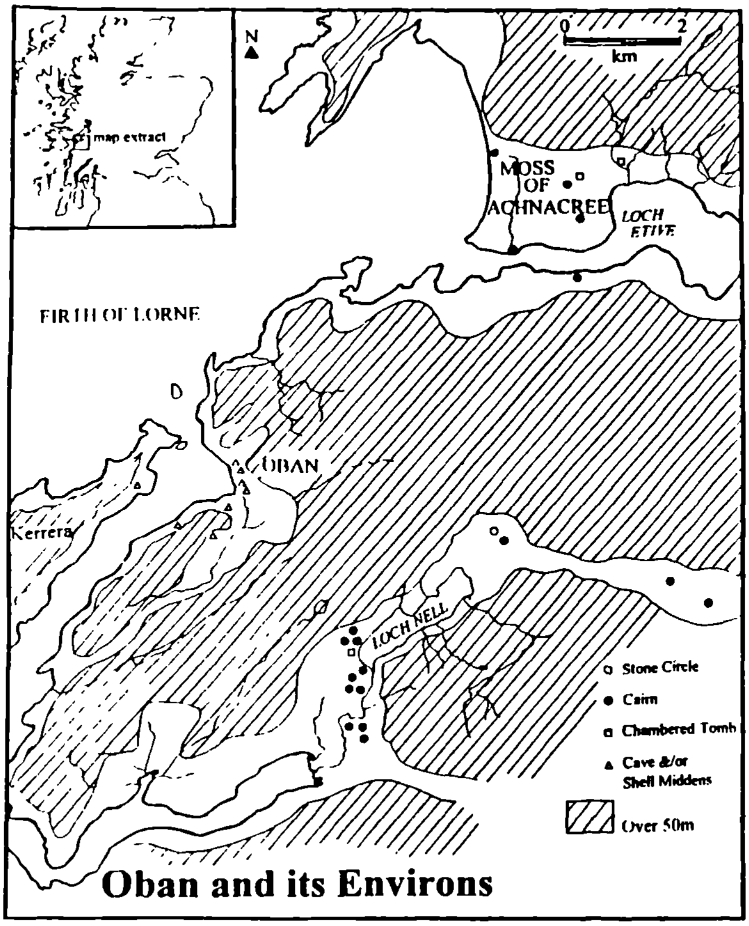
Glasgow ensured a steady stream of affluent visitors eager to escape, if only temporarily, the urban experience which was both part cause and result of the industrial revolution.

The first reported discovery was made in 1869 when workmen building a house for John MacKay revealed a cave, henceforth known as the MacKay Cave. This work had necessitated the removal of rock debris or talus from the foot of a cliff. This cliff marked the rear of the raised beach which had formed as a result of the main post-glacial transgression and its aftermath. It was upon this raised beach that the main parts of the town were built, the cliff for many years providing not only a backdrop to the town but also delineating its landward extent. This site, like many others discovered later, is now lost but descriptions given by Sir William Turner (1895) make it possible to roughly locate its position at the northern end of the bay (see map).

Up until the time of quarrying activity the cave had remained obscured from view behind a substantial talus of earth and stones which had formed across its mouth. With the removal of this deposit not only was the cave revealed but also the deposit of shells and bone which it contained. It was obvious that these deposits were not the result of natural processes but were in fact the result of human action taking place in antiquity. In the absence of an experienced archaeologist, a common enough situation at that time, only objects of obvious interest were removed from the cave. The recovered finds included various animal bones, some shells, several flints and two human skulls (Turner, ibid).

The circumstances which had brought about the discovery of the MacKay Cave were duplicated in 1877 when work was being carried out behind the town gasworks. The removal of talus again revealed a cave containing archaeological deposits. It is reported (Turner 1895) that work some years earlier had recovered human remains in this vicinity, but unfortunately these remains had not been curated. A small sample of the material from the Gasworks Cave was forwarded to Turner, with better success than the skulls from the MacKay Cave, which had been damaged when the steamer upon which they were being carried to Glasgow ran aground. The Gasworks Cave material included limpet, cockle and oyster shells, a flake of flint and fragments of pottery.

fig 4. Map showing distribution of cave sites in Oban



In 1890 extension work to the town's distillery resulted in the discovery of a third cave (the Distillery Cave) in the base of the cliff. As in the case of the earlier discoveries, the destructive nature of the quarrying which had uncovered the cave had also severely disturbed the deposits, thus denying the opportunity of recording stratigraphic details. Turner writes in his published report, "In removing some debris from the base of the cliff many cart loads of shells were exposed and taken away." (Turner 1895,417). The general picture then is one of large quantities of what would now be viewed as important evidence being removed without a second thought. Finds which were recorded included the shells of oyster, common whelks and limpet, along with a number of flint flakes and several bone implements. Human remains in the form of eight lower jaw bones were also recovered from the site.

That archaeology was beginning to find its professional feet became obvious in 1894 when the discovery of a further cave was followed by a detailed excavation of its deposits. The excavation of MacArthur Cave can be seen to represent something of a watershed, at least in the way shell midden sites were dealt with in Scotland, displaying as it did the attention to detail which was to be associated with many, though not all, of the later excavations, while also exhibiting many of the shortcomings which had characterised the work which preceded it.

Like those before it MacArthur Cave was discovered as a result of building operations in the town, on this occasion under the auspices of A. MacArthur. Fortunately by this time enough similar sites had been discovered for its importance to be quickly realised and news of the discovery soon reached the ears of the archaeological establishment. Joseph Anderson, then keeper of the National Museum, was informed of the find by W. Higgin, a local man with some interest in antiquarian pursuits. The cave quickly attracted interested visitors, including several members of the Scottish Society of Antiquaries. Interest shown by the society was soon after to manifest itself in the decision taken by the council to provide funds for a scientific excavation.

The excavation of MacArthur Cave was carried out from December 31st 1894 to February 5th 1895. The work was executed by Higgin, who remained in correspondence with Anderson during this time. It is doubtful that Higgin had much experience in archaeological excavation and the decision to leave supervision of the work in his hands was virtually a case of excavation by proxy. Such an unsatisfactory arrangement can be seen to be a feature of archaeology at this time, especially in isolated areas and, as a full discussion of the Risga site will clarify (chapter 8), was a state of affairs which was to continue well into the twentieth century.

During the excavation of MacArthur's Cave much greater care was taken over the recovery and recording of archaeological deposits than had been the case with the earlier Oban sites. As well as worked stone the recovered implement assemblage included a high proportion of organic elements, including bone and antler barbed points, a fact at least partly due to the optimum preservation conditions provided by alkaline deposits of shell. Barbed points of a different kind, with barbs appearing on one side only, were later recovered from the Druimvargie rock shelter, also in Oban (Anderson 1898). Much of the discussion of the Oban sites which has taken place since their discovery has been dominated by these organic implements, just as they appeared at the time of discovery to dominate the artefactual assemblage. These artefacts were very soon thereafter seen as representative of a way of life previously unobserved in Britain. Though the term *Obanian* was not introduced until 1940, and then by an investigator working on apparently similar sites in Northern Ireland (Movius, 1940), the idea of a distinct cultural group can be traced to the immediate aftermath of the MacArthur Cave excavation.

The traditional view of the Obanian is one of a specialised hunter-gatherer economy which relied to a great extent on resources procured from a marine environment, such as shellfish, fish and marine mammals, though as bones recovered from the midden deposits testified, terrestrial species such as deer were also utilised. This economy was seen as a response to a predominantly coastal environment, while recourse to tool assemblages which were largely of bone or antler was the necessary result of the low availability of flint in the area. As will be discussed later these assumptions have more recently been questioned.

The publication of the work at MacArthur Cave (Anderson 1895a) can be seen to represent the appearance one of the first detailed account of a systematic shell midden excavation in Scotland (other reports at this time including Smith's excavation of the Ardrossan shell midden - 1892). Despite the fact that Anderson had very rarely visited the site, the attention to detail in the report does indicate that Higgin recognised the value of keeping detailed accounts of the work (attempts to locate Higgin's original notebooks in several museums have proved fruitless). In the report Anderson describes the stratigraphy of the site as consisting of a thick deposit of marine shells which underlay a deposit of dark humic earth. Several human skulls had been removed from this black earth layer, a stratigraphic detail which has led to the belief that the funerary element present in many of the Oban sites post-dates their primary use as shell midden sites (the present author disagrees with this assumption as will be made clear in chapter 8).

The shell deposit, which on excavation was found to be the upper of two such layers, was composed of large amounts of shellfish (Anderson notes limpets, razor shells, cockles, mussels, oyster, periwinkles and occasional whelks). Intermingled with this deposit were the bones of various animals and quantities of charcoal. Artefacts were also recovered from this layer, including barbed points of red deer antler and large amounts of worked antler and bone, which Anderson describes as chisel ended implements. Very few pieces of worked stone were recovered, this component being limited to about twenty flints and three hammer stones.

The deposits in MacArthur's Cave were once again compared to Danish *kjökkenmöddings* (Anderson 1895a, 226), but more importantly the assemblage was also compared with finds recovered from a cave site in France, Mas d'azil, which also contained barbed points (Anderson 1898). This typological similarity was regarded as a direct cultural link, demonstrating the movement of peoples and ideas rather than similar but unrelated responses to environmental conditions. Just as the earlier researchers had looked to Denmark for guidance in the interpretation of shell middens, so those discussing Oban also found themselves turning to Continental origins in order to explain what they saw as culturally related phenomena.

It was Anderson who first recognised the similarity between the Oban sites and the shell mounds on Oronsay, which had been subject to investigation as early as the 1870s by Grieve (1885). Anderson states: "It is evident that these three shell mounds in Oronsay and the MacArthur and Druimvargie caves at Oban belong to the same archaeological horizon - a horizon which has not heretofore been observed in Scotland" (1898, 313).

One of the prime movers in the research of the Obanian was A. Henderson Bishop, who provided much of the Scottish prehistoric material now lodged in the Hunterian Museum, Glasgow. In 1913 Bishop carried out an intensive excavation on the mound known as Cnoc Sligeach on Oronsay, one of his major aims being to correlate its deposits directly with the Oban sites. In his report on the excavation Bishop stated that the mound belongs to, "...a stage intermediate between the Palaeolithic and Neolithic periods" (1914, 52). He, like Anderson before him, was struck by the distinct similarity not only between the material on Oronsay and in Oban but also with that from Piette's cave site at Mas d'Azil, in France, from which barbed points had also been recovered. It is clear that Bishop recognised the Mesolithic without going as far as actually calling it such, though the term had been introduced as early as 1874 (Newell 1984).

Bishop's accomplishments on Oronsay were unfortunately not to be mirrored in his approach to the shell midden on the island of Risga in Loch Sunart, Ardnamurchan, which was excavated in 1920-21. This site represents the most northerly of the Obanian sites and has never been adequately published, primarily because Bishop never visited the site himself and hired an inexperienced agent to carry out the excavation in his absence. This state of affairs is all the more unfortunate in that the artefactual assemblage recovered during that work is very extensive and contains elements, such as large numbers of lithics, not present in the other sites. An important aim of this thesis has been to carry out a programme of fieldwork aimed at reassessing this neglected but important site; the results of that work along with a discussion of the earlier work on the site are presented in chapter 8.

Bishop had introduced the term *Oransay* (sic) *culture* (1914) to refer to the western Scottish shell midden sites as the material residues of activities of groups which shared a material culture and a lifestyle based on marine exploitation. However, it was the European label which was for a time adopted to refer to these sites, and so the term *Azilian* or *Scottish Azilian* was widely used. It was not until the publication of Clark's seminal work on the British Mesolithic (1932) that the Obanian sites were formally recognised as belonging to the Mesolithic, all writers before then being satisfied to regard them simply as pre-Neolithic. The term Obanian made a rather later appearance (Movius 1940) and quickly replaced the term *Azilian* or *Scottish Azilian* to refer to a specific cultural component of the Mesolithic.

The foregoing discussion of the intellectual history of the Oban sites has gone into some detail in order to demonstrate their central role in the development of a concept of prehistory in Scotland. Central to this was the recognition of the Mesolithic period in Scotland and its association with shell middens and marine exploitation. On a specific level the Obanian has been taken to represent the epitome of Mesolithic activity in Scotland, which for a long time was viewed as a largely coastal phenomenon geared to marine exploitation. On a general and perhaps more profound level shell middens have been regarded as artefacts of the Mesolithic, despite the fact that marine resources were utilised throughout prehistory and after.

v. Settlement sites and the twentieth century

The investigation of the Risga site coincided with something of a shift, both in the focus of excavation interest and also in the way that excavations were carried out and reported. The interest in shell middens, or kitchen middens, which had come about as a result of discoveries in Denmark in the middle of the nineteenth century declined somewhat as attention was diverted to settlement complexes. This is not to say that these sites have been devoid of evidence for marine exploitation, but this has generally represented only one component of substantial deposits centred upon and around structural remains.

The excavation of settlement sites in the earlier part of the twentieth century was not a new phenomenon but represented the continuation of a long-standing interest in such sites. The mid-nineteenth century had seen a distinct upsurge in the number of archaeological excavations carried out in Scotland (Stevenson 1981). Much of this endeavour was directed toward the substantial and impressive stone-built structures of the north and to a lesser extent the west. The Iron Age brochs and duns were to provide an obvious focus for archaeological activity at a time when the antiquarian zeal for acquiring objects held sway over more scientific motives. Despite Rhind's advocation of the value of faunal evidence and the role of the specialist (1854) the recovery of evidence relating to economy, including agriculture and the exploitation of wild resources, was often neglected in the excavator's primary concern being to reveal the architectural detail of these structures, while also searching for artefacts. This concern with artefacts and architectural form was to become an issue which retarded Scottish Iron Age studies to such a degree that its shortcomings are still apparent today (see chapter 9).

Preservation levels within stone-built structures are quite often very high, with the structure itself providing an optimum environment for both deposition and containment. Unexcavated brochs often appear as cylindrical vessels full to the point of overflowing with rubble and other materials, much of which can be expected to cover and protect evidence for multiple occupations. Another reason for the highly preserved condition of sites in the north and west of Scotland is the tendency for sites in coastal locations to become submerged under considerable depths of wind-blown sand, which protect the site while high alkaline levels in the shell sand also promote the preservation of organic materials.

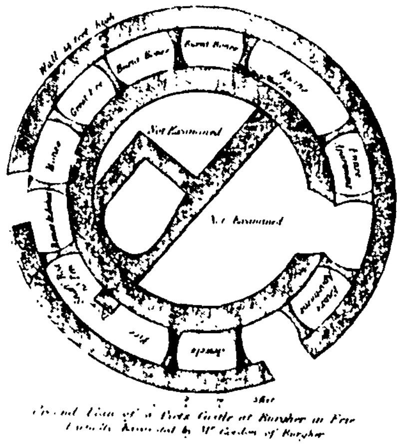
In their eagerness to tackle sites which consisted of substantial upstanding remains, such as many of the brochs, it is perhaps inevitable that early investigators neglected fully to record the more mundane aspects of the material, such as animal bones and marine shells. Though handfuls of animal bones were sometimes recovered and examined it was less normal to take much trouble over recording the contexts from which they came. This situation was even more acute in the case of marine shells which in a number of cases were not even felt worthy enough of a mention in written accounts. Stratigraphical detail was normally ignored or given only cursory attention as structures were 'cleared' or 'emptied'. Reports from the time are full of unclarified references to 'dark soil', 'greasy layers', 'stones and bones' and 'unctuous matter'.

During many of the pioneering excavations the materials which constituted the site's stratigraphy were regarded merely as refuse which had to be cleared in order that architectural features could be uncovered and artefacts recovered. It was not until the middle part of the twentieth century that these residues began to be recorded adequately, with the majority of reports beginning to refer to 'midden deposits' or 'occupation levels', though little attempt was made to more fully understand the processes which brought about the deposition of this material or the nature of the activities evidenced by it. Material such as animal bone was submitted to specialists for examination but this went little further than the identification of species. The value of these reports was further limited by the fact that specialists tended to have no archaeological background, usually being vets or surgeons, and sampling was generally limited to haphazard collection with little thought given to assigning provenance to recovered material.

Exceptions to these prevailing attitudes are of course detectable, for instance in the case of the excavation of a broch at Burray, Orkney, by Farrer. He not only went to the trouble of identifying the species to which bones related but also to the rather unusual length of noting their context, observing that deer horns were all found at a considerable depth and mainly in rubbish located outside the structure (1857). The implications of such contextual information are more fully discussed in chapter 9.

It cannot be denied that material deposited in the prehistoric past as refuse has provided a rich source of information for the archaeologist. However, the ubiquity of this material, most commonly referred to as 'midden' or 'occupation refuse', did little to encourage archaeologists to fully record this material. Very few excavators saw the worth in planning or photographing this material, at best noting its presence and location in the written discussion of the site. Perhaps the earliest example of this sort of information being displayed on a site plan is to be found in the report by Thomas on the monuments of Orkney (1852) which includes a plan of the broch at Erie (?Evie), with burnt bones, ashes and a human skeleton clearly located within the intramural cells (fig.5).

fig 5. plan of broch by Thomas 1852



Despite the limited value of some excavations, as far as an understanding of the context of marine residues is concerned, some early excavators did demonstrate an awareness of the importance of deposits which included evidence for marine exploitation. The use of section drawings in recording archaeological deposits is to be found in some early excavation reports (Laing's section through the deposits at the Harbour Mound, Keiss has already appeared). Dalrymple's section through shell midden deposits in the Ythan estuary (1866) is the earliest published example in Scotland of a section drawing through such a feature (fig.6).

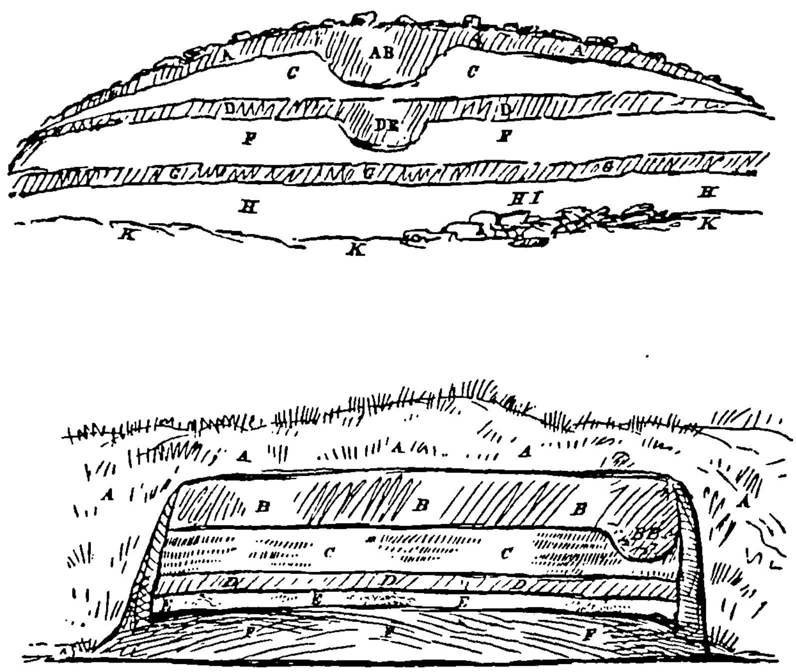


fig 6. Sections through shell middens in the Ythan estuary by Dalrymple 1866 (scale unknown).

During the first half of the twentieth century the interest in settlement sites in northern Scotland was further promoted as a result of the passing of the Ancient Monuments Act in 1882. With the recognition of the national importance of archaeological monuments the Office of Works commissioned a number of investigations in advance of consolidation and reconstruction work. It was during this time that the excavations at sites such as Gurness (1920s), Skara Brae, Rinyo, Jarlshof (1930s) and Skitten broch (1940) took place. However, this government-sponsored activity did not necessarily coincide with improvements in the type of excavation carried out. At Gurness the primary objective was to clear the structure of debris in order to recover relics and to make the site suitable for display (Hedges 1987), motives not dissimilar to those which prompted many of the excavations carried out in the nineteenth century. Fortunately improvements in methodology were more evident at Skara Brae, where excavation was carried out by Childe over a number of seasons and some care taken in the retrieval and recording of information.

In general though, economic analysis was still limited to straightforward species identifications which were then used to give some idea of the type of economy practised on sites. These continued to be carried out by specialists who were provided with only arbitrary samples and the minimum of information about their archaeological context. The relative importance of different species was generally gauged through the numbers of bones present. This type of interpretation was wholly unreliable as results depended on the size of sample the specialist received. This problem was compounded by the invalidity of interpretations drawn from simple bone counts, as not all parts of the carcase may be deposited, or survive, on site, with the result that a small number of bones may actually represent several animals, while a larger number may all originate from a single animal. This technique was utilised more recently to interpret animal bones recovered from the excavation of the broch at Dun Mor Vaul, on Tiree, (MacKie 1974) and produced flawed results (discussed in chapter 9) which conflict with the more valid approach of calculating the minimum number of individuals (MNI) present (where two lower jaw bones and five ankle bones, of the same species, are taken to represent a minimum of two animals rather than a maximum of seven).

The term *fact mine* has been used more than once to describe shell middens and other deposits containing residues of marine procurement practice. The empirically based approach, which has dominated Scottish archaeology for the greater part of its history, regarded the accumulation of facts as of paramount importance. Archaeologists were seen as nothing more than the collectors of data, fitting that data into a broader picture of the past was the domain of the historian. Midden deposits, seen to represent little more than prehistoric rubbish tips, provided an ideal source of data, which prior to the introduction of techniques of environmental analysis meant artefacts. An understanding of the nature of these deposits for a long time took second place to the recovery of artefacts. A good example of this approach is Hamilton's excavation of midden deposits, heaped against the outside of boundary wall of the Clickhimin settlement, specifically for the purpose of retrieving pottery which would provide a datable sequence (1956).

It is also apparent that when later sites, such as brochs, have been excavated and faunal remains recovered, much more tends to be made of information related to agriculture than for other subsistence practices such as hunting and marine exploitation, with marine exploitation usually receiving the most cursory of considerations. This has been a part result of the tendency of issues such as architectural origins and population movements for a long time dominated discussion. Only recently has been it recognised that more attention needs to be paid to the role of marine resources in these Iron Age economies (Hingley 1992, 24).

The introduction of techniques such as the calculation of MNI were the result of the introduction of the so-called *New Archaeology* in the 1960s and 1970s. This movement, which is today more commonly labelled *processual archaeology*, was partly the result of the desire to increase the scientific validity of archaeology and sought the adoption of statistical sampling techniques and taphonomic analysis; these were used to provide raw data, used in turn to construct models which could then be tested through the application of *middle range theory* (Binford 1967), which relied heavily upon ethnographic observation to test this static data against the residues of dynamic processes occurring in the present. A new breed of specialists was associated with this change in attitude, where before vets and surgeons with little archaeological knowledge had been consulted, now people with archaeological experience trained to be archaeozoologists.

An increased concern with the development of models of past human social behaviour in turn gave birth in the 1970s to *palaeoeconomics* (Higgs 1975) or *economic archaeology*, a school which was pioneered by a number of researchers, many of them based at Cambridge University. Theoretical approaches such as *site catchment analysis* and *least cost models* were applied to archaeological sites which had provided evidence for various forms of resource exploitation and subsistence practice (eg Higgs and Vinta-Finzi 1972, Jarman, Vinta-Finzi and Higgs 1972). These techniques were complemented by an increasing awareness of that sites existed and functioned within a wider world. Environmental archaeology, pioneered by the likes of Clark (1952), attempted to integrate site interpretation with studies of a more ecological nature - with his work on deer migration and site function based on work at Star Carr being a classic of its kind (1972).

A key work at this time, as far as this thesis is concerned, was the analysis carried out by Bailey, as a Phd thesis, on the economic role of shell middens (1975). Bailey applied concepts such as site catchment and anthropological studies in his study of shell middens in various parts of the world, mainly in Australia discussed further below) and Continental Europe. It is partly thanks to Bailey's work that an interest in shell middens, which in Scotland at least had last flowered in the late nineteenth and early twentieth Century, once again began to grow, though now it was the role of these sites in prehistoric subsistence practice and not their artefacts which were of primary concern. However, it is also noteworthy that these two peaks in interest correspond to times at which archaeology was most concerned with being regarded as a science.

At the same time as Bailey was resuscitating an interest in shell middens, several important excavations were being carried out on early Scottish settlement sites which had the potential to provide valuable information on marine exploitation. These included excavations on Orkney, with a return to Skara Brae and the excavation of the Neolithic settlement at Links of Noltland, and in the Outer Hebrides at the Udal (Crawford 1988) and Northton (Simpson1976), where settlements were also found to be submerged beneath drifting sands. These excavations are all characterised by the desire to recover as much data as possible in order to facilitate detailed reconstructions of depositional patterns and exploitation strategies. The recovery of vast amounts of material, including numerous animal bones and samples of marine shells, increased through intensive sieving programmes, has necessitated prolonged periods of post-excavation analysis, which is not only time-consuming but also expensive. It is for this reason, despite the production of various interim papers (eg Clarke 1973, 1976, Simpson 1976), that the final reports on these excavations have yet to appear, with, in some cases, twenty years elapsing between excavation and the present time (with the Udal excavation still on-going).

During this twenty year period a number of smaller scale excavations have demonstrated a concern with issues relating to marine exploitation, with a notable increase in the attention being paid to marine shells. The excavation of smaller settlement sites such as the Bronze Age house at Ardnave (Ritchie and Welfare 1983), on Islay, where some considerable attention was paid to marine shells (Evans 1983 - discussed further in the next section). This form of evidence, which had once been totally ignored or given only passing mention, was now subjected to various forms of analysis, above and beyond the estimation of quantities and the identification of species. The application of stable isotope analysis, which gauges changes in salinity, in conjunction with growth ring analysis, has been used by Deith to suggest that shellfish recovered from the Mesolithic site at Morton, Fife, were collected from different zones within a single shore rather than from a series of coastal environments (1986).

For most of the twentieth century much of the evidence for marine exploitation has been recovered as a result of settlement excavations, but the late 1970s and early 1980s saw the most notable work specifically geared to shell middens yet to be carried out in Britain. The excavation of the Oronsay shell mounds, which had last been looked at by Bishop in 1914, saw the application of a number of analytical techniques in an extensive research programme designed to examine issues central to the use of these sites. These techniques included the examination of fish otoliths in an attempt to identify patterns in seasonal exploitation (Mellars and Wilkinson 1980). Since Oronsay the majority of work on shell middens, as well most other types of site, has been carried out on a rescue rather than research basis. The most recent excavations in Oban have been carried out on shell middens discovered after building and extension work, circumstances very similar to those which prompted the excavation of the first Oban cave sites, in the later nineteenth century.

Other important work around this time includes that on the large shell middens in Forth valley, where the application of radiocarbon dating techniques served to cast doubt on some long-held assumptions about the date and cultural context of these features (MacKie 1971, 1972; Sloan 1982). Though some of the shell middens had been used in the Mesolithic it was also found that their use-life extended into the Neolithic, a period associated with agricultural activity rather than the gathering of shellfish. The bones of domestic cattle and sherds of pottery were recovered from one of these features, thus providing a powerful juxtaposition between two firmly embedded stereotypes: the exploitation of the natural environment (the Mesolithic) and the triumph of culture over nature (the Neolithic). It is really here that the present thesis enters the fray, desiring, among other things, to discuss the social implications of such contextual relationships.

vi. A question of context: the present work

It is perhaps now even more surprising, after considering the long history of the discovery and excavation of deposits related to marine exploitation, that no attempt has been made to take a general overview of the information so far obtained. Most of the work concerned with prehistoric marine exploitation has been carried out on a site specific basis, with interpretation usually being limited to that site. The nature of excavation reports, with specialist contributions confined to an appendix and much information removed to *fiche*, has done little to change this situation. Though it is usual, in most reports, for the findings of detailed analyses to be condensed and integrated within the general discussion of the site, this treatment tends to be somewhat cursory. Little or no attempt is made to present an overview of the evidence, which could provide an insight into the nature of marine residue deposits and an assessment of their implications for our understanding of prehistoric social behaviour. This is what the present work hopes to provide.

In explaining the approach adopted in this work it is essential to provide a fuller critique of those methods which have characterised the study of prehistoric marine exploitation over the past twenty or thirty years. The techniques which together comprise the *palaeoeconomic* approach were developed under the auspices of processual archaeology during the 1970s and were touched upon in the previous section. By and large these techniques drew heavily upon a set of principles adopted from nutritional science. Central to this approach was an understanding of the nutritional requirements of human beings and the relative nutritional value of various food stuffs. The data sets provided by nutritional scientists were of great appeal to processual archaeologists as they represented 'law-like' statements which could be extrapolated into the human past, with both the nutritional requirements of humans under given conditions and the nutritional value of food-stuffs remaining constant through time. Considerable advances had been made in the study of human nutrition since the second world war, with the problems of food supply in Britain during what was essentially a prolonged state of siege providing both the data and impetus for a study into the dietary requirements of the British population and the amount of agricultural land required to sustain that population (Wylie 1954).

Archaeologists concerned with the economic role of shell middens were among the first to see the potential of the data provided by nutritional studies (e.g. Shawcross 1967; Bailey 1975a and b). Bailey's work involved the excavation of shell midden mounds in Australia in an attempt to assess the role of oysters within the diet of the aboriginal groups responsible for the build-up of the mounds (Bailey 1975a and b). In order to do this it was essential in the first instance to estimate the number of oysters represented by the mounds. This was achieved through the development of a sampling programme which removed the necessity to totally excavate features which contained millions of marine shells (Bailey 1975b, 48). Sampling strategies and their continued refinement have played a vital role in the archaeological study of shell middens (e.g. Mellars 1978 373-375, 389-392; Peacock 1978; Sloan 1984). Having established the number of oysters represented by the midden and the period of time over which they had accumulated Bailey then converted shell weight to meat weight. This data was used in conjunction with the nutritional value of oysters and the nutritional requirements of modern day aborigines to assess the role of the oyster in the annual diet of prehistoric aborigines .

Bailey's work demonstrated that though shell middens represent visually impressive features, containing millions of shells, they do not necessarily indicate a central role for shellfish within the annual diet of those people exploiting them. Though the shell middens appeared to represent sites geared to the almost exclusive exploitation and consumption of oysters, with fish playing a negligable role, they could only have supported a large group (c. 100 people) for around a week if they ate nothing but oysters, or a smaller group (c. 25 people) for around 56 days if the oysters represented 50% of their calorific intake. Obviously there are mulitiple permutations of population size and proportion of oyster intake possible here (Bailey 1975a, 57) but in every case the data suggests a very limited role for oysters in the annual diet of these groups.

Similar approaches have only rarely been adopted as a means of assessing marine shell deposits in Scotland. Lacaille suggested that the shell midden at Stannergate, near Dundee (region E), which was described as measuring 100 feet by 60 feet, "points to a fairly long occupation" (Lacaille 1936, 421). Atkinson was later critical of this statement, and pre-empted the likes of Bailey when he noted that: "of all forms of food, shell-fish produce the greatest bulk of refuse for a given quantity of edible substance" (1962, 6). From the proposition that at least a large bucketful of shells would accumulate per head per day, Atkinson suggested that a group of ten people could bring about the accumulation of the Stannergate midden in less than seven years of continuous settlement, or within a single lifetime on a seasonal basis (ibid, 6). Though Atkinson made an important point here, the more recent excavation of the Oronsay sites has demonstrated that shell middens can represent prolonged periods of activity, in the this case in the region of 600-700 years (Mellars 1987, 3). The midden investigated by Bailey demonstrated an even longer use of some 1,650 years (1975b, 52). What is apparent in both of these examples is that the sites represent seasonal activity rather than full-time occupation, with the shell middens represent only one component of complex subsistence strategies. It was in an attempt to understand the various ways in which the landscape was utilised by both mobile and sedentary groups that the techniques related to site catchment analysis were developed (these are discussed below).

Other attempts to apply an understanding of nutritional requirements to Scottish archaeological material included the report on the excavation of a shell midden at Morton, Fife (region E), where Coles utilised techniques similar to those used by Shawcross (1967) and later by Bailey (1975a and b) to estimate the meat weight of the shells which constituted the midden. In calculating the nutritional value of all the food types in the midden, including terrestrial mammals and vegetable matter, Coles estimated that a group of no more than 12 people occupied the site for around 13 days per year over the 200 year period suggested by radiocarbon dates (1971, 361).

In the specialist report on the marine molluscs from the Bronze Age dwelling at Ardnave, Islay (B/31), Evans estimated that limpets recovered from several samples would provide enough calories to maintain a family of two adults and three children for not more than three days (1983, 353). However, Evans also notes the drawbacks of analysing material which has been collected through the use of varying standards of sampling (ibid, 351), a problem which perhaps harks back to the arbitrary techniques known to have been practiced on earlier excavations.

The over-riding impression of nutritional analysis when applied to marine shells in archaeological contexts is that shellfish represent a somewhat calorifically impoverished resource. It has been calculated that somewhere in the region of 52,267 oysters, 31,360 limpets, or 156,800 cockles are needed to provide the calorific equivalent of one deer carcase (Bailey 1975, 1978). Explaining the widespread utilisation of shellfish in prehistoric Scotland therefore presents something of a challenge to the archaeologist. It will be argued here that this is a challenge which the palaeoeconomic approach, which itself was partly founded on the principles of nutritional analysis, has largely failed to meet.

The archaeological use of nutritional analysis coincided with and to a degree promoted the development of a further series of influential analytical tools. Perhaps most relevant here is *territorial analysis* which is often confused with the broader parent concept of *site catchment analysis*, largely due to the rather mix and match fashion in which they have been used by their creators (Jarman, Bailey and Jarman 1982, 38) The former assesses the exploitation territory of archaeological sites, while the latter "is concerned with the points and areas of origin of all the various contents of archaeological sites" (Jarman, Bailey and Jarman, 1982, 38), and includes everything from geology to pollen deposition. This approach therefore situates archaeological sites within the context of the landscape and in doing so has something in common with the present work. Again, as with nutritional analysis, there was an attempt to apply law-like generalisations about present human behaviour to the prehistoric past - in this case the distance over which people would be prepared to travel in order to exploit a given resource. Though early attempts to apply these principles concentrated on distance (Lee 1969), the more refined form of the technique recognised that topography would dictate the energy required to cover a certain distance and so it was therefore time rather than distance which was the important limiting factor (Jarman 1972, 710).

Nutritional analysis is a guiding principle here, with the calorific value dictating the amount of effort which people will be prepared, and indeed able, to expend in order to procure a given type of food. It is pertinent to note here that shellfish tend not to be transported over long distances due to their poor weight to nutritional value ratio, hence they are usually consumed in close proximity to their source: the shore (Jarman, Bailey and Jarman 1982, 29). Such an interpretation of shell middens epitomises the palaeoeconomic approach, with human behaviour dictated by pragmatic reasoning based upon the desire to operate within optimal bounds. Though it would be rash to state that this observation was invalid it would be fair to say that it does little to enhance our understanding of past human social practice. It is here that the present approach begins to diverge from that described above, seeking as it does to demonstrate that a number of further, perhaps less obvious motives may lie behind what may otherwise appear to be readily interpreted patterns of human social behaviour.

As noted above, the most important principle behind site catchment analysis is the time-energy factor, where the time and energy required to cover a given distance limit the exploitation of resources from that landscape. This factor serves to define the exploitation territory of a given site within a or 5km and 10km radius around the site. These distances represent walks of one and two hours (Higgs 1975), which are taken to represent the maximum distance that arable agriculturalists (in the case of 5km) and hunter-gatherers (in the case of 10km) are prepared to travel from the base site. These figures are based on ethnographic studies of contemporary hunter-gatherer and agricultural groups (Jarman 1972, 710). The model recognises that technology may increase the potential territory, with rivers and the sea providing the potential for travel by boat. It is also recognised that movement may take place on a seasonal basis with several sites within the landscape perhaps representing the activities of the same group at different times of the year, the resulting area demarcated thus being termed the *annual territory* (Jarman 1972, 709).

Territorial analysis is open to a number of criticisms. Though ideally these measured distances are based on transects actually walked by those building the model (Jarman, Bailey and Jarman 1982, 32) they do represent a normative approach both to the landscape and the people who lived and moved through it in the prehistoric past. The creation of maps based on these data represent the reduction of complex landscapes to greatly simplified graphic constructs. These maps, with their concentric rings radiating from a central place (though not all catchments produce concentric *time contours*) occupy a specific place in cartographic history. The development of site catchment analysis in the mid 1970s coincided with a period in western history when an over-riding concern was the threat of nuclear war. The distinct similarity between site catchment maps and those which demonstrated the destructive capacity of nuclear weapons may therefore be more than coincidental, both appearing at a time when the products of science apparently held sway over individual human choice or action.

The *palaeoeconomic* approach tended to reduce human action in all its varied forms to a constant quest to obtain the minimal daily nutritional requirement. It has been argued elsewehere that these principles are based upon twentieth century western assumptions about what is deemed worthwhile in terms of effort and expenditure (Shanks and Tilley 1987, 51). At the risk of stretching a point too far it can be suggested here that the foregoing discussion has demonstrated that both nutritional science and site catchment analysis are in some way related to that most twentieth century of concepts: total war. Though it cannot be doubted that site catchment anlaysis has opened the eyes of archaeologists to the importance of considering sites as part of the landscape, it comes uncomfortably close to creating what Thomas (1988, 64) has described as a *cybernetic wasteland*, in which people are seen merely as pawns playing out life to a set of rules wholly dictated by the nature of the environment in which they live. This form of analysis places little importance on the understanding of the social process through which change was mediated, nor does it seek to explain the means by which social relations were established and reproduced over time. Barrett has observed that the recognition of territorial behaviour among humans becomes relatively trivial and that it is the means by which access to resources was negotiated which we should be attempting to understand (1994, 140). It is hoped that the approach adopted within the present work will avoid such triviality, focusing upon, among other things, the means by which access to resources was negotiated. Concepts of territoriality and the nature of human/landscape relationships are further discussed in chapter 8.

Another serious draw-back of the palaeoeconomic approach is its failure to credit material culture with a central and dynamic role in the social process touched upon above (Hodder 1982, 210-211). Material culture must not be regarded as a passive type fossil (Thomas 1988, 60), nor, as is the tendency in palaeoeconomic approaches, should it be seen simply as the means by which calories were procured and processed. It is because of these flaws in the palaeoeconomic approach that the present author has chosen a different trajectory, instead adopting an approach which places an emphasis on the contextual relationships between varying types of archaeological material. Consideration is not only given to the specific context of deposition and recovery but also to all those contextual relationships which preceded the final act of deposition, including contexts of procurement, processing and consumption, all of which had a part to play in structuring society. It is believed that it is only through a due consideration of the various relationships, which often changed and shifted - transformation being a central theme in this work - that we will begin to more fully appreciate the social importance of activities related to marine exploitation. As with the palaeoeconomic approach, an attempt is made to place sites within their wider landscape context. However, again it is the social role of both the landscape and the resources exploited from it which will provide the focus of attention. Thus, this thesis owes more to the post-processual school of archaeology than it does to the processual school of palaeoeconomics, being interested as it is in the various readings which can be made of the archaeological record rather than in counting calories or applying least-cost models.

An important aspect of the processual approach has been the adoption of ethnographical and anthropological studies to provide analogies for past human behaviour, with the premises of site catchment analysis being partially based on ethnographic observation (Jarman 1972, 706, 710). Though too much emphasis can be placed on the validity of ethnographic parallels the present author does believe that ethnography and ethnohistory have an important role to play as they can provide not so much an analogue for past human practice but an index of possibilities which allows us to view archaeological evidence in a number of different ways.

Scotland has a very rich but relatively little used ethnohistorical record. Much of this record is directly concerned with the character of marine exploitation in the period ranging from the late seventeenth to the early twentieth century, with the work of Fenton in this area being notable. Many of these accounts document life in places relatively untouched by the processes of social change and industrialisation which were to so dramatically transform the nature of society in western Europe during this time. Important among these works are accounts of early traveller's, perhaps the best known being the journals of Boswell and Johnson. The work of Martin Martin (1716), who travelled around the western Isles in the early eighteenth century, is perhaps the most illuminating of these accounts and is refered to at various points in this work. It is important to reiterate that reference to this body of material is not intended to provide direct analogies for the archaeological material but simply to give some idea of the complex and varied nature of the activities which may be evidenced by that material.

vii. Conclusion

This chapter has attempted to place the discovery and excavation of sites containing evidence for marine exploitation within the context of the development of archaeology as a discipline in Scotland. It has been demonstrated that changing research priorities have influenced the way in which this material has been treated. This results of this long history of endeavour will now be used to provide a long overdue study of marine exploitation in prehistoric Scotland.

Chapter 3

Shell mounds and burnt mounds: an introduction to the corpus and site classification

i. Introduction

Having placed the analysis of marine exploitation within the context of the history of archaeological research in Scotland we can now go on to concentrate on the nature of the evidence itself, which is listed in the corpus in the appendix. Every effort has been taken to make this corpus to which this chapter stands as an introduction as complete as possible.

This chapter also discusses similarity between so-called shell middens and burnt mounds and in doing so introduces a classification system which is designed to overcome shortcomings demonstrated by previous works.

ii. The corpus and the ordering of discussion

A variety of sources were consulted in the preparation of the corpus, including published excavation reports and sites and monuments records. Over 450 sites were found to qualify for inclusion in the corpus, with the main criteria being the presence of marine shells, though other evidence, such as finds of whale remains in association with artefacts, have also been included. It will be seen that a wide variety of sites have met this criteria, ranging from the traditional categories of Mesolithic shell middens to Neolithic chambered tombs, from Bronze Age cairns to Iron Age brochs. These sites are also distributed throughout many parts of Scotland, extending from the Solway Firth in the south to Shetland in the north, from St Kilda in the West to the Firth of Forth in the east.

It should be noted that the corpus is not intended to be exhaustive, such an undertaking is beyond the means of the present work, requiring as it would a field survey of the entire coastline of Scotland, which covers a distance well in excess of 15,000km. Fieldwork was undertaken during the course of this work but this was carried out with specific and limited aims, which did not include the identification of new sites.

Access to information has been largely governed by the availability of published reports, though some excavators have been kind enough to offer information on sites currently undergoing post-excavation analysis. A number of sites, excavated some considerable time ago, have yet to reach publication, and so in these cases the information is limited.

In general it is fair to describe the corpus as the result of a thorough literature and archival search. It is believed that most, if not all, published accounts of sites which have produced evidence for marine exploitation have been consulted. This search has involved the consultation of all relevant journals (both national and local), reference to the National Sites and Monuments Record and local sites and monuments records, as compiled by the Orkney and Highland Region archaeologists. Other sources include *Discovery and Excavation in Scotland*, various regional surveys and gazetteers. Contact with individuals and local informants has also provided much help - these bodies and individuals have been credited in the acknowledgements.

The corpus therefore represents a synthesis which is as near comprehensive as possible, and as such will hopefully provide a useful foundation upon which future field-based surveys and programmes of excavation can be based. Not all of the sites listed in the corpus have been subjected to excavation and so the quality of information is variable. The same can also be true of sites which have been excavated, with some reports providing a useful insight into the nature of the evidence while others have ignored it almost entirely. It is hoped that a critical assessment of past work may also aid the advancement of research in the future.

It can be suggested that the production of a fully comprehensive work would be virtually impossible, as the sites in question exist in a dynamic environment. Sites are constantly disappearing or changing their appearance as more elements are both revealed and destroyed by erosion, equally previously unknown sites appear on a regular basis, usually as a result of winter storms. It cannot be claimed that the sites listed in the corpus represent a statistically valid sample as we have no true idea of the size of the population from which they are drawn. Survey is generally small scale and can only ever detect what is visible, with an area of coast apparently sterile one year and heavily populated with 'new' sites the next. Reference to *Discovery and Excavation in Scotland*, which has proven a valuable source, is more likely to tell you where a given archaeologist went for his/her summer holiday than provide an insight into the true pattern of coastal settlement in a region. Nor can it be ascertained how many known but unexcavated sites may yet prove to include evidence for marine exploitation which has so far remained undetected. It is for these reasons that this work does not contain the detailed site location and distribution analyses of which so many theses appear to consist.

iii. Regional breakdown

This work differs from previous regional studies, such as Hunt's work on *early farming communities in Scotland* (1987), in that it is primarily concerned with an analysis of contextual relationships. It is believed that a contextual approach is most likely to achieve the identification of meaningful patterns in the material, which relate to the role of marine exploitation and possible variations in that role through time and space. It is a concern with the identification of variations in the nature of marine exploitation that a broad geographical and chronological approach has been adopted.

Due to the size of the data base and the extent of the study area, and in order to control and structure the discussion it was found necessary to divide the Scottish coastline into sections of more limited extent. This division must be regarded as a largely arbitrary device and not an attempt to categorise areas for any purpose other than to present information in a controlled manner. Attempts to define areas which can be regarded as archaeologically viable units can cause almost insurmountable problems to the archaeologist when they are called upon to define and defend the limits of that area. That Scotland has been selected as the study area is not without its own problems, and it is fully recognised that Scotland is a historical and political entity which does not conform to any prehistoric perception of landscape or territory.

The regional breakdown is summarised below and can be seen in figure ?. Most of the sites listed in the corpus are displayed on map sheets, each of which represents a study area. It should be noted that these maps are intended only to portray the relative distributions of sites.

Region A: Extends along the Solway and around the coast of Galloway, stretching up the coast of Ayrshire into the Firth of Clyde, taking in the island of Arran.

Region B: Includes the inner reaches of the Firth of Clyde, turning south along the eastern shore of the Kintyre peninsula. From the southern tip of Kintyre the coast extends northward and the region takes in the sound of Jura and the Firth of Lorne, extending as far north as the northern boundary of the Ardnamurchan peninsula. This region includes the southern Hebridean islands of Jura, Islay, Colonsay, Oronsay, Lismore, Mull, Coll and Tiree.

Region C: This portion of the coastline is heavily indented by sea lochs and continues northward through Wester Ross and Sutherland, as far North as Cape Wrath. It includes the Inner Hebridean islands of Eigg, Rhum, Muck, Canna and Skye, as well as the outer Hebridean islands of Lewis, Harris and the Uists. (St Kilda is discussed in this work but its position some 50 miles to the west of the Outer Hebrides makes it very difficult to fit on any map - its small size negates the purpose of including it within an insert, as has been done with the Shetlands).

Region D: Covers much of north eastern Scotland. The coast of the mainland extends as far East as Duncansby Head before turning south-eastward and passing through Caithness and Sutherland until it reaches Inverness in the Moray Firth. From here it extends eastward, taking in Banff, Elgin and Fraserburgh. Also included within this region are the Orkney and Shetland islands.

Region E: Here the coastline extends southward from Peterhead, through Aberdeen and Arbroath, terminating on the English border at Berwick. The southern section of this coastline is indented by two major inlets, the Firths of Tay and Forth.

The largely arbitrary nature of the boundaries which define the five regions does not wholly invalidate their use as a basis for inter-regional comparison. This factor becomes apparent when some of the marked contrasts between different regions are noted. As an example of this one only has to consider that region C, which includes some of the most mountainous country in Scotland, along with a highly convoluted coastline, stands in contrast to region E, the hinterland of which includes some of the most productive agricultural land in Scotland.

The small scale maps used in this work will obviously reduce the apparent length of the coastline by some considerable distance, with bays, inlets and lochs being highly schematic and in some cases not being shown at all. A more accurate impression of the nature of the coastline would necessitate the use of large scale maps, the use of which would defeat the purpose of a general overview of the material available.

iv. The nature of the evidence

The most obvious, and certainly the most commonly referred to, manifestation of archaeological evidence for marine exploitation is the shell midden. A number of definitions of shell middens have been proposed in the past. These include: "a cultural deposit in which the particles of animal shell are the dominant class of refuse" (Muckle 1985, 16). This may be regarded as an adequate defintion and describes a multitude of deposits on a variety of Scottish prehistoric sites ranging from caves to brochs. However, in Scotland the term *shell midden* usually carries with it a series of expectations regarding not only the make-up of the deposit, as defined above, but also its appearance as a component of the cultural landscape. In short the term is generally taken to mean more than a deposit. A shell midden is generally regarded as a site in its own right, constituted from massed accumulations of marine shells in the form of a mound or heap, and as such represents a place at which activities directly and perhaps exclusively related to the processing and consumption of shellfish took place.

The present writer believes that the few works to have previously dealt with marine exploitation, and with the role of shellfish in particular, have generally failed to recognise the wide range of contexts from which this evidence has been recovered, each of which may reflect differences in the nature and role of marine exploitation. This failing may be due to the concentration on areas other than Scotland, with North America, Australia and Western mainland Europe providing the main focus for modern researchers (eg Bailey 1976, Waselkov 1987). The picture in Scotland demonstrates far more variance and provides the researcher with sites and contexts which cannot be satisfactorily accommodated beneath an umbrella term such as *shell midden*.

Despite the applicability of the term *shell midden* to a number of Scottish sites, as reference to the corpus will make obvious, there is a wide range of sites which include marine shells which do not qualify for the use of the term, as defined by the present author, above. Some of these deposits may represent only a relatively minor component on sites which include a wide variety of features and deposits, examples being deposits on settlement sites such as brochs, wheelhouses and duns. In some cases the term *shell-rich deposit*, has been adopted in preference to the more loaded *shell midden* to describe the appearance of marine shells on settlement sites. Whether or not the term *midden*, related as it is to the deposition of domestic refuse, can, in the majority of cases, be regarded as appropriate in the description of deposits which include marine shells found in chambered tombs or other contexts with an obvious ritual dimension will be an issue to be discussed later in this work (chapter 10).

v. Shell middens and burnt mounds: an analogy

Deposits which include marine shells are somewhat analogous to those related to so-called burnt mounds. In their classic form these features, like shell middens, appear as isolated monuments in the landscape, their location not dictated by access to the sea and its littoral but access to a source of water, usually a burn or river. These accumulations of burnt stone have been widely interpreted as cooking stations related to hunting activity in the late prehistoric and early historic period. Burnt mounds, or *fulachta fiadh* as the classic examples are known, are thought to be generally located away from settlements in areas where game were hunted, with the burnt stones usually related to a trough or pit. The heated stones are presumed to have accumulated as a mound after successive cooking sessions, with the hot stones providing a medium to boil water or to provide steam for cooking meat in the trough. An alternative function as a sauna has been proposed for these accumulations of burnt stone. Ray has criticised approaches to these features for their tendency to allow the desire to understand their function to inhibit a full consideration of their wider context and to deny the accommodation of their morphological variety (1990, 10), faults which the present work will hopefully avoid.

Burnt mounds parallel marine shell deposits not only because *fulachta fiadh* and a lot of shell middens appear to stand in isolation, but also because they are found to exist in other contexts. The burnt stones accumulate, like marine shells, over time and may be deposited in a variety of contexts. These contexts include settlement sites, where burnt stones may exist in small quantities in a variety of contexts, and as burnt mounds with settlement components, as are often found in Orkney. This compares well with marine shell deposits, which can exist *en-masse* in apparent isolation as shell middens (cf. *fulachta fiadh*), or on settlements in either large or small quantities, as well as in a variety of other contexts, including caves. The relationship between burnt mounds and shell middens need not be purely analogous either, as several shell middens, including Polmonthill, in the Forth Valley, and Cnoc Coig on Oronsay, have been found to include burnt stones in their deposits. In order to accommodate this variety within the consideration of burnt mounds

Barber has introduced a classification system, where class 1 mounds are *fulachta fiadh*, class 2 and 3 are burnt mounds with settlements, and class 4 are settlements with burnt mound material on them (1990, 98). In recognising the close similarity between these two types of deposit the present author has chosen to introduce a classification system which acknowledges the variety of contexts in which marine shells have been identified. Like Barber's this classification system is not proposed to be rigid, or strait-jacketing, but a flexible framework which will facilitate effective interpretation and discussion.

vi. A classification system

Type I deposits - caves

This class of deposits is limited to the confines of caves. These natural features represent depositional environments which in Scotland very often contain evidence for marine exploitation. The very mention of the Oban cave sites is enough to summon images of massed accumulations of marine shells resulting from the activities of Mesolithic people exploiting the coastal fringe. Despite this over-riding image it is not suggested that all deposits within caves represent the same activities carried out in the same way. The human use of caves in Scotland extends from at least the Mesolithic up to relatively modern times and appears to be related not only to marine exploitation but to burial, religious worship and metal-working. The exploitation of marine resources may in some cases be the primary reason for the use of these caves; such can be suggested for Oban. In others the use of marine resources may simply be incidental to other activities, as can be suggested for the use of caves for metalworking in later prehistory. Recognition of these differences is important, but does not detract from the validity of utilising caves as a classification criterion. Despite their differences, which will be discussed more fully in chapters 5 and 6, deposits in caves are united in that they have generally defied convincing interpretation and in so doing appear isolated from the rest of the archaeological record. One aim of this work is to address caves as an issue and in doing so hopefully going some way to placing these sites within their wider context.

Type II - open sites

These deposits are those which are traditionally termed *shell middens*, though the term can equally be applied to at least some type I deposits. Perusal of the archaeological literature of the nineteenth century reveals a plethora of terms being used to describe these features, including; *shell heap, shell mound, refuse heap* and perhaps most commonly - *kitchen midden.* The latter term was adopted from the Danish; *Kjökkenmödding,* and was widely adopted to describe deposits apparently dominated by marine shells. Many of these features exist in apparent isolation as mounds or spreads of material. Though marine shells are often the major component, most of these features include animal bones, many of them being broken or split, and sometimes being modified into artefacts such as points or gorges.

Relatively few excavations have taken place on these sites, and the majority of those in the nineteenth century. Perhaps the best known of these features are to be found on the island of Oronsay which, as the previous chapter described, have been subjected to excavation several times over the past century. Though these sites may appear as simple accumulations of refuse excavation has revealed that they were formed through the result of complex depositional processes with deposits in different locations displaying a good deal of variation. This work will also demonstrate that upon excavation a number of deposits which at first appeared to represent type II were found to represent type III deposits.

Type III - settlements

These deposits are found in association with structural remains. The majority of such deposits have been identified as a result of excavation geared to the investigation of impressive stone structures such as brochs or settlement complexes such as Jarlshof or Skara Brae. The attention paid to such deposits has generally increased as archaeological techniques have evolved. It was only with the development of economic and environmental archaeology in the 1960s that deposits including faunal remains were excavated with the aim of recovering non-artefactual evidence. Though representative samples of bones and shells were often collected for identification by non-archaeological specialists it was only with the so-called 'new archaeology' that serious attempts were made to build this material into subsistence models and environmental reconstruction. Attempts to analyse the nature of formation processes responsible for the build-up of these deposits have been few and far between, and those excavations which have taken such aims seriously have still to appear as published reports - an indication of the labour and cost involved in such enterprises.

Deposits related to structures can be either inside (type IIIa) or outside (type IIIb) those structures (fairly much as shell midden deposits can be inside or outside caves). Like caves domestic structures provide a depositional environment which confines material deposited within it. Unlike caves these depositional environments are the product of human agency and as such can vary according to design and construction. Many structures are not simply hollow shells, as many brochs and hut circles may appear prior to excavation. Internal divisions, such as the radial bays found in wheelhouses and many brochs, will influence the nature of deposition, by defining activity areas and containing materials deposited during those activities.

Type IIIa deposits, which include marine shells, animal bones, discarded artefacts and other types of refuse, have been variously described as: occupation refuse, midden material, floor deposits and occupational deposits. The implications of these different terms are discussed in more depth in a later chapter.

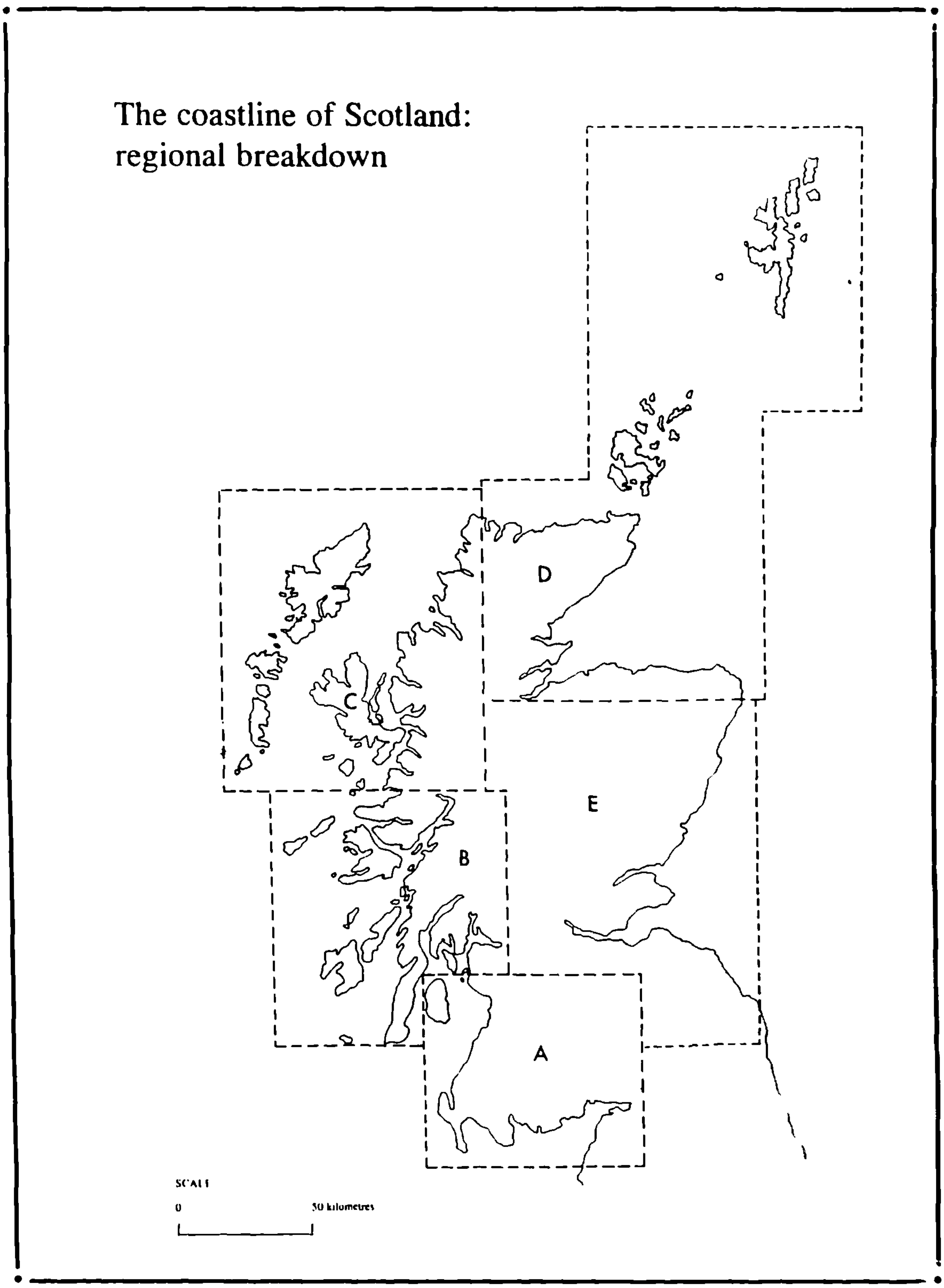
Material is often found deposited outside structures and is here classified as type IIIb. These deposits may represent material resulting from 'house cleaning', having first been deposited inside prior to being removed outside and redeposited. Alternatively this material may be the result of activities taking place outside these structures, though in many cases it is not possible to draw this distinction.

In some circumstances it is possible to discern type III deposits without recourse to excavation. Such observation is usually dependent on the presence of stone structures, which are more likely to survive than those using turf or timber. A large number of coastal erosion sites consist not only of shell-rich deposits eroding from sections but also elements of masonry. Without the benefit of excavation it can be difficult to differentiate between type II deposits and type III deposits which may have been related to timber structures.

Type IV - ritual deposits

This final class of deposits are associated with ritual monuments or have been deposited within other contexts which also have a ritual connotation. The most obvious, and widely recorded, examples of this association are to be found in the case of marine shells and other faunal remains deposited within chambered tombs. It has been noted that these deposits may be due to processes not related to the ritual use of tombs, with chambers being used by predatory animals etc. Despite this problem, which will be touched upon again, a number of deposits do appear to represent securely stratified deliberate inclusions. Other contexts include Bronze Age cists or other types of funerary associations.

fig 7. Regional breakdown



Chapter 4

Time and tide: The coastal and marine environment

i. Introduction

No work which concerns itself with the exploitation of natural resources can avoid dealing at some length with the environment within which those resources existed and from which they were exploited. Archaeology is concerned with the past but written in the present; likewise evidence for marine exploitation was deposited within a past environment but identified and recovered within the present environment. This chapter will therefore begin by discussing the contemporary environment from which archaeological evidence introduced in the preceding chapter has been recovered, and in doing so will more fully consider some of that evidence. Attention will then turn to the prehistoric environment within which marine resources were exploited and their residues deposited.

ii. The contemporary environment

When one considers how much of Scotland borders the sea it should perhaps come as no surprise that marine resources have been exploited for as long as humans have been there to do so. With the presence of so many sea lochs, embayments and islands accurate measurement of the length of the Scottish coastline is an almost impossible task. It will suffice to say that it extends for a distance well in excess of 12,000km. This figure excludes all inlets with mouths less than 1km wide and in doing so fails to take into account many of the major firths and sea lochs which so dramatically indent the coast (Hanson pers comm). Taking this consideration into account it may be more realistic to suggest that the real figure could be in the region of 15,000km.

The coastal regions which in this work make up Scotland all share a number of environmental characteristics, many of which are specific to the coast. These include: machair (which appears in most regions but dominates much of region C), raised beaches (with perhaps the most striking examples in region B), cliffs (which appear in all of the regions but are dominant features in the northern regions), and caves (which are dependent on the presence of cliffs) to name but a few. However, any work which intends to study the role of marine exploitation in prehistoric Scotland cannot concentrate on these coastal features alone, but must also be aware of the environment which exists away from the coast and which may well have been an important focus for other forms of economic practice such as agriculture and hunting. It has already been suggested that the study of the Mesolithic in Scotland was for a long time held back by the perception that activity during that period was concentrated on the coast, a rather blinkered outlook which meant that inland sites were less likely to be identified.

It could be suggested that the nature of the inland portions of the regions differ more markedly from each other than those of the coast. This is not to say that important variation was not displayed by the coastal regions but that they at least all had the sea in common. However, further inland the various landscapes created by geology, glaciation, vegetation and climate can display marked contrasts in their character and thus in their attraction and influence over human settlement. Perhaps the most striking of these contrasts is the ready availability of large tracts of flat fertile land in region E. Today this region represents the most productive agricultural land in Scotland, with broad expanses given over to large, cereal-producing fields. The picture is somewhat different in region B, where land suitable for arable production is extremely limited. Indeed, this activity is to a large extent confined to the coast, either on raised beaches or on machair lands (though the latter are more prominent in region C). The coastal hinterlands and inland parts of region B are dominated by ice-scoured mountains and deep glens, with fertile land being limited to low lying river valleys or loch shores. Though these thumb-nail sketches reflect only what we see today it is likely that the same sets of environmental factors, soil type, altitude, climate etc have ensured that some of the contrasts evident now are not wholly dissimilar to those exhibited during prehistory.

It must also be realised that these thumb-nail sketches are just that. Closer examination reveals that even in the most apparently harsh environments techniques have been developed to permit the growth of crops. Today the most obvious manifestation of the former extent of arable agriculture in northwest Scotland are the lazy beds and rigs which cover even steeply sloping land. These heaped banks of earth permitted the growth of crops in places where topsoil was otherwise prohibitively thin. Many prehistoric sites excavated in the western isles and in northern Scotland have provided evidence for crop production in the form of charred cereal grains, with ard-marks, field systems and clearance cairns providing further evidence that arable agriculture was by no means confined to the readily tillable soils of eastern and lowland Scotland.

Despite the fact that many regions hold a number of coastal features in common, it cannot be denied that there exists a striking degree of variation in the nature and character of the coastline. Perhaps one of the most obvious of these differences is the configuration of the coastline. On the east coast the prospect from shore is of an open, gently undulating coastline, broken only by river estuaries, which in places constitute major Firths such as the Forth and the Tay. The sea stretches out as a clear expanse, with the only land visible across water being that on the opposite side of estuaries, though at places such as Elgin where the Moray Firth provides long distance views of the land mass of Caithness and Sutherland to the north-west. Islands are a rare occurrence, with the Isle of May, the Bass Rock and several small outcrops at the mouth of the Forth being the only examples of note.

The west coast is very different. Here the coastline is indented by numerous sea lochs which break up the land, which itself undulates and meanders creating various peninsulas and spurs. The impression that land and sea are wholly intertwined is accentuated by the presence of a number of island groups, namely the southern or inner Hebrides and the Outer Hebrides to the north west. Many of these islands are visible from the mainland and one another, an intervisibility which in many places creates the impression of a closed sea surrounded by land rather than of an open sea which stretches out from the land, as in the east. Some islands are situated at some distance from the mainland, or from other islands, thus appearing as distant lands clinging low to the horizon. Perhaps the most spectacular example here is St Kilda which sits in the open Atlantic, some 65 kilometres to the west of the Uists. It can be seen in good weather from the long island: a single dark speck on the horizon. As such it must always have been regarded with some awe and curiosity, and as early as the Bronze Age appears to have attracted seafarers (Morrison and Pollard forthcoming).

It is probable that the contrasts outlined above had some influence at least not only on the nature of marine procurement but also in the way people saw their world and their place in it. In the west the deeply penetrating sea lochs would make movement up and down the coastline a very laborious affair, if one chose to move by land. It is therefore likely that transport by water was normal practice. Much has been made of islands being isolated entities, distinct and separate from the land, as such providing ideal subjects for units of study (eg Renfrew on Orkney and Arran [1974]). However, the distinction between island and mainland may have been somewhat overplayed (Pollard

1987, Mercer 1991, 49), being at least partially the result of a world view based on maps. Steers expresses something of this ambiguity when he states: "...some of them (islands on the west coast), like Skye and Mull, are so close to the mainland that the assumption that the separating straits of sea water were at one time rivers is easily made." (1973, 1). Prior to the development of map-making, people's perception of the world around them may have been somewhat different than the generally two dimensional view held today. In carrying out fieldwork on the island of Risga (discussed in chapter 8) it became apparent that the island, which sits around 250 metres away from the northern shore of Loch Sunart, was rarely visible as an island from the shore. From the northern shore, almost immediately opposite, it was only possible to see either the eastern or western ends of the island appearing from behind a headland, and from such a viewpoint could easily be mistaken as yet another headland jutting out from an undulating coastline. When viewed from a greater distance, and height, from the northwest the whole of the island could be seem, but the backdrop provided by the larger island of Carna removed any impression of it being an island, as it simply blends in with the background. The backdrop provided by the mainland of Morvern provided the same blurring effect for Carna. The only viewpoint from the mainland which appeared to afford a view of Risga which clearly demonstrated that it was an island, surrounded on all sides by water, was from the high ground in Morvern, looking to the northwest. The only other position from which this distinction could be clearly made is from a boat on the loch. It is this latter viewpoint which is probably the most important in relation to the present work. In prehistoric times the land was just as likely to be seen from the sea as it was from other parts of the land, with people using boats as the most convenient form of transport, especially in places such as the northwest coast, where the mainland is dominated by rugged high ground. The landscape was experienced directly, with knowledge of it largely dependant on movement through it, though the passing of knowledge through mechanisms such as oral tradition would also play an important role here, with aboriginal songlines perhaps being the best known example today (Chatwin 1988). We must therefore understand not only that the landscape was observed from a viewpoint different from our own, the latter more often than not being from a car window as scenery hurries by, but also that it was regarded differently, holding meanings to those who lived and moved through it which we today can only begin to imagine.

iii. Contexts of discovery

As the previous chapter demonstrated, the archaeological evidence for marine exploitation is varied and widely distributed. Despite this wide geographical distribution, many of the environmental contexts from which this evidence has been recovered can be seen to share various characteristics in common. Perhaps the most obvious example of contexts of deposition held in common is demonstrated by the substantial quantity of archaeological material recovered from caves (defined as type I deposits). Other natural features which have been found to accommodate archaeological deposits include: raised beaches and estuaries, sand dunes, areas of machair and peat bogs. These components are all characteristic of the Scottish coastal environment, though some are more extensive in their distribution than others.

The features discussed below have provided much of the evidence of prehistoric marine exploitation to come to light. They are not archaeological sites but the components of the environment within which sites are situated. It is not possible to talk in terms of past human activity without considering the role of this environment and the temptation to see the *archaeological site* as a suitable unit of analysis, removed from its environmental and landscape context should be avoided at all costs.

This is not to say that these environments appear today as they did during the prehistoric period. Coastal areas represent the most dynamic component of the landscape, and are open to dramatic change over relatively short periods of time. Today the most obvious agent of change is the sea and its phenomenal erosive power. Wind-driven waves at times of high tide can bite large chunks from the landscape, and perhaps in doing so reveal archaeological sites to the human eye for the first time in thousands of years. Though they can also act as an agent of discovery waves are quite definitely an agent of destruction and today there is much concern over the fate of numerous archaeological sites which teeter precariously on the verge of being washed into the sea (Ashmore 1993).

iii.i Sea level change

Today the relationship between humans and the 'natural' environment is becoming increasingly tense. Slight rises in sea level have been blamed on damage to the ozone layer caused by human abuse of the environment, with aerosol cans, some of them dispensing deodorant labelled 'natural', releasing damaging C.F.C. gases into the atmosphere. This is not the first time that sea levels have risen, and a good deal of the evidence discussed in this work relates directly to these past incursions.

It is sea level change which has been responsible for forging the character of much of Scotland's coastline. At times the result of this change has been more land, with areas once submerged left high and dry, while at other times this change has meant the submergence of the coast and the reduction of the area of land available for human settlement. These changes have not been uniform, nor have they resulted in the same types of features all over Scotland, which has a coastline displaying a morphological variety second to none. This section will go on to describe some of this variety and its implication for our understanding of past human behaviour, but prior to that it is important to outline the processes which brought about these dramatic changes in sea level.

The periods of sea-level change which have influenced prehistoric human activity in Scotland occurred as a result of the melting of ice sheets which marked the end of the last glaciation (Devensian), around 10,000 years ago, and the commencement of the Holocene period. As far as the present study is concerned the most important of these events was the period of main post-glacial, or main Holcene, transgression, which resulted in a rise in sea level somewhere in the region of 10-15m higher than that of today. The freeing of water from the ice sheets led to a world-wide increase in sea levels, though this process coincided with the recovery of the land which followed the release of downward pressure of glacial ice. However, the isostatic recovery of the land was markedly slower than the eustatic increases in sea level, an imbalance which brought about the inundation of many low-lying coastal areas.

The changing relationship between isostatic recovery and eustatic rise had brought about an earlier and more substantial rise in sea-level, of around 30m, sometime around 11,050 BC (Donner 1959). This event caused the submergence of large areas of the coast, evidence of which can be seen in the 30m raised beach or late Devensian shoreline, existing today as a land-locked terrace running parallel to the present shoreline. It has been established that there is a difference in the age of these former shorelines (Sissons 1966; Stephens and Synge 1966), with those in central Scotland being younger than those outside this area. This age difference is due to the lack of uniformity in isostatic recovery, with some parts of the earth's crust recovering more rapidly and more effectively than others. The absence of raised beaches in southern England is in contrast to the position in Scotland and is a result of this differential recovery.

The submergence of areas in southern England and Wales has removed much evidence for coastal Mesolithic activity from the scrutiny of the archaeologist, a work such as that presented here therefore being largely impossible in the areas of mainland Britain to the south of Scotland. It should also be noted however, that former shorelines have been lost in Scotland, both through more recent coastal erosion and sea-level change taking place prior to the main Holocene transgression. These early beaches related to the immediate late glacial and immediate post-glacial periods and have been detected beneath Carse clays and peat in the Forth estuary (region E). Radiocarbon dating of the peat deposits has established that these features vary in age between 9,500 years and 8,800 years old (Sissons *et al* 1966). It has also been suggested that similar deposits may exist in the Clyde estuary (region B) on the west coast (Steers 1973, 51). The burial of these deposits may therefore have serious implication of our understanding of the earliest period of human settlement in Scotland, as to date evidence for Late upper Palaeolithic activity and early Mesolithic activity is sparse and somewhat confused. The only semi-convincing suggestion of Late Upper Palaeolithic activity is the suggested cache of reindeer antler in a cave at Inchnadamph in Sutherland, region C (Lawson and Bonsall 1986), while the earliest evidence so far obtained for the Mesolithic activity in Scotland comes from Rhum, also region C, where the average of the three earliest dates comes to 6,605 BC (Whickham-Jones 1987). Though this evidence from the northwest of Scotland does indicate that even the far-flung parts of the country were attracting human occupation at a relatively early date the lack of contemporary shorelines in places further south represents a serious obstacle to understanding the colonisation of Scotland in the immediate post-glacial.

The late Devensian transgression was followed by a period of land recovery in Scotland, and it was during this time that the buried beaches described above were formed. This process coincided with the retreat of remnant glaciers which still occupied some sea lochs. This period of land recovery continued through the Boreal climatic phase until the beginning of the Atlantic, some time around 5,850 BC (zone VIIa).

It was at this time that rising sea-levels once again overtook land recovery, a change which heralded the main post-glacial transgression, which reached a maximum of around 15 metres above present levels. Continued recovery of the land however ensured that by around 3,500 BC sea-levels had receeded to their present level (Steers 1973, 51). This retreat left in its wake a series of raised beaches collectively known as the main post-glacial, or Holocene, shoreline. Work by geomorphologists has resulted in a very coarse understanding of the dating and extent of sea level changes in Scotland. It has been calculated, through the measurement of raised beach altitude and the dating of buried peat deposits, that as in the case of the earlier transgression the most dramatic recovery of the land took place in central Scotland, where the main

Holocene shoreline rose to a height of 14 metres above the regressed sea level, while in the far north and south recovery was reduced to around 6 metres (see Fig). However, there is some marked variation within areas which sit more or less on the same isobar, with raised beaches in Ayrshire varying from between 2 metres to well over 10 metres above the present sea level (Jardine and Morrison 1976). It has been suggested that the maximum washing limit in Jura at the time of maximum transgression was around 16m O.D. (Mercer 1968), though the likelihood of such a high limit has since been debated (Bonsall 1988). It has also been difficult to establish the rates at which this recovery took place and Price has pointed out the probability that in areas such as the northwest coast, where the coastline is highly convoluted and has a complex formation history, that rates of recovery and extent of recovery may well have varied (1983, 163).

iii.ii Raised beaches: morphology and distribution

The areas of land which had once been covered by transgressing seas now take several forms. The text book example takes the form of a narrow terrace which runs parallel to the shore, with many of them occurring in south-west and north-west Scotland. Very often these raised beaches occupy rock-cut platforms created during the Late-glacial or inter-glacial periods (Price 1983, 154), with the landward limit of these features being marked by cliffs, which rise in dramatic contrast to the gently sloping surface of the raised beach. Some raised beach terraces extend for some distance inland, the slopes of the hills which overlook them representing the shoreline of a former bay; again many examples of such features are to be found on the west coast. The third and perhaps most striking manifestation of these features takes the form of expansive carselands which, like flood plains, extend outwards from the banks of rivers and estuaries. What makes them so striking is the degree to which they penetrate inland. Without doubt the most impressive example of such an incursion is represented by the Carse of Stirling. The town of Stirling occupies a terrace on the banks of the river Forth almost 10km inland from the Firth of Forth. However, at the time of the post-glacial maximum the area on which the town is built lay beneath the sea and the rocky crag now crowned by Stirling castle existed as an island. Evidence for marine exploitation related to this former estuary includes finds of whale remains in association with artefacts and a number of shell middens, at one time situated on the shores of the Firth but now some distance removed. Stirling by no means marks the inland limit of this former estuary, with whalebones, not all of the at least 20 instances (Morris 1925) necessarily related to human activity, being found as far west as

Cardross, some 35 kilometres inland (if Kincardine is taken to represent the mouth of the estuary - the distance to Queensferry being more in the region of 55km)..

Though raised beaches are common features on both the east and west coasts, they appear to be generally absent from the Outer Hebrides and the Northern Isles. The coastal geomorphology of these areas is not as fully understood as that of the mainland but in general the picture appears to be one of continued submergence, and as will become obvious in the chapters which follow many of the sites which now appear on the immediate shore were at the time of their occupation located some distance away from it. Indeed, the extent of submergemce in the Outer Hebrides is so dramatic that people alive today can remember a time when the islands upon which they live were much larger in extent, though it is possible that ozone depletion may have a part to play here. However, the main reason for this contrasting picture is the existence of these islands on the periphery of the Devension ice sheet where they were depressed to a much lesser extent. Correspondingly, once the glaciers had retreated the islands did not experience the same degree of isostatic rebound as the mainland (Price 1983, 164). One only has to look at the various ship's masts and rusting hulks which break the surface of the sea around the Orkney islands to realise that these waters are shallow. Submarine survey has established that the sea bed represents a submerged ancient land mass, with the islands representing higher ground which remained above the surface (Mather, Smith and Ritchie 1974). A fuller understanding of the situation in Orkney has not been helped by the relative neglect of the north coast of the mainland. Work here did result in the identification of raised beaches (King and Wheeler 1963), when before they were thought to be poorly represented, but they have not been recorded to the same degree of accuracy as those features on the east and west coast (Steers 1973, 52).

There is an apparent lack of raised beaches on the Orkneys. Though there are places where low-lying terraces fringe the sea, such as on Hoy these are more likely to be areas which have undergone continued submergence rather than representing raised beaches. However, evidence of temporary regressions, probably dating to the post-glacial period, may be evidenced through the presence of high shingle bars which possibly represent storm beaches from recent episodes of relatively higher sea levels (Mather, Smith and Ritchie 1974, 8). Steers has also suggested that the bench and relict cliffs which occupy the northern side of Scapa Flow may represent raised beaches and also points to wave-cut platforms on Sheltand as possibilities (1973, 54).

iii.iii The archaeological potential of raised beaches

Perhaps the most obvious implication of the formation of raised beaches is the survival of Mesolithic shorelines. The main Holocene transgression occurred at a time when people practicing a Mesolithic lifestyle integrated the coastal and marine ecosystem within their subsistance strategies. Evidence for Mesolithic activity on the coast takes a number of forms, varying from lithic scatters, which have been located in close proximity to raised beaches and shell middens which are normally situated at their rear. It is important to realise that the raised beach itself tends to be devoid of Mesolithic evidence, representing as it did the sea bed during the period generally associated with Mesolithic activity. This is not to say that a Mesolithic lifestyle could not be maintained after the recession of transgressing sea, and the rate and chronology of regression is less poorly understood than the transgression itself.

The presence of shell middens to the rear of the raised beaches which fringe the Forth estuary has already been noted, though as will become apparent some of these also appear to include evidence for a Neolithic lifestyle which at least included pastoral agriculture. In occupying a former shoreline, set back from the present high water mark, the Forth valley (region E) shell middens are not alone. Those on the island of Oronsay, off the west coast (region B), are today located in sand dunes at an average distance of two hundred metres inland, but at the time of the maximum post-glacial transgression, when the island was much smaller, they directly overlooked the shore and in fact some deposits were disturbed by the sea at times of high storm tide (Jardine in Mellars 1987).

Archaeological evidence from the raised beaches proper has taken a variety of forms. Raised beaches represented a substantial increase in the amount of land available for human use. It has been calculated that the total area of new land created by the Main Holocene regression was as much as 200,000 hectares (Price 1983, 182). Today many of these raised beaches are occupied by farm fields and their potential to provide such a resource in prehistory should not be underestimated. This point is of particular importance in the consideration of the Mesolithic/Neolithic transition in northwest Scotland, an area where land suitable for agriculture is limited in extent and generally to be found occupying these raised beaches, some of which have chambered tombs situated on them or close by.

In other places the availablity of the main post-glacial raised beach may not have been quite so important. On the east coast (regions D and E) in places such as Caithness and Fife this feature exists not at the foot of craggy hills or mountains but the higher, earlier raised beach, which at one time was known as the 100' beach. It is usually this earlier feature which represents the main focus for agriculture and certainly occupies a much greater area than the later beach which fringes its seaward edge, though that is not to say that it is not used. This pattern can also be seen in some parts of region A on the west coast, in areas such as the Ayrshire coast, where the earlier post-glacial transgression made extensive incursions into the Ayrshire plain.

These raised beach terraces have proven attractive not only for agriculture but also settlement and many towns are today located on these features. This type of urban development serves as something of a two edged sword, in that while it has also brought about the discovery of much evidence it has also resulted in the destruction of archaeological features prior to their adequate recording. Both of these factors are discussed with reference to Oban later in this work.

iii.iv Caves

Open shell middens, such as those on Oronsay and in the Forth Valley, are not the only evidence for marine exploitation to be situated at the rear of the raised beach. As previously noted it is not uncommon for the limit of the raised beach to be demarcated by cliffs which rise up from the relict shoreline. At the post-glacial maximum, and indeed during the periods of high sea level which preceded it, the bases of these cliffs were lapped by waves. The erosive power of the sea was noted in the earlier part of this chapter in relation to its effect on the present day environment. Landforms were no less affected by marine erosion in the past, and the formation of caves and other features such as stacks, arches and platforms are a direct result of waves acting against rocky cliffs which offer differential resistance (Butzer 1971). It is likely that many of those caves which have been found to contain archaeological material were not formed during the main post-glacial transgression but during those periods of high sea-level which preceded it. Marine caves are widely distributed around the Scottish coast but are most commonly found in areas of softer rock, as in the case of the sandstone cliffs of the west coast, or limestone, as in the case of northern Scotland.

Caves overlooking the sea were often utilised by groups exploiting marine resources and, as demonstrated in the previous chapter, make up a relatively large proportion of the sites known to include such evidence. The best known series of caves in Scotland are those discovered in Oban during the nineteenth century and found to contain quantities of marine shells and artefactual material related to prehistoric marine exploitation. These caves were situated in the base of a series of conglomerate cliffs, derived from the local Old Red sandstone, which rose up to the rear of the raised beach. The suitability of raised beaches for human settlement is here aptly demonstrated by the presence of the town of Oban on this terrace, which in places extends inland for over a kilometre, while in others it is limited to a width of several metres. It was only in the later part of the last century, when the raised beach could accommodate no more buildings, that the caves were discovered. The cliffs to the rear of the town were fronted by deposits of talus and scree which had fallen from the cliff face and it was this material which had for so long concealed the caves. As the town began to encroach upon the area occupied by the cliffs this material was removed and the caves behind them revealed. This process has been mirrored in more recent times with the removal of talus in order to free land for a house extension revealing another cave at Raschoille (B/53), also within the town (Connock 1985).

That the sea existed at a much higher level in the past was realised very early on in the history of the investigation of the Oban caves. During the excavation of the MacArthur Cave (B/49) in 1890 a substantial deposit of water-rolled pebbles, some 5-6 feet deep, was found to lie between two deposits of marine shells which were representative of human activity. Joseph Anderson, who visited the excavation and wrote up its findings, comments: "That beach (the one from which the gravel was washed up), however, was not the present beach, which is fully 100 yards off, but a beach on a much higher level, or fully 30 feet above the level of the present beach. That the gravel-bed in the cave is really the inwash of the sea when it stood at that level I think there can be no doubt" (1895a, 288).

It should perhaps then come as no surprise that marine caves, with their potential to provide shelter in close proximity to the sea, should have been chosen as sites for human activity related to marine exploitation. It has been suggested of the Oban sites in particular that the retreat of the shoreline which followed the period of higher sea-level would have made the cave sites of little value in marine exploitation strategies (Armit and Finlayson 1992). However, this does not appear to have deterred people from depositing marine resources within caves on these former shorelines in later periods, with much of the cave evidence included in this work dating from the Iron Age, particularly in regions A and E.

It should also be noted that rock formations other than marine caves have also provided closed environments within which marine residues have been deposited. There are a number of examples of 'boulder caves', such as the Ellary boulder cave

(B/14) in Argyll, and the shell midden related to the boulder cave at Allt Na H-uamha (C/75), near Craig in Wester Ross. As the term *boulder cave* suggests, these features exist as voids, sometimes of impressive proportions, between large rocks which were deposited as glacial erratics. As these were not formed by marine erosion, it is not unusual to find these caves located somewhat further away from the coast, a factor which may indicate that, in some cases at least, the presence of natural shelter, in the form of a cave, took precedence over proximity to marine resources.

Once the high sea level of the maximum transgression had receded, the newly created areas of land, now known as raised beaches offered themselves up for colonisation. Evidence recovered from these raised beaches, rather than from within the caves which can be found at their rear, include Neolithic chambered tombs, such as the example at Camas Nan Geall in Ardnamurchan, Bronze Age cairns, such as that at Sheildaig (C/85) in Wester Ross, and various types of settlement structure relating to these and later periods. The implications of the appearance of these formerly submerged areas for settlement and economic practice will be discussed later in this work.

iii.v Sand Dunes and Machair

While also bringing about the formation of rasied beaches changes in sea level were also responsible for the formation of sand dunes and machair zones. Indeed the majority of these sandy features accumulated upon raised beaches, creating an environment which stands in marked contrast to the gently sloping platforms which punctuate the much of the northwest coast of the mainland.

Machairs are the result of massive quantities of shell sand being moved from the sea bed and deposited on the land. This process appears to be related to the increase in sea levels during the post-glacial period, with high tides redepositing sand from the shallow off-shore zone onto the beach. It is though that those sands which today form the sand dunes which occupy the mouth of the Ythan estuary in Aberdeenshire (region E) had previously been washed from the land into the sea by fluvio-glacial melt-water, only later to be returned to the land as the sea-levels rose (Steers 1973, 243). Undoubtedly the most extensive area of machair is to be found on the west coast of the Outer Hebrides. Here it is likely that the continuous submergence of these islands has played a part in this formation (Price 1983, 164).

Raised beaches represent ideal locations for sand dune colonisation, being gently sloping and low-lying. Once the sea has depoisted the sand it is the wind which continues the task of redistribution. The greater amount of material deposited by wave action remains within the inter-tidal zone, moving backward and forward as waves build and crash and as the tides change. However, some of this material may remain on the beach and from there can be carried by the wind and deposited to the rear of the beach. This material then serves as a reservoir which may be reworked by onshore winds into dunes (Mather and Ritchie 1977). The process of sand movement and deposition is extremely dynamic and sand may be moved once again from the dunes back onto the beach or further inland to form Machair. Blowouts and deflation are a common feature of dunes, with vast quantities of sand being shifted or totally removed through the action of the wind. It is the dynamic nature of this process which has revealed so much archaeological material previously obscured or buried within dune systems. As wind action can reveal sites in the present so it has been responsible for burying them in the past. Skara Brae on Orkney is the best known case of a prehistoric site, in this case a Neolithic settlement, being smothered by substantial deposits of wind-blown sand. This process of rapid burial has also been responsible for the impressive states of preservation displayed by many other sites, with shell sand further promoting the preservation of organic materials.

The importance of exposure to both wind and tide in the formation of dunes and machair is clearly demonstrated if one considers the pattern of their distribution on the northwest coast of Scotland. Machairs are most apparent on the exposed western coasts of the Outer Hebrides but they are also found on the mainland in the are to the south of the Outer Hebrides, on the Inner Hebrides, being most extensive on Coll and Tiree, the southern tip of Mull and the western coasts of Colonsay and Islay, with much of Oronsay characterised by coastal sand deposits. To the far north Sandwood bay is also notable for its sandy beaches. Those areas which sit in the lea of the Outer Hebrides, including Skye and the coasts of Wester Ross and Sutherland are relatively free of machair and it is here that the raised beach is the dominant coastal feature. The Outer Hebrides therefore acts as shelter belt, protecting the areas immediately to their east from the strong winds and tides which characterise the open Atlantic.

As the previously cited example of the Ythan has demonstrated these features are not limited to the northwest coast, and indeed they are characteristic of many parts of the east coast, from as far south as Berwick (region E) to as far north as Freswick Links (region D). They also appear in southwest Scotland, with major formations along the Ayrshire and Solway coasts region A).

iii.v.i. Archaeological potential of Machair regions

Though exposure to sea and wind played a vital role in the formation of Machair environments these same areas have proven extremely attractive to human settlement in the past. It is important to note here that many of the areas which now represent active dunes would have once been more stable Machair lands sheltered from the sea by dunes. Crawford has suggested that Machair lands in the Outer Hebrides relating to Mesolithic and Neolithic activity have been long since been submerged by the constantly encroaching sea (1979, 53).

In contrast to the dunes, areas of Machair are stabilised through the growth of grass sward and herbs. The light sandy soils created through the deposition of shell sand and the presence of vegetable humus are ideally suited to limited agricultural activity, and today oats and barley can be seen growing in such areas in the Uists. The arable capacity of these soils can be markedly enhanced through the application of fertilizing agents such as seaweed (discussed further in chapters 7 and 9), which can also increase the stability of these areas (Angus and Elliot 1992). Despite the agricultural suitability of these areas it should not be forgotten that they exist within a fragile and dynamic environment and were periodically prone to inundation by sand being moved inland from the dune front. Despite these risks human activity on machair has been long-lived, with many sites demonstrating evidence for re-occupation of structures previously inundated (a not wholly invalid parallel may be seen in the attraction of fertile volcanic soils to agriculturalists in various parts of the world, despite the ever-present threat of eruption).

Though it has been noted that the addition of seaweed as fertiliser can act as a stabilising agent, it is important to note that human activity can all too easily lead to the destabilisation of these environments and increase the effects of erosion. The rise of the kelp industry in the 18th century has been blamed for an increase in the effects of wind erosion, with seaweed that would have previously been spread on the machair fields being burned to produce soap and other products (Angus and Elliot 1992). The grazing of livestock on machair leads to diminution of vegetation cover, which in turn opens the sandy soils to the effects of wind erosion. The cropping of marram grass in order to manufacture ropes, sacks, mats and even chairs in North Uist up to the end of the nineteenth century is another historically documented form of exploitation (Beveridge 1911) which has led to further destabilisation.

Despite the practice of agriculture in Machair regions evidence for marine exploitation is often associated with these sites. Their instability, exacerbated by any significant agricultural pressure, ensured that marine resources continually played an important role (the disturbance caused by pigs has been suggested as one reason for sand destabilisation during the Bronze Age occupation at Ardnave [b/31], Islay [Ritchie and Welfare 1983]).

iii.vi Peat formation in coastal contexts

Much of this chapter has been concerned with processes of environmental change and its effect on the formation of coastal landscapes. Nowhere is the changing nature of the environment more apparent than in the case of peat deposits. The formation of peat, though generally equated with increased wetness and climatic deterioration, is a complex process which may be influenced by a number of local factors, not all of which need be associated with climatic change. It has been suggested that human disturbance of the environment may also have an important part to play here, with the increasing podsolisation of soils caused by agriculture and drainage modification being noteworthy (e.g. Whittle 1986, 149).

It is obvious that the implications of peat growth for our understanding of prehistoric settlement are considerable. When peat develops in areas which had previously been attractive to settlement an obvious result is a shift of human population away from that area. This 'cause and effect' model has been used to explain the apparent abandonment of upland settlements during the first millenium BC, though such purely environmentaly determinist hyoptheses are now generally tempered with a desire to see internal social processes of change playing an important role (Hodder 1981, 10). The obvious implication of this process is the presence of archaeological sites beneath peat deposits, which can be several metres deep. Thus, it is likely that a considerable proportion of archaeological sites have been concealed in this way and still await discovery. It is in recognition of the archaeological potential of peat deposits that a comprehensive data-base of Scottish raised peat bogs is currently being compiled by Historic Scotland and Scottish Natural Heritage (Ashmore 1995).

Though peat growth is commonly associated with upland environments it is also an important factor in any consideration of coastal environments. It is not possible to present a thorough overview of the coastal distribution of peat deposits here, requiring as it would a considerable programme of research, including field investigation. It is hoped that initiatives such as the peat-bog data-base will go some way to establish the extent and location of these deposits. However, it is worthwhile making mention of two important examples of coastal peat bogs which have been found to overlie important evidence for prehistoric settlement.

One of the first archaeological discoveries to come from a coastal peat bog was made n 1880 when a carved wooden figurine was recovered by workmen clearing peat during the reclamation of agricultural land at North Ballachulish, in Wester Ross (see fig 8). This figurine has been radiocarbon dated to 626 BC and thus appears to relate to Iron Age activity in the vicinity (Coles 1990). Other finds were also made from the Moss, including casks of bog butter, wooden bowls, ox and deer horns, lithics and possible traces of wattle-built structures. A series of cists, some with urns, are also reported to have been discovered in and around the fringes of the Moss in the nineteenth century (Christison 1881).

It is apparent that the area presently occupied by the Moss and its fringes were an important focus for prehistoric activity, though the loss of the many finds other than the figurine make it difficult to place this activity within a chronological framework. Fieldwork carried out by the present author has established that the Moss has undergone considerable disturbance, through the removal of peat for fuel and in the reclamation of agricultural land. More recently the building of houses in the village of North Ballachulish has also caused the denudation of the peat Moss (Pollard 1993). A series of test pits established that the Moss, which now exists in a southern and northern portion, survived in places to a depth of 3.5 metres, though in places it is as shallow as 10 cm. It is hoped that radiocarbon dates from cores recovered during this fieldwork will provide a dated sequence for the growth of the peat.

The peat Moss at Ballachulish developed on a fluvio-glacial terrace which accumulated at the head of Loch Leven, with the main post-glacial raised beach later forming along the coastal fringe of the terrace. It is therefore possible that the Moss may conceal activity relating to various periods of prehsitory, with its presence at the rear of the raised beach suggesting the possibility of Mesolithic activity. A Mesolithic presence may be further suggested by caves in the crags which overlook the Moss, some of which are reported by locals to contain deposits of marine shells (Gourlay pers comm).

The figurine has provided evidence of Iron Age activity and its recovery from a depression beneath the peat (Oban Times Dec 4th 180) may indicate that it was purposefully deposited in a pool, with a subsurface topographic survey suggesting that a number of pools existed prior to the growth of peat. Iron Age Votive deposits have been recovered from a number of peat deposits and these include not only wooden idols but also human bodies (Coles 1990, 56), some of which appear to represent purposeful sacrifice. It is possible that this deposition coincided with the commencement or acceleration of peat growth, and it is tempting to suggest that this ritual act, which appears to be related to human sacrifice, or at least the sacrifice of a human effigy, may have been directly related to this process, with what may have been a fertility rite bringing together the community under controlled conditions and in doing so serving to reinforce social relations at a time when increased pressure was being placed on valuable land resources. The fluvio-glacial terrace and related raised beach at Ballachulish represents the rare occurence, in northwest Scotland, of land suitable for arable agriculture, being surrounded by the steeply rising hills and rock-crags which are characteristic of the Scottish Highlands.

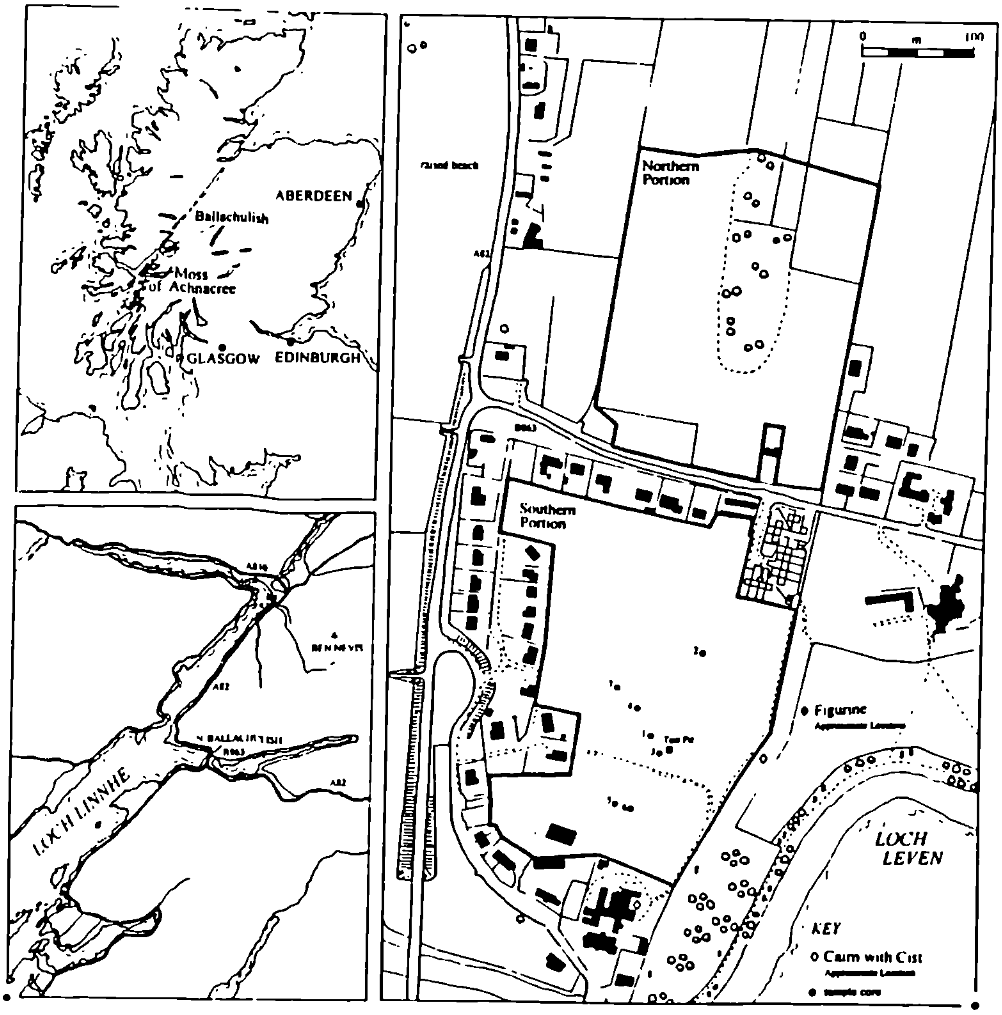


fig 8. Ballachullish Moss

There is further evidence at Achnacree, some 30km to the southwest, for prehistoric activity sealed beneath peat deposits. The Moss of Achnacree closely mirrors the Moss of Ballachullish in that it is situated on a fluvio-glacial outwash terrace loacted at the mouth of a sea loch, in this case Loch Etive. Here, peat cutting revealed a series of field boundaries extending across the old ground surface, which have been interpreted as a means of stock control related to Bronze Age pastoral agriculture (Barrett *et al* 1976). It has been suggested here that the disruption of the natural drainage system caused by the construction of the dykes brought about increased podsolisation which in turn promoted peat growth (Ritchie *et al* 1974).

Despite the obvious locational similarity between the Ballcahulish and Achnacree Mosses it is difficult to make generalisations about the age and distribution of coastal peat deposits and much more work is required here. It is likely that the date of peat growth commencement varied, with the Iron Age date of the effigy and the Bronze Age provenance of the field boundaries perhaps suggesting that the Ballachulish Moss formed later than the Achnacree Moss. The fact that many low-lying coastal terraces in northwest Scotland have never attracted peat growth strongly suggests that variations in land-use and agricultural regimes may have played an important role here, along with local variations in geology and micro-climate.

Despite the fact that that the most thoroughly investigated coastal peat deposits are found in the northwest (region B), it would be a mistake to suggest that their distribution is limited to that area. There are a number of notable peat mosses in the vicinity of the coast in southwest Scotland (region A) and these include Shewalton Moss on the Ayrshire coast and considerable deposits along the Solway coast. Some valuable work has been done in the southwest, with the palaeoenvironmental analysis of the Aros Moss (southern Kintyre - region B) and Racks Moss (Dumfriesshire - region A) by Nichols providing an insight into post-glacial vegetational change (1968).

It is clear then that peat mosses have the potential to provide vital information on the nature of coastal activity in prehistoric Scotland. In many cases they may serve to conceal archaeological deposits but it is their ability to provide information on climatic and vegeatational change for which they should be truly valued as an archaeological resource.

iii.vii Other coastal contexts

Though raised beaches, marine caves and machair systems represent characteristic components of the coastal environment, they are not the only locations within which evidence for prehistoric marine exploitation has been identified. Sites such as chambered tombs, brochs and duns can be located in other types of environment, usually on areas of high ground, perhaps on cliff tops. Though on a map these sites may appear to exist in close proximity to the sea, as the crow flies so to speak, they may well be distanced from the sea by their location on cliff tops, which makes access to the shore a difficult undertaking which may involve travel over some distance (as in the case of Isbister chambered tomb [D/82] on Orkney and Crosskirk broch [D/4] in Caithness). Despite this difficulty of access these sites have continued to provide evidence for marine exploitation.

iv. Discovery and excavation: accidental and on purpose

Just as evidence for marine exploitation has been recovered from various parts of the coastal environment so also has it been recovered from a variety of archaeological contexts. In what can be regarded as its classic form, this evidence appears in shell middens, usually appearing as mounds as on Oronsay or as linear deposits as in the Firth of Forth. These deposits may also be found in caves, as in the case of many of the Oban sites. However, these features represent only a relatively small proportion of those archaeological contexts from which evidence for marine exploitation has been recovered. Excavations of a wide variety of prehistoric sites, many of them centred upon the examination of structural remains, have also resulted in the recovery of marine resource residues. An important aim of this work will be to examine both the similarities and differences between shell middens and these other sites, which among other types of site include duns, brochs, chambered tombs and wheelhouses, and in so doing to clarify the nature of marine exploitation over time and space. Approaches to these various types of site have differed, not least in that shell middens have tended to be excavated specifically because they are known to contain evidence for economy and subsistence, whereas elsewhere this material has been recovered merely as a result of excavation more primarily concerned with the investigation of upstanding structures, as in the case of brochs.

The processes through which these various types of site have come to the attention of archaeologists have also differed. Accidental discovery has played a vital role in shaping present perceptions of the archaeological record and the nature of past human activity. It has already been noted that the erosive power of the sea has brought many sand dune and machair sites to light, while the human modification of the landscape brought about the accidental discovery of the Oban cave sites. Many more sites than those in Oban have been discovered as a result of human action, both by accident and as a result of surveys specifically geared toward the identification of new sites, such as the Mid Argyll cave and rock shelter survey (Smith 1988). Though much material has been recorded by antiquarians and archaeologists visiting coastal regions for this very purpose it cannot be doubted that without the action of marine and wind erosion a good many of these sites would to this day remain unobserved.

The role of marine and wind erosion has been most marked in northern and western Scotland where sand dunes and machair landscapes provide volatile environments susceptible to disturbance and transformation through the action of wind and waves. Those sites which exist closest to the shore are obviously more likely to be revealed in this way than those which may be set a little way back. However, it is important to realise that the sea is constantly eating into these shorelines and those sites which were once set back may now be found eroding from sand dunes at the head of the beach. These sites may include structural remains which consist of masonry walls and so have tended to be regarded as settlement sites. However, it is probable that in some cases these structural remains may have been totally removed by erosion or yet wait to be revealed. In this instance what may be observed by the archaeologist are deposits related to the use and occupation of settlements not evidenced by structural remains. It can be suggested that in the past at least some of these deposits have been regarded as entities removed from settlement locations, an impression reinforced by the use of the term *midden site* (eg Baden-Powell and Elton 1937, Armit 1992).

Marine shells and other marine resource residues from sites which are more obviously removed from the immediate shoreline, as in the case of many brochs, chambered tombs etc, may have been discovered without the aid of marine erosion but provide archaeologists with problems none the less. Shell middens and other *midden sites* have generally been identified on the shore-front, as it may have existed at the time of their use or as it appears now, at the time of their discovery. The presence of sites on former shore-lines may suggest that they relate to the primary exploitation of marine resources being on the interface between land and sea. This primary activity, taking place at or very near the place of procurement, may be somewhat different to that evidenced by material present on sites located away from the beach front. The nature of these 'off-site' procurement activities and the relationship between these sites and those that may be found on the shoreline is therefore problematical.

Approaches to marine resource residues usually take the form of what can be described as 'habitat allocation'. This uniformitarian approach relies on consistency in the behaviour of marine species and their preference for specific environmental niches. Thus, limpet shells recovered from an archaeological site are taken to be indicative of the people responsible for its deposition exploiting rocky shores, where limpets can be seen living today. Such observation is hardly revelatory, though the absence of rocky shores in the immediate vicinity of the site may be of interest. What this approach, which is to be found in the majority of specialist reports, fails to take into account are the processes by which that shell found its way onto the site - was it collected by the same people who deposited it on the site or is its history of procurement, transport, processing, consumption and deposition more complex? This question will be returned to in later chapters. Before it can begin to be answered it is necessary to travel down the path of habitat allocation and introduce the marine species commonly found on Scottish prehistoric sites and to locate the niches they inhabit.

v. Exploited species and their habitats

It is not the author's intention here to provide exhaustive descriptions of all the marine species known to have been exploited in prehistoric Scotland. What this section is concerned with are those characteristics which may influence what, when and how various species are exploited. Without some understanding of these basic characteristics it will not be possible to make any worthwhile statement about the role and influence of these resources on human social behaviour.

Most forms of exploitation are extractive, with resources being removed from their own environment or habitat to be utilised elsewhere. Marine exploitation is perhaps the most striking example of this movement and can be seen in the case of fish, shellfish, mammals etc., being removed from the marine environment to the terrestrial environment. As far as the physiological requirements for human existence are concerned there can be no environment more alien than the sea. It is only within the past fifty years, with the invention of the aqualung, that humans have begun to explore what has been called 'inner space'. Though activities such as pearl diving in the Pacific have a long history it is doubtful whether the rather colder waters of the north Atlantic promoted procurement activities which involved swimming. Despite this past restriction of humans to the surface of the sea, the archaeological evidence strongly suggests that people had a thorough knowledge of the habits and life-cycles of those creatures which inhabit its concealed depths (cf. Wheeler and Jones 1989).

However, marine exploitation does not always involve the removal of resources from the sea itself. Much of it takes place on land, with sea birds and seals most probably hunted on land rather than at sea. Depending on the condition of the tide it is also possible to recover species such as shellfish from locations which are temporarily more terrestrial than they are marine. It can be suggested that these locations are never truly marine or terrestrial but somewhere in-between. It is also probable that whales and dolphins, which inhabit the sea, were also exploited when they became land resources, with strandings being a relatively common occurrence. This transformation between land and sea, terrestrial and marine, is an important one and will be discussed further in the chapters which follow.

The shoreline includes various niches, each of which is inhabited by different species, with one niche giving way to the next as beach gives way to sea. Various definitions can be offered for the term littoral and the parts of the environment ecompassed by it. For the purposes of this work the term *littoral* is taken to include the area between the highest and lowest tides, with the storm beach also included.

Though beaches may be characterised by rocks or sand the overall picture is usually a lot more complicated, with stretches of sandy beach including rocky outcrops at their edges. Rocks may well shelve off into much deeper water than the sandy or pebble part of the beach and may accordingly attract different types of marine life, perhaps bringing non-littoral fish within the reach of those fishing from the shore.

v.i Shellfish

Of all the littoral species to be exploited in the prehistoric past shellfish are the most ubiquitous and it is in recognition of this fact that the present work has chosen to make special reference to them. The suitability of some shellfish species to human consumption has been recognised in the scientific names accorded them, with the species name *edulis* or *edul*, meaning edible, being used in the case of species such as *Cerastoderma edule* (edible cockle) and *Mytilus edulis* (edible mussel). However, the spectrum of species exploited by humans is by no means limited to those known as edulis. Indeed, the most commonly occurring shell type on Scottish archaeological sites is neither of these but the limpet (*Patella vulgata*), with the periwinkle (*Littora littorea*) coming a close second. The habitats and behaviour of these species are discussed below.

The limpet (*Patella vulgata*)

Limpets are widely distributed along the coasts of Scotland, their presence being dictated by the presence of rock outcrops within the littoral zone. Though this species is capable of firmly anchoring itself to rocks, its apparently stationary appearance is somewhat misleading. Limpets are browsers and move around rocks feeding on algae and sea weed. Each limpet will usually graze an area up to 1m square around its home base, always returning to the same spot to anchor itself once feeding has taken place. Young limpets usually inhabit the area beneath the tidal zone but tend to migrate up the beach as they mature. Shell size and shape can be indicative of the parts of the shore inhabited by individuals, with those in exposed positions tending to be flatter and broader than those in more sheltered locations (Hawkins and Jones 1992). This characteristic has been used in some specialist reports to assess the areas of beach being exploited (eg Evans 1983, Evans and Vaughan 1983). Limpets occupy the sub-tidal and tidal zones, with the ability to hold water within their shells preventing them from drying out at times of low tide. It is at low tide that limpets expose themselves to human exploitation, with their appearance in large numbers making them a resource with the potential to be cropped en masse. Despite their ability to anchor firmly to rocks a sharp blow with a stone is enough to dislodge them.

The periwinkle (*Littora littorea*)

Like the limpet the periwinkle is commonly found on rocky shores. Though the shellfish are smaller in size than the limpets their inability to anchor in the same way as limpets makes them easier to gather, a firm flick of the finger being enough to dislodge them. Like the limpet, the periwinkle occupies the inter-tidal zone and its presence in large numbers lends it to quite intensive exploitation. Periwinkles are collected on a commercial basis in many locations around Scotland, with the collection of tens of thousands of shells being within the capabilities of individuals on a daily basis. It should however be noted that intensive collection by more than one person on a daily basis can quickly exhaust the supply of sizeable adults in any single location.

The dog whelk *(Nucella lapillus)* is somewhat similar to the periwinkle and shares similar habits and habitats. However its smaller size and appearance in smaller numbers has ensured that it has not threatened the periwinkle's popularity with those wishing to exploit it.

The mussel (*Mytulis edulis*)

Unlike the shellfish discussed above mussels are bi-valves, a feature which gives this species the ability to be wholly self-contained. As in the case of limpets and periwinkles the mussel anchors itself to rocks. Though they do have the ability to move around this only usually occurs in the early stages of the mussel's life, preferring as it does to remain fairly stationary upon finding a suitable spot. As well as anchoring themselves to rocks this species can use their byssus threads to attach themselves to one another, hence their common appearance in tightly packed clumps. Mussels can be readily exploited from their beds at low tide, with their appearance in knotted groups making collection a simple and rapid process. Mussels have long been farmed commercially, with the first recorded examples occurring in medieval France (Dipper and Powell 1984).

The cockle (*Cerastoderma edule*)

Also a bivalve, the cockle differs from the mussel in that it is found in sandy locations, such as beaches and estuarine flats, rather than on rocks. Like many of the shellfish exploited in prehistory and the present day they are found in large numbers and it has been estimated that one square yard can accommodate up to 10,000 individuals (Dipper and Powell 1984). The cockle burrows beneath the sand at low tide and requires the use of a digging stick or rake in its collection. Cockle beds are today exploited on a commercial basis with the use of rakes and riddles, the latter being used to allow small shells to be returned to the beach. There have been recent cases of conflict over cockle beds in North Wales as people out of work have recognised a means of supplementing their dole. This influx has caused tension with those who have traditionally collected cockles and also threatens over-exploitation.

The oyster (*Ostrea edulis*)

Perhaps more than any other species, oysters are identified with human consumption and have probably been farmed since Roman times. Oyster beds are limited to the tidal waters of sheltered bays and estuaries, a distribution which is reflected in the presence of shell middens apparently geared toward the exploitation of oysters in the Firth of Forth. It was the occurrence of oysters in vast beds which prompted one observer to state, "It is everywhere easier to find the remains of colonies of oysters than of men" (Maclagan 1871, 43).

The scallop (*Pecten maximus*)

The scallop, or clam, is unusual in that it represents the only free swimmer of any of the shellfish species noted here. Accordingly, is not subject to the same limiting factors as many of those species discussed above. Its capacity for free movement ensures that the scallop is rarely found within the intertidal zone, its lifestyle requiring it to remain beneath the sea rather than being left high and dry twice every day. Its preference for deeper water has ensured that the scallop was not exploited during the prehistoric period to the same extent as those species previously discussed. Today the main procurement techniques include dredging, where rakes are dragged along the sea bed, taking with them scallops and any other forms of life which happen to be in the way. Commercial scallop diving is practised off the west coast of Scotland, with scallops being collected from the sea bed by collectors using sub-aqua equipment. The location of this species within deeper water did not, however, prohibit low-level exploitation during the prehistoric period, with scallop shells appearing in comparatively small numbers in many shell middens and other deposits. Many of the so-called Obanian sites have included scallop shells, some of which bear traces of use as implements.

Other shellfish

Those species listed above are the most common components of shell middens and other archaeological deposits which contain evidence for prehistoric marine exploitation. However, it should not be thought that they are the only species to have been exploited. Those shellfish which were collected to a lesser extent include the carpet shell (*Venerupis rhomoides*), the tellin (*Tellina tenuis*) and the razorshell (*Ensis siliqua*), all of which are found in sandy habitats, from where they can be recovered from their burrows at low tide. Also of note is the European cowrie, not because it provided a dietary component, being very small, or was collected in any quantity, but because it has been found perforated, possibly as a form of bodily adornment on a number of sites, including Cardingmill Bay (B/42) in Oban (Connock et al 1993).

Another crustacean which is regularly evidenced on prehistoric sites is the edible crab (*Cancer pagurus*). It is common to the sub-tidal zone, where it shelters and hunts in rocks and seaweed. The collection of large specimens, which can weigh up to several pounds, is unlikely to be achieved within the tidal zone and may necessitate the use of a baited line or a creel. The general absence of deep water crustacea such as lobsters on prehistoric sites tends to suggest that creels were not used and that line catching from rocks is most likely method of capture.

v.ii Fish

The majority of the shellfish species discussed above can be collected from the tidal zone when the tide is out. Other resources which can be exploited from this littoral zone include seaweeds, many of which can be found anchored to rocks revealed at low tide. However, species such as kelp are found in deeper water in the sub-tidal zone and may have required wading or dragging. However, storms will often wrench kelp fronds from their sea bed anchorages and cast them up on to the beach, where they can be collected. Rock pools may also provide a source of small fish, such as the sea scorpion (*Taurulus bubalis*) and the corkwing wrasse (*Crenilabrus melops*). Though these species are unlikely to have provided an important dietary component they may have been used as bait for catching larger fish (chapter 8).

Fish also contrast with shellfish in that their residues are much less likely to survive on archaeological sites. Unlike marine shells fish bones are generally small and friable, a characteristic which in many cases will ensure their total and rapid decay. Fish bones are rarely reported in early excavation reports but in more recent times improved recovery techniques have made it clear that fish bones can survive and do have the potential to cast light on prehistoric economic practice (Wheeler and Jones 1989).

Many of the fish remains recovered from archaeological sites represent the exploitation of the sub-littoral zone, with only small fish being regularly available within the littoral zone itself. The resilience and relatively large size of the pharyngeal plate (a mouth part) of the ballan wrasse has assured its identification on many sites. This fish prefers rocky coasts and is commonly found close to the shore, where it feeds off shellfish and crabs. However, it must be accepted that the same resilience and size of the pharyngeal plate may also have led to an over-representation of this species on archaeological sites. Many of the larger fish, including cod, saithe, haddock etc, may have been procured from rocky promontories, where the shelves bring deep water into contact with the shore. Steeply shelving rocks are a feature of many coasts and are commonly found in the deep sea lochs of western Scotland, and the cliff-lined coasts of northern and north-east Scotland.

Despite the problems associated with fish bone preservation and identification a wide variety of marine fish have been identified on Scottish prehistoric sites. It is also likely that species which were exploited have yet to be recognised. A conspicuous absence in the fish assemblage is the herring which has never been recorded on a prehistoric site but has been so very important to the economy of Scotland in the historic period. In relatively modern times the herring has been known to shoal in large numbers in autumn and winter along both the western and eastern shores of Scotland, sheltering in the bays of the east during the late summer and the lochs of the west during the winter (Gray 1978). In the early nineteenth century it was said that its arrival off the coast of Shetland, where the shoals commenced their migration south-west, could be timed to the day, that day being June 22nd (Rees 1819). It is therefore probable that the herring was also important during the prehistoric period. However, it should also be noted that population sizes and distribution patterns observed today need not reflect patterns in the prehistoric past, as the section which follows will make clearer. Another fish which is readily caught today off Scottish coasts is the mackerel, which also shoals close to the shore. There have been some finds of this species but it is probable that it was caught on a much more regular basis than surviving evidence may suggest. It is possible that the bones of the herring and the mackerel, most of which are relatively small, may be more susceptible than most to total decay.

Fish which can be found both in deep water and periodically closer to the shore include the cod, saithe, pollack, haddock, sea bream and skate. Many of these spend part of the year shoaling in shallow waters while dispersing in deeper waters at other parts of the year. Spawning is a controlling factor in the behaviour of these fish. The cod tends to winter in deep water while coming closer to the shore during the spring to spawn. Mature pollack are usually to be found in deep water during the summer but move inshore during the summer. Young pollack tend to remain inshore for most of the year until they reach maturity. The migratory behaviour of the haddock runs counter to that of the cod and the pollack, as it spawns in deep waters in the northern North Sea but migrates inshore during the winter.

The migrating and shoaling behaviour of marine fish is an important factor in considering their role as an exploitable resource. The appearance of fish in considerable numbers relatively close to the shore is likely to have influenced the methods of fishing adopted and the extent to which it was practised. The times of year at which these fish make their appearance will also have influenced resource scheduling and dictated the period over which certain resources will be available for exploitation. The most obvious example of fish behaviour benefiting human groups is that of the salmon which moves from the marine environment into river systems in order to spawn. Another characteristic of many marine fish which will influence the species procured and the time at which this activity takes place is their tendency toward vertical migration. Fish may move upwards from deep water to the surface and *vice versa* on a regular basis, sometimes on a daily cycle. Fish such as the saithe and the haddock are more likely to be found on the surface of the water at dusk (Muus 1964), a behavioural characteristic which would make fishing for them in the evening a favourable option. As with much of the subject matter of this work the over-riding impression of fish behaviour is of variety, with different species inhabiting specific locations at certain parts of the year.

v.iii Marine mammals

Cetaceans

Finds of what is generally termed *whalebone* are very common on prehistoric sites which include evidence for marine exploitation. They are particularly common on Iron Age sites in western and northern Scotland, where they appear almost ubiquitously in brochs in the guise of a variety of artefacts, including cups and mattocks. Speciation has been attempted rarely with these finds, a factor which makes any assessment of the relative importance of various species unviable. Many of the major whale species have been observed off the Scottish coast and the Outer Hebrides and the north-east coast were important centres for commercial whaling during the nineteenth century. There has been a general uncertainty as to the role of whaling during the prehistoric period, with most commentators content to see the majority of whale bones as resulting from strandings rather than from hunting activities (eg Clark 1947). The social and economic role of whales is discussed further in the chapters which follow.

Seals

Seals have been recorded on a number of Scottish prehistoric sites, including the shell middens on Oronsay. It is likely that their size and tendency to breed in large colonies made them an attractive prey species. In Britain the most common types are the grey (*Halichoerus grypus*) and the common seal (*Phoca vitulina*).

vi. Marine species and environmental change

A variety of processes have in some places ensured that the nature of the coastal environment as we see it today bears little resemblance to that of the prehistoric period. As previously noted, in many parts of Scotland isostatic uplift has ensured that Mesolithic sites are now generally some distance removed from the shoreline which they inhabited during the time of the post-glacial maximum sea-level. Contrastingly, the lack of uplift in areas such as the Outer Hebrides and the Orkneys has caused sites which during the Neolithic, Bronze Age and Iron Age were situated some distance from the sea to be now located on the immediate shoreline, and in many cases to be eroding into the sea. It should also be noted, however that prehistoric sites which contain evidence for marine exploitation may also bear witness to change in the coastal environment which goes beyond a shift in the proximity of the site to the shore.

Shellfish are extremely sensitive to environmental change and there have been a number of instances of species found on archaeological sites no longer inhabiting the stretch of coastline from which they appear to have been procured (though this assumes that they were not imported from further afield). This shift has been noted at a number of sites, including the Ardrossan shell midden (A/2), where *Trochus lineatus* were recovered from the midden but by the time of excavation in the late nineteenth century were extinct in the Clyde and the west of Scotland (Smith 1895, 357). In his investigation of a shell mound at Brigzes, near the Moray Firth, Lubbock found that though the dominant species were oysters and cockles the midden also included examples of *Tapes decussta*, which at that time was not known to exist in such northern latitudes (1863, 419). More recently the presence of the thick topshell (*Monodonta lineata*) has been identified in the lower deposits of the midden at Ulva Cave (B/64) (Bonsall 1989). Today this species is not to be found north of County Down in Northern Ireland. At the same site the presence of mussels on the present shoreline and their absence within the midden may suggest a further change to the local coastal environment over time (Bonsall ibid). A dramatic change in the nature of the coastal environment has been identified at Howar, on Westray, Orkney. Here the first excavation of the Neolithic settlement resulted in the recovery of oyster shells and it was noted that the local coastline, which is now open and exposed, is today totally unsuited to this species (Traill and Kirkness 1937). However, subsequent investigations have established that at the time of the site's occupation the sea would have been some distance from the site (Hunt 1987), an observation which not only underlines the erosive power of the sea but also warns against the assumption that species found on a site were necessarily collected in the immediate vicinity.

Less commonly recorded are changes which appear to have taken place during the use of a site, a change which may be reflected in the disappearance of one species in the deposits and its replacement by another. Such is the case at the Bronze Age midden at Culbin, where cockles dominate the basal deposits but disappear from the upper deposit, to be replaced by mussels and periwinkles (Coles and Taylor 1970). This change from species which burrow into sand flats to those that cling to rocks has obvious implications on the changing nature of the coastline, though it must also be realised that such a change in the species present may just as well indicate that different parts of the coast were being exploited. This latter point is especially pertinent to a site situated over a kilometre from the coast at the time of its occupation, with such a location perhaps reflecting a willingness to forage over a wider distance than sites situated immediately upon the shore, while also suggesting that coastal resources were not of primary importance.

Landscape formation processes such as the development of machair regions are another mechanism by which the nature of the coastal environment can change. The movement of sand from the sea-bed onto the sea-shore would cover rocky areas and thus prohibit the presence of species such as mussels and limpets, while sand burrowing species, such as cockles and razor shells would find such an environment ideal. This process of change, though reversed, may well be reflected in the marine shell assemblage identified at Northton on Harris, where cockles are replaced by limpets in later levels and so may indicate a change from sandy to rocky conditions (Simpson 1976).

However, in general the reasons for change in the marine environment and in the species inhabiting it are extremely complex and very difficult to trace back into prehistory. It has been suggested that changes in the salinity levels along the coast of southern Scandinavia were responsible for the decline in the exploitation of shellfish and promoted the adoption of agriculture (Zvelebil and Rowley Conwy 1984). Other factors which may effect the marine environment are changes in temperature, chemical content and tidal shifts, but these are almost impossible to identify in the distant past. Human action has also brought about profound change. Over-fishing, of species such as cod and herring, is a problem which has blighted British fishing fleets for almost half a century now. Though this problem is largely due to the over efficiency of modern boats and equipment it is possible to envisage over-exploitation on local and regional scales during prehistory. This may have been more likely at times when undue pressure was brought to bear on a limited number of resources, perhaps on shellfish during times of bad harvest or other hardship.

vii. Tidal action

The terms *tidal* and *intertidal* have appeared repeatedly in the foregoing description of the various shellfish species. The influence of the tides on marine exploitation practice cannot be over-emphasised and its potential for influencing social behaviour will be discussed at greater length in a later chapter. Here it will be sufficient to briefly outline the mechanism behind tidal action and to summarise its relationship to marine species.

The movement of the tides is influenced by the shifting spatial relationship between the earth and the moon. The same process which creates night and day also causes a change in the relative level of the sea, bringing about a rapid shift in the position of the boundary between land and sea. The furthest inland extent of this rise, which can be described as a temporary transgression, is known as high tide, while its outward extent is referred to as low tide. High tide occurs twice every twenty four hours, and its timing shifts by an hour each day, thus though the time of high and low tide can be predicted, it never occurs at the same time on two consecutive days. The timing shifts on a monthly cycle with the start of each month marking the end of the daily cycle and a return to high tide at the same time as it occurred a month previously.

If marine resources are to be exploited on anything more than the most casual basis then it is essential that people are aware of the timing of tides. Certain species, such as mussels and limpets, can only be exploited effectively at low tide, with other resources such as seaweed also becoming available then. Rock pools, which may accommodate small fish are also created as the sea recedes. High tide would have opened different resources to exploitation, bringing in with it various species of fish, which could then be caught close to the shore, either from the shore itself or from small boats.

It is probable that communities living by and from the sea have always been acutely aware of the influence of the tide and its cycle of movement; it may therefore, have often served as a clock, alongside night and day and the seasons, which influenced the timing of various activities (chapter 9). Today this influence can still be seen, with fishing boats reliant on high tide before they can put out to sea.

viii. Conclusion

This chapter has examined the environmental contexts within which sites containing evidence for marine exploitation have been recognised. These components of the contemporary environment were discussed and then considered in the light of their contemporary and prehistoric relationship to the marine environment. The chapter concluded by introducing the main species known to have been exploited and provided a brief insight into their habitats and patterns of behaviour, all of which are important if we are more fully to understand the nature and practice of marine exploitation.

Chapter 5

Different kettles of fish I: the nature and distribution of early period evidence

i. Introduction

The corpus of evidence relating to marine exploitation has already been introduced (chapter 3), along with an introduction to the types of environment from which that evidence has been recovered (chapter 4). This chapter will now go on to more fully discuss the nature of this material. The evidence will be ordered according to the classification system proposed in chapter 3. The regional breakdown introduced in chapter two will also be utilised as a means of identifying meaningful patterns within the material on both a temporal and spatial level.

The term early prehistoric is taken to refer to the Mesolithic and Neolithic periods. There has recently been an increased awareness that terms such as Mesolithic and Neolithic may be counter-productive to a full understanding of the nature of society and economy during the prehistoric period (eg. Pollard 1990, Barrett 1994). Despite the recognition that these terms are constructed categories, the application of which carries with it a number of difficulties, it is also realised, considering their general use and role as terms of reference, that they cannot be rejected out of hand. Their use is therefore maintained in this and later chapters, but an attempt to identify some of the problems relating to their use has also been made.

ii. Mesolithic evidence

In Scotland marine exploitation has frequently been seen as synonymous with Mesolithic activity. Shell middens represent the most readily identified manifestation of this exploitation. However, archaeological examination of these features using modern excavation techniques has generally been limited to west coast sites which have been regarded as Obanian in character, with the work of Mellars on Oronsay representing the main focus. Very little excavation has taken place on other shell middens which have the potential to be Mesolithic. On several occasions when excavation has taken place the radiocarbon dates have demonstrated that sites which appeared Mesolithic are in fact contemporary with Neolithic activity, a revelation which has gone some way toward indicating that the differences between the Mesolithic and the Neolithic are more perceived than real. These sites include the shell midden at Nether Kinneil in the Firth of Forth (E/26) which provided dates ranging from between 3110±50 BC (SRR 1486) and 2230±65 BC (GU 1258), these were obtained from oyster shell (Sloan 1982) and so are likely to be in the region of 400 years older than charcoal dates (Harkness 1981). Excavation of a shell midden deposit at Cardingmill Bay, Oban (B/42) has provided charcoal dates of 3110±50 BC (GU-2796) and 3030±50 BC (GU-2797), both of which come from the earliest midden deposits (Connock et al 1992). These dates indicate marine exploitation at a time at which a Neolithic lifestyle was being practiced elsewhere in Scotland (Connock et al ibid, 36). This issue is central to an understanding of the nature of the transition from hunting and gathering to agriculture and will be discussed more fully in chapter 8.

So far the only shell midden sites to provide certain Mesolithic dates are the Morton site, the Oronsay middens (which range from around 5,000 BC, with some earlier dates from shell, up to around 4,300 BC), the Ulva Cave deposits and the Muirtown midden in Inverness (where a single charcoal sample gave a rage of 4675 BC - 4350 BC), while radiocarbon dating of antler artefacts from Risga and the Druimvargie rock shelter and the MacArthur Cave have also provided Mesolithic dates, 5860±90 BC (OXA 1948) and 4750 BC (OXA 1949) respectively (Bonsall and Smith 1989).

All of the Oronsay sites are on, or in close proximity to, the former shoreline related to the transgressional maximum. The only convincing evidence for structures related to the Oronsay middens was located beneath the Cnoc Coig (B/57) deposits, where two arrangements of stake-holes may represent small circular structures such as bivouacs or tents (Mellars 1987). These appear to go out of use once the shell material begins to accumulate in quantity and the area occupied by them is buried beneath the mound. The only evidence for possible structures outwith the area buried beneath the mound takes the form of several small stake holes cut into the upper deposits of the mound. The purpose of these postholes remains unclear and in plan they appear to represent uneven linear arrangements, the best defined being a series of four postholes loosely arranged in a line some 7 feet long (Bishop 1914). It may be that these postholes may represent drying racks or some other feature related to the use of the site. The Oronsay shell middens therefore appear to represent type II deposits; deposits unrelated to structural remains.

The main constituents of the Oronsay shell mounds are vast quantities of marine shells, mainly limpets, which in places attain a depth of well over a metre, with relatively little matrix between the shells. This latter point would suggest a relatively rapid accumulation, for at least some parts of the deposits, uninterrupted by the deposition of blown sand, which both underlies and overlies the deposits. Radiocarbon dates recovered from various parts of the mounds stand in some contrast to this supposition, suggesting that the deposits were built up over periods of five hundred years or more (Mellars 1987).

The charcoal from which a number of the radiocarbon dates were obtained, the remainder being from shell, appears to represent fires which had been lit on the surface of the mounds as they accumulated, prior to themselves being buried beneath deposited shells. Apart from shellfish, other exploited species included fish, with modern retrieval techniques permitting the recovery of substantial quantities of fish bone, the dominant type being saithe. Marine mammals which included small cetaceans and seals were also represented by bones. The remains of terrestrial species were limited to red deer and pig, with relatively few bones of either present. It has been suggested that these bones were brought across from the neighbouring island of Colonsay (Grigson and Mellars 1987), where lithic scatters may relate to deer hunting (Mithen and Finlayson 1991). Scattered human remains were also found intermixed with the shell deposits, with the bones of hands and feet being predominant (Meiklejohn and Denston 1987).

Artefacts related to the Oronsay deposits include examples of the famous bone and antler barbed points which have come to be regarded as the type fossil of the Obanian. Other implements of bone and antler include a variety of pieces with bevelled ends which were first suggested to be limpet scoops (Bishop 1914), while elongated beach pebbles have been interpreted as limpet hammers. The latter were presumed to have been used to remove limpets from rocks and the former the flesh from the shell (Lacaille 1954), though it has been suggested that these implements may also have alternative uses, including the working of hides (Finlayson pers comm). Obanian sites have been characterised by their absence of flint tools, hence the apparent reliance upon organic forms such as the barbed points. A modest number of lithics was recovered from the Oronsay excavations, but the majority of this appears to represent waste material resulting from the manufacture of stone tools. It is more realistic to see the sparsity of lithics on the Obanian sites as a result of limited excavation, with the midden deposits representing contexts within which specific types of deposition took place (Morrison 1980, 164; Pollard 1986). The suggestion that 'off-site' deposition was responsible for this pattern appears to be vindicated by the recovery of an extensive lithic assemblage within Oban but away from the midden sites (Bonsall pers comm) and also at Risga (see chapter 8).

In contrast to the Oronsay shell middens, many of those in Oban are situated in caves (type I deposits). However, it can be suggested that there is little difference between these two types of deposit, with those in Oban merely situated in caves because such shelters were at hand. The provision of shelter may have been a factor in the decision to use the caves, but, as the Oronsay sites demonstrate, the location of shell middens was not always dictated by the presence of shelter. It is likely that artificial shelters were located away from the Oronsay shell middens and the same is probably true for the Oban sites - flint scatters such as that mentioned above may indicate the location of such settlements.

The contents of the Oban shell deposits bear some similarity to those on Oronsay, with limpets and periwinkles physically dominating an assemblage which included marine mammals, fish and various terrestrial species, including deer, boar and wild cattle (though Childe suggested that one of the cattle bones may represent a domesticant [1935, 15]). It is difficult to assess the comparative importance of these different resources as recovery techniques were less efficient during the nineteenth century than they are today. However, more recent excavation of the Raschoille Cave (B/53) (Connock 1985) and the Cardingmill Bay (B/42) deposits (Connock et al 1992) suggest that terrestrial species were present in limited numbers only.

It has generally been assumed that the small quantities of terrestrial animal bones recovered from shell middens is indicative of a heavy reliance on marine resources. However, it can also be suggested that this absence of terrestrial species is merely the result of depositional patterns. The presence of terrestrial species in even small quantities is suggestive of hunting taking place but processing and consumption related to this activity may well have taken place elsewhere (see chapter 7 for further discussion of terrestrial bones on these sites). It is likely that terrestrial hunting activities utilised lithic as well as organic implements (Pollard 1986), which as the evidence suggests were at least manufactured in areas removed from the middens. The organic implements recovered from the Oban sites are similar to those from Oronsay, with barbed points and bevelled pieces being recovered from several of the sites. Differences in barbed point design and manufacture are apparent in the presence of uniserially barbed points, with the barbs deeply cut, from the Druimvargie rock shelter, while all other examples, from Oban and Oronsay, are biserially barbed and have less prominent barbs. The reasons of such variation are difficult to assess but may have chronological or functional implications. Certainly, early forms of barbed point from both the Palaeolithic and early Mesolithic tend to be uniserially barbed and the Druimvargie example has produced the oldest date.

As explained in the previous chapter the Oban caves are situated to the rear of the raised beach and their lower deposits appear to equate with the period of maximum transgression. However, as already indicated by the late date for the Cardingmill site the use of these locations appears to extend into what in other places would be traditionally referred to as the Neolithic (cf. Edwards 1989).

The shell midden on the island of Risga (B/3), in Loch Sunart, represents the most northerly of the Obanian sites. Due to the circumstances of its excavation this site was never published (see chapter 8) and only with fieldwork carried out by the present writer has the exact location of the site been re-established. Like the sites on Oronsay, it appears to represent an open site lacking structural evidence (type II). Again, large quantities of shells were recovered along with animal bones. The implement assemblage does, however, display a difference in that alongside the Obanian organic implements, such as barbed points and mattock heads, a substantial number of lithic artefacts was recovered. This assemblage numbers 14,080 pieces (Stevenson 1978), which by any standard represents a considerable quantity of lithics. The size of this assemblage is all the more striking when it is realised that the excavation was carried out in the early 1920s by an individual with very little experience in excavation. The presence of this large lithic assemblage immediately casts previously suggested similarities between this and the other Obanian sites into some considerable doubt. If the presence of this assemblage within the deposit is not indicative of a difference in the procurement strategies practiced by those using the site then it definitely suggests of differences in depositional processes and perhaps in the activities taking place on the site (this issue is considered more fully in the light of fresh excavation in chapter 8).

The presence of lithics within shell midden deposits similar to those previously classed as Obanian has recently been detected in a freshly sampled site at An Corran (C/54) in Skye (Miket and Saville pers comm). Here microliths appear side by side with, or at least within the same deposit as, beach pebble hammer stones, worked bone and antler implements, and of course, marine shells. Additional work will be required on this site before further conclusions can be drawn. However, the site does highlight the likelihood that more of this type await discovery and that the contents of shell midden deposits and their contents do demonstrate a variation which the blanket use of the term 'shell midden' tends to obscure.

Outside the Obanian the only other verified Mesolithic shell middens, in terms of radiocarbon dates, are to be found in eastern Scotland, at Morton (E/72) and in the Firth of Forth (E/22/23/24/25 etc.). These sites have been classified as type II deposits in the corpus, neither of them being directly related to structures.

However, the Morton shell midden does not appear to exist in total isolation, being situated some 80m to the south-west of an area where ephemeral structural remains were recovered along with a lithic scatter. These took the form of small arcs of stakeholes which, like those on Oronsay, may represent small bivouacs or wind-breaks, situated around a series of hearths (Coles 1971). Evidence for stone tool manufacture was recovered from the area around the structures and it has been suggested that the proximity of lithic sources influenced the location of the site (Deith 1986). What the Morton site does demonstrate is that though Mesolithic shell middens may appear to represent sites in their own right they represent only one component of a more complex use of the landscape, with other activities taking place at different but nonetheless closely situated locations. Shell middens are in most cases more visible than other types of evidence, which may include the remains of timber structures, no longer visible as upstanding features.

The Morton shell midden differed in its composition from those on the west coast in that the predominant shellfish species was cockles, though a total of 40 varieties species were identified in its deposits (the widest selection so far identified in any shell midden). The predominance of cockles, as opposed to limpets, appears to represent a difference in the nature of the local marine environment, with sand flats in the Firth of Tay supporting a considerable population of these burrowing shellfish. Fishing is also evidenced at the Morton site, with the bones of cod representing the dominant fish.

The sites distributed along the upper reaches of the Firth of Forth differ from all of those previously discussed in that they are substantially larger. Those in Oban were defined by the confines of the caves in which they were located - though they may have extended out of the cave mouths - and those on Oronsay, Risga and Morton were substantial deposits but of limited dimension (the Cnoc Coig mound was some 20m x 25m, and up to 1m deep, while the Morton midden was some 30m x 3.5m, with a depth of up to 0.78m). By contrast many of the sites in the Firth of Forth are considerably larger, representing elongated deposits extending along the former shore of the Forth (Nether Kinneil being in the region of 150-180m long, 20m wide and up to 3m thick - and though this appears to be Neolithic it compares well in size with Mesolithic examples such as Inveravon). They also differ in the type of shellfish exploited, with oysters a common inhabitant of shallow estuarine waters, being the dominant species in the east, while in the rocky west it is the limpet which dominates.

Though a number of the Firth of Forth shell middens were assumed to represent Mesolithic activity excavation has established that at least some of these are either largely Neolithic or appear to have continued use into the Neolithic. Radiocarbon dates from the Inveravon midden (E/25) are early enough to be able to state with confidence that they represnt Mesolithic activity (MacKie 1972, 413), with the earliest phase of activity taking place between 4,900 and 5,000 BC. However, activity on the site appears to have been long-lived and the later dates correspond to the period when the Neolithic had at least begun to take a hold in southern Scotland. Clearer evidence for Neolithic activity comes from the Nether Kinneil midden, where very late radiocarbon determinations (the latest being 2270±65 BC [GU1258]), the bones of domestic animals and pottery all point to the integration of shellfish within Neolithic subsistence practice (Sloan 1982).

This small number of verified Mesolithic sites providing evidence for marine exploitation may appear somewhat surprising when one considers that the popular perception of Mesolithic activity in Scotland is of a lifestyle largely geared towards the exploitation of these resources. The presence of considerable numbers of coastal Mesolithic sites exclusively represented by stone tools, as found on Jura, Islay and several places on the north-west coast, may suggest that a presence on the coast need not necessarily result in the exploitation of large amounts of shellfish. It may be that the same people responsible for the deposition of this lithic material practiced marine exploitation elsewhere - Jura may even represent a staging post for seasonal activity on Oronsay.

Limiting the foregoing discussion to known Mesolithic sites has hopefully served to highlight the differences which exist between features which are too often simply written off as 'shell middens' without due consideration of their make-up or the activities which brought about their deposition. A direct result of this failing has been the general perception of shell middens as artefacts of the Mesolithic, thus promoting the view that the majority of shell middens are Mesolithic. It was the shell middens in the Firth of Forth which first demonstrated both the potential of long-term use and the problems inherent in automatically assigning these features a Mesolithic provenance

(MacKie 1971, Sloan 1982). These issues will be returned to in later chapters when the role of marine exploitation is discussed in relation to the processes of culture change and social organisation.

Shell middens are not artefacts which can be tied down to any single period, as are brochs or chambered tombs. They are the result of human behaviour which is not obviously culturally or temporally specific, though it is one of the aims of this work to assess whether the nature of marine exploitation, of which shell middens are one manifestation, does change over time and space. Despite the cautious tone adopted above it can be suggested that a number of sites investigated without the benefit of modern techniques, and many of those which still await investigation, will prove to be Mesolithic or at least have Mesolithic elements. The discussion which follows will use the verified sites as a means of selecting likely candidates.

iii. The Neolithic

The Neolithic has traditionally been regarded as a period which marked profound change in the way that people lived their lives. The period saw a change from food procurement to food production, with agriculture becoming the mainstay of the subsistence economy. The appearance of domestic animals such as cattle and sheep along with cereal crops appeared to represent the dominance of culture over nature, with the exploitation of wild resources being considerably reduced. This transformation has been associated with changes in the nature of social organisation, with previously mobile groups settling down to a sedentary existence. The construction of monuments such as chambered tombs implied co-operation and sedentism, both facilitated through the availability of a food surplus which would permit a diversion of labour away from food production. The nature of material culture also changed, with ceramics being an obvious element of this 'Neolithic package'.

It is during the Neolithic that the first obvious examples of type III deposits appear. The only examples of type III deposits so far identified in the Mesolithic appear to be those related to the first phases of activity on Oronsay, though it must be remembered that the nature of these structures will make similar relationships between structures and deposits difficult to identify elsewhere, as work on Risga has established (chapter 8).

The contrast between the ephemeral structures, such as those on Oronsay and at Morton, which appear to characterise Mesolithic sites and those which may suggest a greater degree of permanence in the Neolithic is nowhere more obvious than in the case of Skara Brae (D/128) on Orkney. The circumstances of the site's discovery are well known, with a storm revealing upstanding features which had been buried beneath sand since the Neolithic. Entire houses appeared almost totally intact, complete with stone furniture and artefacts apparently left where they had been dropped during the sand storm which engulfed them. The upstanding nature of the site and the material culture recovered from it led Childe to believe that the site was later than the Neolithic and possibly Pictish (1931c). Only after chambered tomb excavations began to recover pottery similar to that found on the settlement site was it realised that this 'northern Pompeii' was Neolithic.

The stone buildings themselves were built into substantial midden deposits, a process which may have provided an ideal form of insulation, though the possible symbolic connotations of this use of midden material must not be overlooked (discussed later). This midden material appears to represent the detritus of activity which preceded the construction of the excavated settlement as well as material deposited during its occupation. Though shells were included in these midden deposits, they consisted of a wider variety of materials, and were visually dominated by ash from fires, organic waste and various other forms of domestic refuse. Deposits within which marine shells were dominant were detected during the excavations carried out by Childe and later by Clarke, and these along with all other marine resource residues on the site can be classified as type III deposits. Whether they are type IIIa or IIIb deposits is a little more problematic as some of them are outwith the 'houses' but still within the fully enclosed settlement itself.

Excavation in areas outside the settlement complex has been very limited, amounting to little more than a limited series of test pits excavated around the site periphery by Childe. However, recent storms have revealed shell-rich deposits in the cliff section some 80m to the south-west of the main site. Also eroding from this face are animal bones and Skaill knives which may indicate an area given over to the processing of meat, again suggesting that some activities may have taken place at locations removed from those investigated by archaeologists. Excavation just carried out appears to support this hypothesis, with the locale apparently being given over to the butchery of deer carcasses (Richards pers comm).

Skara Brae could thus be said to differ markedly in several ways from Mesolithic sites which have provided evidence for marine exploitation:

a) marine resources are not deposited in substantial shell middens - though midden deposits are prominent.
b) marine shells and other resource residues are deposited within the settlement - the locations of which have rarely been identified in the Mesolithic.
c) the resource base has been expanded to include not only wild animals, with red deer being hunted, but also domestic livestock, with cattle predominant, and the use of cereals.
d) despite the proximity of the site to the coast (with immediate proximity being a result of marine erosion) it can be suggested that site location is influenced as much, if not more, by these other elements of the resource base. In the case of sites such as the Obanian shell middens, proximity to marine resources appears to be the paramount locational factor.

Orkney has provided several well preserved Neolithic settlements, including Rinyo, Barnhouse, Links of Noltland and Knap of Howar. Many of these sites have survived due to the dynamic nature of coastal environments being buried beneath wind blown shell sand. Barnhouse was not recovered from beneath drifting sands but from inland agricultural land, and was thus less well preserved than any of the coastal sites. The survival of organic remains which is promoted through burial in alkaline shell sands or indeed shell middens, was relatively poor at Barnhouse and so accordingly provides a less clear picture of the type of economy practised (Richards pers comm). The presence of well preserved sites on the coast and poorly preserved sites outwith sand and machair regions may therefore have created a bias toward coastal activity which is a result of differential preservation. Barnhouse further reinforces the suggestion that proximity to coastal resources was not necessarily a primary locational factor, with access to agriculture land being of more importance.

Despite the obvious importance of agricultural resources on Orkney, the coastal sites with good preservation have provided considerable evidence for marine exploitation. The site at Knap of Howar (D/85), Papa Westray, consists of two drystone-built houses apparently representing a farmstead (Ritchie 1983). The work carried out by Ritchie in the 1970s was in effect a re-excavation of the site, with the first phase of work being carried out in the 1930s by Traill (the landowner) and Kirkness (1937). This pattern is similar to that at Skara Brae (D/128) where the work of Clarke in the 1970s followed that of Childe in the 1930s. The work at Knap of Howar differs from that at Skara Brae in that at the former post-excavation work has been completed and the site published, while at the latter publication has been limited to an interim report in the form of a popular booklet (Clarke 1973) and a summary account in a collection of archaeological papers (Clarke 1976). The more recent work at Knap of Howar is interesting for a number of reasons, not least because comparison with the earlier work gives some idea of the way that interests and research priorities have shifted in the intervening forty years. The recording of economic and environmental material was extremely limited in the earlier excavation while it was of great importance in the latter. In the first report the analysis and interpretation of animal and marine remains is limited to half a page written by a non-archaeological specialist. The later excavation regarded the investigation of these deposits as a primary aim and succeeded in building up a valuable and illuminating picture of the history of the site and the economy practised by the people living there, especially with regard to the nature of deposition. This observation may give some idea of the vast quantity of material which early excavations have failed to report - with many of them simply noting 'quantities of bones and shells' or 'vast quantities of shells'. On a more positive note it suggests something of the value of the modern investigation of sites previously excavated, providing of course that the work is fully followed through to publication.

The houses at Knap of Howar are built on midden deposits, as was previously noted with the case of Skara Brae. The activities which resulted in the deposition of these earlier deposits are unclear, but their presence would suggest long term activity on the site with the excavated structures perhaps representing only a later phase of this activity. Midden deposits were not limited to the immediate vicinity of the houses, and traces were detected in test pits situated some distance from the buildings. It has been noted at Knap of Howar that the lower, earlier midden deposit contained less shell than the later one above it (Ritchie 1983, 44), perhaps suggesting either a change in the role of these resources or in the nature of actions responsible for their deposition.

Marine shells were recovered from inside and outside the houses, as were fish bones. The dominant shellfish exploited were limpets and oysters, though around 20 species in all were present. The fish included cod, saithe and conger, while marine birds were also exploited. Cattle and sheep bones were common, with pig also present. The bones of whales and deer were also present but in small quantities (Noddle 1983, 93). Various midden deposits also included charred cereal grains. The economy was therefore highly mixed, with agricultural resources being utilised alongside those procured from the sea.

Outside Orkney Neolithic settlement sites are rare, and those providing evidence for marine exploitation even rarer. In many parts of Scotland the only elements of the Neolithic landscape still visible are the chambered cairns and tombs which have survived to a much greater extent than the settlements. An inland Grooved Ware settlement was recently discovered at Beckton, Lockerbie, as a result of motorway construction, but was identified only through the presence of small numbers of lithics in the ploughsoil (Pollard 1992a). Structures were represented by post and stakeholes; bones and other organics survived only when burnt.

Some chambered tombs do provide evidence for economic practice, with animal bones and marine shells being recovered from the fill of chambers and in some cases from pits immediately outside the tombs. It has been argued that many faunal remains in chambered tombs may be later intrusions unrelated to the Neolithic use of the tombs (Barber 1988). This issue is discussed fully in chapter 10, but as will be made clear this cannot be taken to apply to all deposits in all chambered tombs.

The majority of deposits in chambered tombs represent animal bones and shells in ashy deposits which include pot sherds, some of the bones with evidence for burning. In some cases this material represents the blocking of the chamber and passage, a process which marks a change in the use of the tomb.

Marine residues related to chambered tombs are classified as type IV deposits and their implications are more fully discussed later in this work. Here it will suffice to say that they appear to lack a direct counterpart in the Mesolithic, though human remains are found in association with shell middens. Disarticulated human remains from the Oronsay sites appear to represent the purposeful selection and deposition of various parts of the human skeleton. These deposits differ fundamentally in that on Oronsay the human remains are inserted into deposits related to the procurement and processing of marine resources, whereas in the case of chambered tombs small quantities of marine resources, or their residues, are moved to a context which includes human remains. In the former the site of procurement and processing is the focus while in the latter this focus shifts to the chambered tomb though reference to resources is maintained. There appears to be a juxtaposition of these two points of focus, in the appearance of chambered tombs above shell middens at Glecknabae (B/23) on Bute (Bryce 1904) and at Clach Aindreis (B/1), in northern Ardnamurchan (Henshall 1972).

Type III and type IV deposits are difficult to detect in the Mesolithic record, though it can be argued that there is evidence for both on Oronsay (with the earliest levels at Cnoc Coig being related to structures and the shell middens containing human remains having a ritual and symbolic connotation). However, type I and II deposits do appear in both periods, and it is this common strand which has highlighted the problems in labelling some sites Mesolithic while others are termed Neolithic.

iv. Distribution and nature of early period evidence

Known early period sites are concentrated in regions C, D and E, with type I and II deposits being their most common manifestation. Type III deposits, which provide evidence for the nature of settlements and of agricultural activity, are generally limited to area D and specifically to Orkney (Beaker activity has been classified as Bronze Age in this work and is discussed in the next chapter). Type IV deposits have also provided limited evidence for marine exploitation, with their use in ritual activities apparently reflecting continuing importance.

This limited picture is undoubtedly the result of differential discovery and prevailing research interests. Only sites which have been subject to excavation have been discussed above and reference to the corpus will verify that excavated sites represent only a small proportion of the total sites known to exist. It is therefore highly likely that a number of these less familiar sites may well represent marine exploitation taking place in the earlier period and as such may go some way to providing a more balanced picture of the role of these resources during this time.

iv.i The broader picture

The limited view provided by excavation is soon put into perspective when one considers the number and distribution of unexcavated sites. For the purposes of this more speculative overview this section is organised region by region, with the potential to provide evidence for early period marine exploitation being assessed in relation to sites which may have been recorded but have so far remained unexcavated or where early excavations have provided little information of worth.

Region A

Though this region has provided no definite evidence for marine exploitation in the form of firmly dated shell middens, there are a number of sites which have the potential to date from the early period. It is worth noting that a large number of coastal Mesolithic sites have been recorded in region A, with the Dumfriesshire and Ayrshire coasts demonstrating a concentration of lithic scatter sites so far unparalleled in their density anywhere else in Scotland. The sand dune environments which elsewhere have produced so much evidence for marine exploitation (eg Orkney) have so far produced only scatters of lithics, many of which appear to be Mesolithic. A strong Mesolithic presence has been established, through the excavation of sites such as Barsalloch (Cormack 1970) and Low Clone (Cormack and Coles 1968) with sites situated on the cliff-tops which back the raised beach (ibid). These cliffs are the equivalent of those which rise up from the rear of the raised beach at Oban. They also bear a strong resemblance to those in Oban in that they have created quantities of talus and scree which rest in considerable heaps at their base. There is every probability that this material conceals caves which could have been used at the time of Mesolithic activity attested by the sites above.

A number of caves are known to exist in region A and these may yet be shown to contain evidence for Mesolithic activity. Many of these sites were investigated in the nineteenth or early twentieth century and were found to contain evidence for Iron Age or later activity, including evidence for marine exploitation. These sites include St Ninian's Cave (A/27), Borness Cave (A/17) and Torrs Cave (A/19). Despite the relatively late date for much of the activity evidenced in these caves (St Ninian's Cave contained an important collection of early carved crosses), the potential for earlier deeply stratified deposits should not be ignored. Excavation of St Ninian's Cave was terminated once the fourth cultural deposit, some six feet below the surface, was reached. This included ashes, shells and bones, with the bones of horse, ox, dog and sheep and deer antler being recognised (Maxwell 1887). The age of this deposit is uncertain; all that can be said with confidence is that it post-dates the Mesolithic, though the presence of horse bones also suggests that it post dates the Neolithic and may be Iron Age or even later. All that can be said here is that further excavation may have provided evidence for early period activity.

More positive evidence for early period activity comes from a series of cave sites in Loch Ryan, which include a rock shelter at Corsewell House (A/21) (Gregory et al 1930), in which oyster shells, hammer stones and a few flints were discovered. The animal bones included fish, birds, sheep and cattle. Though the presence of domestic species does not indicate Mesolithic activity it is possible that this activity is Neolithic. Other caves in this area include Cairn Ryan Cave (A/20) and Ouchtriemarkain Cave (A/25), both of which have produced remains of domestic animals but also included evidence for marine exploitation (Gregory et al ibid). It is not possible to state confidently whether these deposits refer to the Neolithic component of the early period or whether they are considerably later. No diagnostic artefactual material was recovered other than a few flint fragments and some split and polished bones which may have been used as implements.

Prehistoric activity centred on the exploitation of marine resources from Loch Ryan is further suggested by the discovery of a type II site in the town of Stranraer, at the head of the loch, when a cable was being laid. This substantial deposit was dominated by oysters and the only artefacts recovered were a nodule of flint and what is described as a small wheel of flint (Truckell 1960, 41). In its substantial deposits of oysters and its apparent extent this site bears some resemblance to those found in the Firth of Forth.

A number of potentially important sites in region A have been lost to urban development which took place in the late nineteenth century. Some of these sites were investigated and recorded, though levels of recording were often minimal. Several of the sites in Oban suffered a similar fate and it was not until the importance of these sites was recognised that the MacKay Cave (B/50) and the MacArthur Cave (B/49) were subjected to reasonably thorough investigation. Unfortunately the attention that Oban received led to the neglect of other areas, a state of affairs which in turn reinforced the impression that the Obanian represented a series of specialised adaptations limited to a relatively small area. While the idea of the Obanian was being formulated, sites of equal importance were elsewhere destroyed without due care and attention paid to their recording. If it were not for the efforts of John Smith many of these sites may well have remained totally unknown. Sites recorded by Smith include a substantial shell midden in Ardrosson, which was largely destroyed by the building of the railway station (Smith 1892). Smith also recorded shell middens at West Kilbride with possible sites at Ballantrae and Shanter Knowe.

Further comparisons with Oban cannot be avoided when discussing the discovery of two barbed points from region A. The first of these was recovered from the bed of the river Dee at Cumstoun (A/31), near Kirkubright. This biserial point is made of red deer antler and is similar to several recovered from Oban - though it is longer and the barbs do not stand as proud as on those from Oban. Its recovery from the estuarine deposits of the Dee suggest that it may have been deployed in marine exploitation and may well be Mesolithic or Neolithic. A similar implement was recovered from a comparable context, in the bed of the river Irvine at Shewalton (A/13) in Ayrshire. It too is biserial and made of red deer antler. These pieces differ markedly from those in Oban in their context of discovery, with the more northerly examples being recovered from shell middens. It is possible that these implements were lost during their use, hence their presence on the river beds, which at the time of the maximum transgression would have represented marine estuaries.

Though direct evidence for marine exploitation in region A may be scarce, closer examination of the corpus of known sites clearly suggests that such evidence does exist. It is probable that only an intensive survey of raised beach environs and re-investigation of cave sites will clarify this picture. There is still an apparent lack of evidence from the extensive dune areas which back the Solway and cover parts of the Ayrshire coast, though more sites such as the shell middens at West Kilbride (A/14) may well await discovery. Though the Luce Sands have been subjected to quite intensive archaeological scrutiny, with a considerable number of Mesolithic lithic scatters being identified, it is probable that other coastal regions in area A have not been subjected to the same degree of examination. It should also be noted that though fortuitous blow-outs can reveal impressive archaeological deposits, deep sand dunes are very effective at concealing even substantial structures and, as Mellars has found in his search for 'missing' shell middens on Oronsay (1981), recourse to intensive survey and test pitting is required before positive statements can be made about the presence or absence of shell middens and other deposits.

Region B

It is unavoidable that discussion of this area be dominated by the so-called Obanian sites, indeed these sites have dominated discussion of both prehistoric marine exploitation and the Mesolithic in Scotland for well over a century. It is, however, becoming more and more apparent that the well known sites in Oban and on Oronsay are only the tip of the iceberg, with many more sites suggesting marine exploitation during the early period. However, it is important to realise that more inland sites have also been discovered and the concentration on the coast should not be overplayed. The coastline of Kintyre and Argyll is dominated by raised beach terraces, many of them backed by cliffs accommodating caves which have provided an important focus for early prehistoric activity.

The cave site at Duntroon (B/11) has much in common with those in Oban. Its deposits included considerable quantities of marine shells deposit as well as human remains. The excavator suggested that the human remains found in the cave, which indicate at least seven individuals, represent the occupants of the cave who were killed when the roof collapsed (Mapleton 1873). This seems unlikely, especially when it is considered that the remains of an adult male were stratified above the other remains, the bones of which were dislocated and scattered. Mapleton suggests that two rock falls may have accounted for this stratigraphic anomaly with the upper individual falling victim to a later collapse. It is more likely that these remains represent funerary insertions, possibly of disarticulated human remains, and as such bear close relationship to the funerary activity identified at Raschoille in Oban. This activity appears to have carried on concurrent to the deposition of marine shells, which were found at all levels. Shells were also found outside the cave mouth, along with the remains of a red deer, part of which was found inside the cave. Artefacts were limited to a couple of flint scrapers, though it is likely that others were missed during excavation.

Though caves were undoubtedly utilised during the early prehistoric period, much of the evidence for human activity has been found to be more recent, with the utilisation of caves well into the modern period being well attested (Leitch and Smith 1993). Many of the cave excavations to be carried out in Scotland over the past century have been of limited extent and have provided archaeological evidence for activity post-dating the earlier period. However, many of these sites may also, with more thorough excavation, provide evidence for much earlier activity in their basal deposits. Limited excavation in Smoo Cave, Durness (D/193), has established that visible shell midden deposits are no earlier than the Iron Age, though a deeper trial trench revealed potentially early period bone fragments and chipped stone at a much deeper level (Pollard 1992).

A number of caves have been excavated in recent times in region B. The first of these took place in the 1970s at the Cave of Crags in Kilmelford, Argyll (Coles 1963). Though this excavation did not produce evidence for marine exploitation it did result in the recovery of a microlith dominated lithic assemblage. More recently still, the Mid Argyll cave and rock shelter survey has the potential to further our understanding of these sites. This survey is still on-going and the full implications of its results are not yet known. However, it is apparent that a large number of previously unknown cave sites has been identified. One of the major aims of this project was to identify more evidence for so-called Obanian activity on the mainland (Smith 1985). Over 50 caves and rockshelters were recorded as containing evidence for past human activity, though few of these sites provided obvious clues as to the period at which that activity took place. Excavation of several sites has indicated that evidence for marine exploitation covers a long time-span. Excavation of Tinkler's Cave (B/19) revealed midden material including limpet shells deposited in association with beaker sherds, with radiocarbon dates from shells suggesting activity around the first quarter of the second millenium BC (Smith 1988). These results again point the use of caves and of marine resources later than the Mesolithic. The discovery and excavation of these new sites have produced more questions than answers about the caves' role in the broader pattern of settlement during this period. Paramount among these questions is the role of these sites within an economy which is generally seen as agricultural in character. It is possible that the present work may help to clarify this role.

Another recent cave excavation to have revealed evidence for marine exploitation in area B is that carried out within a cave on the small island of Ulva (B/64), off the west coast of Mull. This site was chosen in the hope that it would provide evidence for human activity dating to the period prior to 7,050 BC, as caves offer the best protection of deposits against the destructive forces of advancing and retreating ice sheets. Though as yet no definite evidence for very early activity has been recovered it does appear to commence somewhat earlier than that at Tinkler's Cave and extends at least into the Mesolithic (Bonsall 1989). Evidence for marine exploitation included shells of the limpet, oyster, dog whelk, periwinkle and scallop. Neolithic pottery sherds have also been recovered from the cave and again suggest the use of the site into the Neolithic - though problems of definition will be discussed presently.

It is interesting to note that both the Mid Argyll Cave survey and the Ulva excavation were undertaken in the hope that they would provide evidence for early activity, in the case of the former related to the Obanian and in the latter to glacial or immediate post-glacial activity. The indications are that these aims may yet be achieved, but so far the most striking discoveries have been of the utilisation of these sites by people using pottery and exploiting marine resources. It would be normal to describe such evidence as relating to Neolithic activity (though beaker ceramics have been classified as late Neolithic or early Bronze Age). However, the definition of what constitutes Neolithic activity has caused not a few problems in this part of Scotland (see chapter 8).

This upsurge in cave archaeology in area B can therefore be seen to be related to the desire to locate Mesolithic or earlier sites. It should be realised that other areas also hold potential for cave archaeology but have not been subjected to such intensive interest. It should however also be noted that the number of cave sites in area B may well increase further still. Caves can be totally concealed behind deposits of talus and soil washed from above and it is worth noting that all of those cave sites so far excavated in Oban were only discovered when building operations led to the removal of this concealing detritus. As well as the potential for further caves awaiting discovery it is also very apparent that a number of sites are known but are yet to be subjected to archaeological investigation. Immediately to the south of Oban several caves have been observed to include deposits of marine shells (Hunter pers comm) and a series of caves in the vicinity of Ballachulish have been reported to contain material "suggestive of Obanian activity" (Gourlay pers comm).

Considerable evidence for early prehistoric activity has come from the islands located in region B. Bute is situated in the Firth of Clyde and has great potential in its cliff-backed raised beaches. A survey of caves both on Bute and on the nearby island of Cumbrae (Marshall 1938) identified a number of sites which included evidence for human occupation in the form of shell debris. However, without excavation it is impossible to determine the age of this activity. A *terminus ante quem* is established for a shell midden (type II) at Glecknabae (B/23) on the north-west side of the island. This site is situated toward the rear of the raised beach and is undoubtedly earlier than the chambered tomb which is built over on it (Bryce 1904). Lithics of a distinctly Mesolithic type have been recovered from this deposit. The construction of a chambered tomb over a shell midden may also have occurred at Clach Aindreis, in northern Ardnamurchan, where marine shells were observed eroding from rabbit scrapes (Henshall 1972). This pattern may be repeated at the chambered tomb at Crarae (B/5), which was itself found to contain deposits of marine shells, both in the chamber and in a pit cut into the forecourt (ibid).

At Crinan (B/8), near the river Add in Argyll, Mapleton reported: "an extensive deposit of oyster shells, evidently a bed of oysters when the sea covered that portion of the land, ie before the rising of the 25 foot raised beach" (1873, 102). Though natural deposits of marine shells are common, as oyster colonies generate considerable quantities of shells, which can be mistaken for shell middens, it is also true that shell middens can be mistaken for natural deposits and the position of this deposit may suggest that it represents human exploitation of the marine environment. If so the site may bear some similarity to the large oyster dominated middens identified in the Forth Valley and related to Mesolithic and Neolithic activity.

The southern Hebrides have provided much evidence for early period activity with the microlithic sites on Jura again representing a Mesolithic coastal presence which is apparently unrelated to the formation of shell middens, though several limpets were recovered from the site at Lussa Wood (B/70) (Mercer 1978). Recent work on

Colonsay has resulted in the location of several Mesolithic lithic sites, which may be related to red deer hunting (Finlayson and Mithen 1991). However, unlike its immediate neighbour, Oronsay, no definite evidence for marine exploitation has been identified. However, Mithen has suggested the presence of 'limpet hammers' at Staosnaig may indicate the former presence of a now totally denuded midden (Mithen *et al* 1991). Despite an apparent lack of open shell midden sites of the type found on Oronsay, a number of caves including shell debris have been identified on Colonsay. These include the Crystal Spring Cavern (B/30) which included marine shells and animal bones, some of which are reported to be domestic (Grieve 1880, 1883; Stevenson 1881). Again, excavation would be required to establish the period at which these sites were used.

The island of Islay, which may have acted as something of a stepping stone between Jura and Oronsay/Colonsay, has provided only limited evidence for marine exploitation in the early period, though recent work indicates that Mesolithic activity may have been more intensive than previously thought (Mithen 1993). The investigation of a cave known as Uamh phort luinge Mhic-Ruaridh (B/33) at the end of the nineteenth century resulted in the recovery of a leaf-shaped arrowhead and a polished stone axe along with fourteen pieces of flint (Mitchell 1898). These artefacts were recovered from deposits which included charcoal, splintered animal bones, limpet and whelk shells. Mesolithic and Neolithic activity, in the form of lithics and possible structures, has been more recently recognised at Newton, but evidence for marine exploitation was not recovered (McCullagh 1989). Excavations at Killelan Farm (B/71) have also revealed evidence for Mesolithic activity in the form of stone tools as well as more extensive evidence for Bronze Age activity. There is evidence at this site for the exploitation of shellfish during the Bronze Age; however, the Mesolithic levels appear to lack such evidence (Burgess 1976).

At its northern limit region B extends westwards onto the Ardnamurchan peninsula. The island of Risga (B/3) is situated in Loch Sunart, which penetrates inland from the southern shore of the peninsula. Mesolithic activity is known elsewhere in the Ardnamurchan area in the form of several lithic scatters (Lacaille 1951, 1954, Pollard 1994), while two chambered tombs, the most northerly of which may be built over a shell midden (Henshall 1972) provide the only verified evidence for Neolithic activity. Cultural deposits including shell mounds have been reported as eroding from dunes at Sanna Bay (B/4) (DES, 1961, 12) on the western tip of the peninsula but these may relate to beaker material which has also been recorded (Lethbridge 1927). Sand dunes have also provided evidence for prehistoric coastal activity at Kentra Bay and Drynan

Bay, much of it from insecure contexts and representing everything from Mesolithic to Bronze Age activity. Shell middens have been reported in this area (MacKewan 1922) but recent attempts to locate them have been unsuccessful. This failure may be due to the fact that, according to MacKewan, farmers were using them as sources of fertiliser (1922)

Lacaille has suggested that this area was one in which hunting and gathering was maintained as a way of life long after agriculture was introduced elsewhere, with Mesolithic flint knapping techniques being maintained as late as the Bronze Age (1951, 1954). It has been rightly pointed out that this association of early and later artefactual material is probably the result of mixing in unstable sand dunes (Morrison 1980). However, it cannot be denied that Lacaille in making this statement laid the foundations for the recent upsurge of interest in the nature of culture change and the so-called transition between the Mesolithic and Neolithic in this region (Armit and Finlayson 1992, Connock *et al* 1992, Pollard 1991).

Evidence for early period activity on the islands of Coll and Tiree may well exist within or beneath the sand dunes which are to be found on both islands. Raised beaches backed by cliffs also provide the potential for cave sites. Evidence for marine exploitation in the later period is evidenced by hut circles and other remains apparently associated with shell midden deposits on both islands (Ross 1881, Mann 1906, Beveridge 1911). It has been suggested that shell-rich deposits identified beneath the Iron Age site at Ballevullin (B/61) on Tiree may represent an Obanian shell midden (Lacaille 1954). It has also suggested that even earlier activity may be represented by the discovery of a flint tanged point from the Ballevullin excavation, bearing as it does some similarities to European late upper Palaeolithic types (Morrison and Bonsall 1989). However, the risks involved in basing such a hypothesis on the typological study of a single lithic artefact are obvious and need not be fully discussed here.

In summary, it is apparent that region B is rich in evidence for the exploitation of marine resources during the early period, in both verified and potential sites.

Region C

Early activity in region C is not as well attested as in regions A or B. A Mesolithic presence is suggested by lithic material in Morar (Lacaille 1951, 1954) Redpoint and Shieldaig (Walker 1973, 1974), while the site in Kinloch bay on Rhum (Wickham-Jones 1989) demonstrates a penetration at least into the Inner Hebrides. Shell middens have not been identified in relation to any of these sites and very few have so far been identified in this area. A cave on Rhum (C/51) is known to contain shell midden material which includes seal bone and a small limpet-dominated midden occupies the mouth of a boulder cave at Craig (Gourlay 1984) but these have not been excavated. A badly truncated shell midden related to a small rock shelter has been recorded at Cean A' Chaolais (C/76), near Ardmare, north of Ullapool. This site is situated on the edge of a former embayment now represented by an extensive raised beach terrace. A variety of marine shells are visible within the deposit, which has been exposed by a road. Antler tines and a wooden bowl have also been recovered from the site and it has been suggested that the remains may relate to Mesolithic or pre-pottery Neolithic activity, though without further verification it must be accepted that the site may equally well relate to later activity (Crawford 1983).

Neolithic activity on the Outer Hebrides is evidenced by a series of chambered tombs but related settlements are not well attested. This may be due to Neolithic sites being incorrectly recorded as later sites, as was recently established in the case of the supposed island dun, Eilean Domhnuill A Spionnaidh, which upon excavation proved to be Neolithic (Armit 1986). Beaker settlements are known from North Uist and Harris and have provided clear evidence for marine exploitation during the late Neolithic/early Bronze Age, but as yet unequivocal earlier evidence for this practice is absent (none of the Outer Hebridean chambered tombs have provided evidence for marine residues, but many of these have yet to be subjected to intensive investigation). Marine erosion may have had a part to play here and Crawford has noted that Neolithic and pre-Neolithic machairs must once have existed (1979, 53).

A Mesolithic presence has been established at least as far west as the island of Rhum but has still to be established on the Outer Hebrides, though recent pollen analysis may suggest that humans were modifying the landscape during this period (Edwards forthcoming). The long term settlements at the Udal (C/49 North Uist) and Northton (C/10 Harris) may yet help to fill in these earlier gaps. Research interests in this area have been somewhat biased towards the later period, with a wealth of Iron Age sites known in the Outer Hebrides, and this may at least be partially responsible for the apparent lack of evidence.

Region D

It has already been established that Orkney is particularly rich in Neolithic sites, a number of which have provided evidence for marine exploitation. However, mesolithic material has only recently been identified but this is limited to scatters of lithics (Wickham-Jones 1992). Despite this it is tempting to see limited occurrences such as a microlith from the deposits at Knap of Howar (Wickham-Jones 1983) as a tantalising suggestion of activity dating back as far as the Mesolithic. However, there is some evidence to suggest that the use of microliths was not limited to the Mesolithic and their maintenance into the Neolithic is a distinct possibility (Pollard 1993); and their use as reaping knives has been suggested (Clarke, D.L. 1976). Again, it is likely that the continued submergence of the coasts of Orkney has removed much early period evidence.

The picture on Shetland is even less clear, with fewer excavations and the majority of these on sites relating to the later period such as the settlements at Jarlshof and Clickhimin. It is realistic to envisage marine exploitation playing an important role throughout the island's human history, which still lacks a Mesolithic chapter.

On the north-east coast of the Scottish mainland Neolithic marine exploitation appears to be represented by lithic material stratified with shells, fish bone, red deer and pot sherds from the eroding beach section at Freswick Bay, Caithness (Lacaille 1954). This material included worked bone and antler and an apparently perforated tower shell (*Turritella communis*).

The sand dune systems of the north-east coast of Scotland have proved a happy hunting ground for antiquarians and archaeologists alike. It is here, in the sand links around Keiss, some 6km to the south of Freswick Bay, that Samuel Laing carried out his excavations in the middle of the nineteenth century (1866, 1868). It is possible that the large shell midden he detected beneath Keiss broch was of considerable antiquity, and may relate to early period activity.

Farther south still the identification of type I deposits in the dune systems which fringe the coast between Meikle Ferry and Little Ferry in Sutherland has provided further possible evidence for early period exploitation. It has been noted that the shell mounds in these dunes were dominated by specific types of shells, with oysters, mussels, cockles, limpet and periwinkles all represented (Tait 1870). Worked pieces of flint and splintered fragments of bone were recovered from these mounds (Tait ibid).

Six kilometres south of Lossiemouth an extensive shell midden was identified at Meft (Morrison 1872). The site occupies a terrace which at the time of the post-glacial maximum would have occupied the shore of an embayment. The site is reported to cover nearly two acres (Morrison ibid), and trenches revealed densely packed deposits of whelks, cockles, mussels and limpets. In some places the excavator reports concentrations formed exclusively from oysters while other areas were dominated by whelks. No artefacts were recovered, though ashes and burnt stones were observed. Flint chips and fragments of pottery were recovered from a nearby sandy slope. This site may be closely related to or even part of the same deposit which was identified by Sloan in the vicinity of the Palace of Spynie (1985). On this occasion, winkles and oysters were reported to be situated in close proximity to a lithic scatter. It is highly likely that this deposit relates to early period activity, possibly Mesolithic, as regression brought about the retreat of the sea for a distance of 6 kilometres to the north.

Region E

It has already been noted that the excavated shell middens in the Firth of Forth (Nether Kinneil and Polmonthill) represent only two of a series presently known to exist to the south of the Firth. As the majority of these sites lie on the same contour it is very likely that they are roughly contemporary, though it is worth noting that the Inveravon sites provided earlier dates than the Nether Kinneill midden. A number of shell middens have also been noted on the northern side of the Firth (Sloan 1985), one of which was recently identified through survey carried out as part of the Kincardine Bridge assessment (GUARD 1994), and these too may well extend from the Mesolithic into the Neolithic.

Evidence for marine exploitation in the Firth of Forth also takes the form of whale remains, some of which are associated with antler tools of the mattock type. The overall picture shows the Firth of Forth to be an important focus for human activity during both the Mesolithic and the Neolithic, with shellfish resources being exploited intensively, possibly on a seasonal, 'cropping', basis. The potential for more sites in similar locations on the east coast of Scotland is strongly reinforced by the discovery of several sites in the Inverness area (region D) in the Cromarty Firth. Limited excavations at Muirtown have established that shell fish resources were exploited during the period generally regarded as early Neolithic (Gourlay and Myers 1991). The presence of similar substantial deposits at Stannergate, Dundee provide further evidence for this correlation between estuarine environments and marine exploitation. Limited work on the Firth of Forth sites has suggested that these deposits may relate to activity extending into the Neolithic period, a suggestion backed up by radiocarbon dates and the presence of bones from domestic fauna (Sloan 1982). A shell midden of more limited dimensions was recorded at the Morton Farm site at the head of the Firth of Tay, and clearly indicates the exploitation of the local marine environment in the Mesolithic.

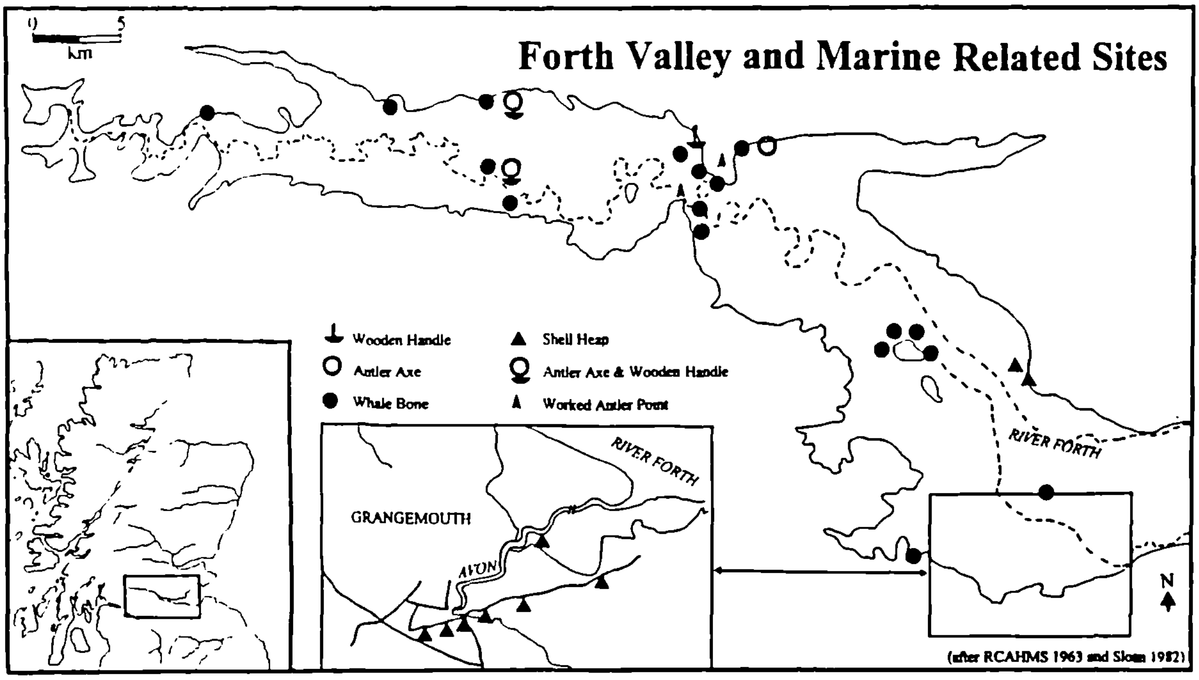


fig 9. Forth Valley sites

The area around the Morton site is occupied by sand dunes, with the area known as Tentsmuir Sands providing a rich source of archaeological material. This material spans a considerable time span, stretching from the Mesolithic to the Iron Age and beyond. A shell midden identified not far from that at Morton Farm was recently excavated in the belief (or hope) that it too was Mesolithic. However, on excavation this feature was found to be the result of activity taking place as recently as the Pictish period (Wickham-Jones 1994). Despite the problems related to site identification and provenancing it is probable that at least some of the sites in the Tentsmuir sands and similar sand dune areas, such as the sands of Forvie and the Drynan Sands, relate to early period activity. A number of sites at Tentsmuir are located along the line of the main post-glacial transgression around 10 feet above the present sea level and half a mile from the present shoreline. It has been noted that these deposits consist almost entirely of single species of shells, with cockle and mussel being dominant in mounds toward the southern district near the mouth of the Eden. Those nearer the Tay are dominated by the whelk (Paul 1905) and appears to mirror modern distributions of these species. Several of these sites were examined but no artefacts were identified, though flint artefacts are found distributed throughout the sands, some of them leaf-shaped arrowheads which indicate at least a Neolithic presence.

At Forvie alongside the Ythan estuary a number of shell middens have been identified in close proximity to Mesolithic stone tool assemblages. It has been suggested that these lithics may have been used to manufacture marine procurement equipment such as barbed points (Hawke-Smith 1980). A similar interpretation was applied to lithic assemblages recovered from coastal sites in the Luce Bay area with the presence of 'reamers', notched flakes and awls possibly used to make baskets or fish traps (Cormack 1970,80), despite the apparent absence of deposits including marine residues in this area.

Two of the shell middens in the Ythan estuary were excavated in the 19th Century (Dalrymple 1866), during the period of increased interest in such sites inspired by the Danish work. It is probable that in producing section drawings of these deposits (chapter 2) Dalrymple took his cue from Lubbock, who had produced similar representations of the Danish *kjökkenmöddings* (1863). These sections revealed alternate layers of blown sand and shell, with deposits being some 150 feet long and 30 feet wide, in a mound 15 to 16 feet high. Two layers of shell midden deposits were detected, the uppermost being five feet deep and containing what appeared to be a hearth pit. Beneath these substantial deposits were several layers of mixed sand and shell with charcoal. Dalrymple reports that all of the shells displayed evidence of burning. No animal bones or artefacts were reported to be present within the section.

The second mound was situated about a mile inland and farther from the bank of the river. The surface of the mound was covered with burnt stones and shells, while within the mound upwards of three layers of shells separated by blown sand were detected. The shell layers were considerably thinner than the upper deposit in the mound discussed above, in some places being only several inches thick. The upper deposit was found to include the bones of red deer and ox, though these were apparently absent from the lower deposits. The smaller size of the mound and the less substantial nature of these deposits appear to represent less intensive and possibly shorter lived periods of exploitation than are evidenced by the previous mound. It may be that the detection of animal bones, both wild and domestic, in only the upper deposit of the second mound represents a shift in the nature of procurement. In the earlier period shellfish appear to be the only resource exploited, with this concentration on a single resource later replaced by the deposition of the bones of terrestrial species. It must also be remembered that these observations were made on the basis of single sections cut through deposits which covered a considerable area - the bones of domesticants were limited to one location in the Nether Kinneil midden (Sloan 1982). Differential deposition certainly seems to be responsible for the apparent absence of artefacts within the sections, with lithic scatters noticed nearby (Dalrymple 1866, Hawke-Smith 1980). This is of course assuming that these lithics are related to the use of these shell midden sites. A similar pattern of selective deposition was earlier suggested as being responsible for the relative absence of lithics from the majority of the Obanian sites.

Numerous shell middens have been identified in the Culbin sands, some of which when excavated revealed medieval pottery and fish bones in their upper deposits, while these were absent in the lower deposits (Black 1891). This pattern may be suggestive of the long term use of these sites, though ascertaining at what time this activity commenced would not be possible without modern excavation and the retrieval of radiocarbon dates.

v. Conclusion

Though radiocarbon dating has verified only a few sites as early period features it has been suggested that a considerable number of sites have the potential to provide such evidence. A certain degree of caution is of course necessary here, as establishing the chronological provenance of shell middens and other deposits related to marine exploitation is not readily achieved. Unlike other components of the archaeological record, which includes buildings, ceramics, ritual monuments etc, shell middens do not conform to readily definable typologies or design templates with a limited currency which identifies them with a specific period, as in the case of Beakers or brochs. One only has to look at a broch to know that it belongs somewhere in the Iron Age, or at a food vessel to know that it was made during the Bronze Age. This is not possible with these deposits; as they are not artefacts. Though the activities related to the deposition of these material residues may be of a specialised character - relating to the procurement and processing of marine resources - these residues are not themselves indicative of activity in any given period. The temptation among archaeologists to automatically identify shellfish exploitation, especially when represented by shell middens, with earlier periods of prehistory, and specifically the Mesolithic, has hopefully been curtailed (cf. Sloan 1982).

Problems relating to dating are enhanced by a general absence of characteristic artefacts associated with these deposits, though of course there are exceptions. It has been noted that very substantial deposits, such as those in the Firth of Forth, appear devoid of artefacts, at least in the limited areas excavated (Stevenson 1947, Sloan 1982). In many cases shells, animal bones and burnt stones are the only components identified within these deposits. Even when assignable artefacts are recovered from shell midden deposits it has been suggested that they may have percolated downwards through voids between the shells from upper layers (Sanger 1981). The problems raised by this lack of artefactual material and the use of similar locations at various times is highlighted by the case of a cave site at Port A' Chotain on Islay. This cave is located in a re-entrant in a fossil cliff face some fifty feet above the sea. A trench cut through the earth floor revealed a thick deposit of marine shells which included bones of sheep and red deer (MacKie 1974). The only artefacts to be recovered were two beach pebbles which had been used as hammerstones. On the basis of this material it is reasonable to consider the deposit as post-Mesolithic, as the presence of sheep bones attests. It could be suggested that the site was Neolithic, with hunting and herding both evidenced. However, a radiocarbon date placed this activity within the late 17th or early 18th century AD, thus reminding us that assigning these sites to a given period is highly problematic.

Sometimes the superposition of sites of known or quantifiable date over marine residue deposits can serve as a *terminus ante quem* for the deposit. At Stannergate, Dundee, in the Firth of Tay, Bronze Age cists with diagnostic ceramics were found to be situated above a substantial shell midden. It is therefore obvious that the shell midden cannot have been deposited at a time post-dating the early Bronze Age. The fact that the upper surface of the shell midden and the cists above it were separated by a substantial depth of soil may further suggest that the shell midden predated the cists by some considerable time. The presence of a polished stone axe within the shell deposits is a rare occurrence of a diagnostic artefact and would point to a Neolithic provenance for the deposit. This site would therefore appear to have close parallels with the large shell middens situated within a similar estuarine environment in the Firth of Forth.

A shell midden situated beneath a chambered tomb can certainly not post-date the Neolithic. Establishing whether that shell midden is actually Mesolithic or Neolithic or indeed was used during both periods is a different matter. The temptation is to regard the shell midden as Mesolithic, with the chambered tomb marking a dramatic cultural change. However, it has been noted that the shell midden beneath the Glecknabae tomb contained not only shells and the bones of wild animals but also ox bones. If these are domestic then it is probable that pastoral agriculture at least was being practised by those people who used the shell midden. It has also been suggested that domestic cattle bones were deposited in the MacKay Cave deposits in Oban (Childe 1935, 15), deposits which are usually regarded as the result of hunter-gatherer or Mesolithic activities. This issue will be returned to later and is raised here merely to illuminate some of the problems involved in assigning to these sites chronologies which may be totally inappropriate.

Despite these words of caution it is apparent that the body of evidence for marine exploitation during the early period may be more substantial than is first obvious. It is also clear that there is great potential for more evidence to be identified through the initiation of research programmes which target likely locations, such as the fossil cliff-lines of regions A, B and C.

In summarising the nature of this evidence it is hoped that its variety, complexity and wide distribution have been emphasised. The evidence is certainly not limited to a few sites in Oban as many distiled works would have us believe. The relationship between purely hunter/gatherer (Mesolithic) communities and those utilising agriculture (Neolithic) is a complex issue but hopefully one that further discussion of this material will clarify.

Chapter 6

Different kettles of fish II: the nature and distribution of later period evidence

i. Introduction

For the purposes of this work the later period groups together the Bronze and Iron Ages. As noted earlier the division of the past into chronological stages is problematic, but here the initiation of the Bronze Age is taken to coincide with the appearance of beakers while the discussion of Iron Age material extends to deposits at least post-dating the arrival of the Romans in Scotland. This chapter will introduce the evidence available for this period prior to a more detailed discussion of its implications for economy and settlement.

The later period marks changes in the nature of social organisation and material culture. However, it also stands somewhat in contrast to the earlier period in the way its evidence has been treated and perceived by archaeologists. It has already been suggested that the investigation of apparently isolated middens (type II deposits) and cave sites (type I deposits) gave way to a concern for excavations centred upon more readily definable settlement complexes. The inspiration provided by the research into *kjökkenmöddings* on the continent had really had its day by the turn of the century. The same could be said for cave excavations, which had peaked towards the end of the century with the investigations in Oban but after that time were somewhat curtailed. After this time the investigation of settlement sites, many of which were represented by upstanding structural elements, entered the forefront of archaeological research. The bulk of known evidence for this period, which extends from before 2,000 BC with the appearance of Beakers up to around the late 2nd century AD with the departure of the Romans from Scotland, is represented by type III deposits, that is evidence for marine exploitation related to structural remains.

It has already been established that settlement complexes with upstanding remains were not limited to the later period, with sites such as Skara Brae and the Knap of Howar standing out as notable examples. However, it is apparent that due to the vagaries of preservation and discovery early sites with upstanding remains, other than chambered tombs and cairns, have very much been confined to sand and machair regions such as those found in Orkney and the Outer Hebrides. The substantial nature of such structures breaks this mould to a degree; they tend to survive irrespective of whether they were located in sandy areas. This is especially obvious in the case of brochs, though their highest concentration is in the north of Scotland.

This period saw excavations which were geared to the opening of structures and even the stabilisation and renovation of archaeological sites, turning them into monuments which could be visited and entered. It is not therefore surprising that evidence for subsistence and economy was often overlooked in the search for artefacts and the investigation of architectural features. Though retrieval techniques and the care and attention paid to the recording and analysis of faunal remains and their contexts have always varied, it was not until after the middle of the twentieth century that a general upsurge in their perceived importance is noticeable.

It is perhaps a little ironic, when one considers that marine resources, especially shellfish, are commonly associated with early activity, that the greatest quantity of evidence for this type of exploitation, at least in the number of sites including evidence, actually comes from the later period. It is also noteworthy that in the later period marine residues appear from a much greater wealth of contexts, with sites such as crannogs, brochs, hut circles, caves, cairns, forts, duns and souterrains, as well as so-called midden sites, all producing evidence for marine exploitation. An equally wide variety of context types exist within these settlement features, with floors, walls, cells, stone-tanks, wells, ramparts and cess pits all yielding varying types of evidence related to the use of marine resources. It should be realised that this variety is not fully expressed in the classificatory system, which would simply class much of this material as type III. This is because it is intended only as a very coarse means of ordering the data, designed more to prompt discussion than to represent a finite statement.

ii. The Bronze Age

The Neolithic in Britain is generally regarded to have come to a close with the appearance of Beakers. Traditionally these artefacts were interpreted as evidence for population movements with immigrants, collectively known as the *Beaker folk*, introducing a new material culture and belief system, but most importantly a new technology: metalworking (Harrison 1980). Beakers have been recovered from a number of contexts which certainly appear to indicate their association with quite dramatic changes in the nature of ritual activity. Blocking material which denied access to chambered tombs has included fragments of Beaker pottery. The practice of communal burial which had epitomised the Neolithic was replaced by a variety of rites, including cremation. Beaker burials in their 'classic' form consist of crouched inhumations associated with grave goods which included beakers, archery equipment and metalwork.

The idea that Beakers represent a population movement has been abandoned in favour of a process of acculturation, within which beakers represent part of a material culture package which could have been utilised in the establishment of social hierarchies and the renegotiation of social relations (Harrison 1980, Shennan 1976). A similar model has recently been suggested for the material culture related to the commencement of the Neolithic (Armit and Finlayson 1992), to explain the use of ceramics by Mesolithic groups prior to their adoption of agriculture.

The Beaker deposits in the Outer Hebrides represent the most thoroughly investigated beaker settlement sites in Scotland. It has already been stated that one manifestation of beaker period activity appears to be the filling and blocking of chambered tombs. Several of these events may be associated not only with Beaker ceramics but also with the deposition of marine resource residues, though the presence of marine shells in the forecourt of Cairnholy I (A/16) may equally relate to the earlier use of the tomb.

Evidence for settlement and economy during the Bronze Age is relatively restricted, with some of the most thoroughly investigated sites being those which were stratified beneath or in close proximity to Iron Age structures, as in the case of Jarlshof (D/174) in Shetland. Again, the majority of known sites come from sand-dune and machair areas, with the sand promoting both the preservation of stone-built structures and organic deposits. Our perception of the Bronze Age, like the preceding Neolithic, is dominated by funerary and ritual monuments with burial cairns and standing stones surviving to a greater degree than domestic structures, which outside the north and west of the country may have included a substantial timber element. It has been noted that areas such as Orkney, which has a very rich assemblage of funerary cairns, appears to be almost totally devoid of related settlement sites (Downes pers comm). Only with the instigation of carefully designed survey programmes will the picture be filled out.

Sand dune areas in region B have produced some evidence for Bronze Age settlement with the sites of Ardnave (B/31) and Killelan Farm (B/71), on Islay being notable. Both sites have produced evidence for a mixed economy including the exploitation of marine resources. Activity at Ardnave appears to continue into the Iron Age but the site does not develop into a substantial settlement as has been the case at Jarlshof.

The presence of marine resource residues in ritual contexts has already been noted with reference to the Neolithic and Beaker phases of chambered tomb use. The insertion of marine resource residues, including marine shells, is not so apparent in Bronze Age contexts. However, marine shells have been recovered from cists in cairns, accompanying inhumations and cremations. These include the cairn at Shieldaig (C/85) in Wester Ross, from which the shells of oyster, mussel, winkle and limpet were recovered from a pit beneath the cairn along with fragments of burnt bone (Hedges 1978). Finds of single shells or valves of shells are not unknown in Bronze Age funerary contexts. The cairn at Inverlael (C/81), also in Wester Ross, included a single valve of a mussel shell in the cist which contained cremated bone, along with a burnt barbed and tanged arrowhead, several scrapers and quartz pebbles (Cree 1914). A valve of oyster was recovered from a bronze Age cist at An Sithean Altair on Lewis (C/29), while a single shell is reported to have been recovered from a cist in Kilphedir (D/188), Sutherland (Joass 1864). The deliberate insertion of these single items with the remains of individuals stands in contrast to the inclusion of larger quantities of material with multiple inhumations in chambered tombs and the implications of this change will be discussed later. A pit filled with marine shells has been identified in close proximity to the Bronze Age cist cemetery at Dalgety (E/36) in Fife, but this appears to be Neolithic (Watkins 1982). This site is of further interest in that one of the inhumations appears to demonstrate the use of a coracle as a coffin (Watkins ibid).

The incorporation of a Bronze Age cist, apparently associated with a food vessel, into the upper deposits of the shell midden at Cardingmill bay, Oban, may reflect the continued use of this site from the Neolithic. A number of shell midden deposits appear to have had Bronze Age burials inserted into them. These include the rock shelter site on the banks of the river Add, near Crinan, Argyll (B/8), where a cist and human remains were found to have been inserted into midden deposits which included marine shells and animal bones (Mapleton 1881). This inclusion of human remains in a type I deposit bears some similarity to the insertion of a cist into shell-rich deposits found eroding from sand dunes at West Links, North Berwick (Crombie 1907). The presence of stone slabs in the section of this deposit strongly suggests that this material was related to a structure and therefore represents a type III deposit.

Despite the previously noted relative rarity of Bronze Age settlement sites it cannot be denied that the majority of evidence for marine exploitation during this period originates from type III deposits, though some type IV deposits have been observed. Verified Bronze Age type I deposits (cave sites) are rare but not unknown. The cave at Rudh' An Dunain, on Skye, included evidence for both Bronze Age and Iron Age activity (Scott 1934). Bronze Age pottery sherds were found scattered through deposits which included the bones of domestic and wild animals along with marine shells and a few fish bones.

Perhaps the most striking Bronze Age cave deposits have been recovered from the Sculptor's Cave at Covesea, Morayshire (region D). Like a number of the type III deposits the cave appears to have witnessed a protracted period of use, of which the earliest recorded was Bronze Age and the latest Norse (Benton 1931). Bronze Age activity was attested through the presence of a relatively large quantity of metalwork, including bracelets, and so-called ring money. Indeed this material appears to be unsurpassed outside contexts which have been interpreted as hoards and their presence in the cave did cause the excavator some degree of puzzlement. It has since been suggested that this material and its deposition in the cave may have a ritual connotation (Shepherd and Shepherd 1979). A number of worked animal bones were also identified, a common occurrence in many cave sites, which include at least two probable fish gorges. Unfortunately the presence of metalwork in the cave appears to have detracted attention from the economic evidence, and only a single valve of oyster is recorded in the specialist report. The animal bones included ox, red deer, roe deer, sheep, pig, gulls and several gadoid fish bones. These identifications were made from a collection of 536 bones forwarded to the specialist, and so cannot be regarded as representative of the quantity of material actually present within the cave.

Like type I sites verified examples of Bronze Age type II sites (open sites) are very rare. This may in part be due to the reduction in interest in this type of deposit at some time around the turn of the century. In recent times only one type II deposit (D/24) has been identified as Bronze Age through excavation. This site is situated, as so many others have been, in a sand dune system, this time in the area known as the Culbin sands, Morayshire (Coles and Taylor 1970).

The picture of marine exploitation during the Bronze Age is obviously fragmented, with only a hand full of sites providing evidence in the form of marine shells and fish bones. Does this lack of evidence indicate a reduction in the importance of these resources in the Bronze Age? Without further survey and excavation this question is difficult to answer. However, as in the case of evidence relating to the early period it must be recognised that the picture obtained so far cannot be regarded as complete. It is likely that a number of the sites known to contain marine resource residues but so far unattributed to any period will upon excavation be found to represent Bronze Age activity. The excavation of the type II deposit on Culbin sands is important in this regard, as it represents only one of many possible Bronze Age sites which have been recorded over the past century and a half. Further excavation and survey in areas such as the Outer Hebrides and Orkney is also likely to reveal more sites. What can be suggested on present evidence is that intensive extraction of shellfish resources, as evidenced in the large estuarine shell middens of the Mesolithic and Neolithic, was not taking place. The role played by these resources within Bronze Age subsistence practice will be discussed in later chapters.

iii. The Iron Age

The Iron Age stands in some contrast to the Bronze Age in the wealth of evidence relating to marine exploitation. Indeed, more evidence for marine exploitation has been recovered from the excavation of Iron Age sites than of any earlier period. However, when one considers the bias toward the investigation of impressive upstanding structures, which tend to be Iron Age, and their occurrence in coastal regions, it should come as no surprise that marine residues have been identified as a result. Inland areas and places where Iron Age structures were more likely to be built of timber rather than stone have been relatively undisturbed by excavation, though sites such as hillforts have attracted some considerable attention. Most of the best recorded evidence for this period therefore comes from the north and west of Scotland, where the use of stone and the presence of preserving sands and machairs have again promoted the preservation of structures. However, as this section will make clear evidence is present in other regions but tends not to have been subject to the same degree of scrutiny.

The type III deposits which make up the bulk of the evidence for Iron Age marine exploitation can be seen to rank as one of the more neglected elements of sites which have otherwise been the subject of much archaeological interest. This imbalance in research priorities is no more apparent than in the case of brochs, where concerns with architectural form and the desire to identify cultural origins have generally relegated issues such as economy and subsistence to a poorly upholstered back seat.

Evidence for marine exploitation was recorded during some of the earliest broch excavations, indeed it was a broch excavation which prompted Rhind, as early as the middle of the nineteenth century, to predict an important role for the analysis of faunal remains in furthering an understanding of this material (1854). However, the recording and recovery were often limited to brief references to sea shells or animal bone. The results of broch excavations carried out during the nineteenth century on Orkney clearly illustrate the tendency to ignore this material. Of the 52 brochs noted by Hedges (1987) on Orkney (more are now known) 35 of them are *known* to have been examined and marine resources were reported from only 18 of these. This statistic may of course reflect differential preservation or even differences in the types of resources exploited. However, it is more likely that this variance is due to a lack of interest on the part of early excavators, who were more concerned with 'clearing' or 'emptying' refuse than recording the nature of these deposits or sampling their contents. More recent excavations of brochs, though themselves varying in quality, have demonstrated that a wide range of resources, both terrestrial and marine, wild and domestic, appear to have been utilised by the occupants of brochs.

There is a wealth of evidence for agriculture in later prehistoric Scotland, a factor which perhaps more than any other distinguishes it from the earlier period, though there are problems distinguishing between Bronze Age, Iron Age and later agricultural landscapes. Despite the presence of field systems, which include rig, boundaries and clearance cairns, relatively little work has been carried out on agricultural practice in later prehistoric Scotland. This failing can again be seen as symptomatic of the type of research agendas which have for so long dominated the study of the Iron Age, with issues such as architectural origins, population movements, chronologies and artefact typologies representing the key issues of the last thirty or so years.

iv. The broader picture

Region A

There is a marked sparsity of evidence for Bronze Age marine exploitation in region A. The only find from a definate Bronze Age site was a single cockle fragment recovered from the cremation cemetary at Kirkburn (A/15), Lockerbie (Cormack 1963). However, this is of interest as it represents the furthest known removal of marine resources from the coast, the site being some 18km from the nearest stretch of coastline in the Solway Firth.

The lack of other types of evidence, in the form of shell middens or settlement sites perhaps mirrors the earlier period, where evidence for coastal activity is known but does not usually take the form of marine resource residues. A couple of bronze fish hooks are reported to have come from Glenluce Sands (Wilson 1881), but the fact that they are made of bronze need not imply a Bronze Age date. Bronze Age activity is known from this area, and other sand dune areas in Region A, but this is generally limited to pottery sherds and cremation burials (Davidson 1952). It must, however, be noted that Bronze Age marine exploitation may be represented in some of the less well recorded sites, as in the case of the various shell middens reported by Smith (1895), which include those at West Kilbride (A/14). The potential of caves, such as Cleaves Cove (A/6), Borness (A/17) and Torrs (A/19), which are so far better known for their Iron Age evidence should also be considered (see below).

Though still somewhat thin on the ground, evidence for Iron Age marine exploitation is more dense than for the Bronze Age. Most notable here are the series of caves, several of which were discussed briefly in the previous chapter with relation to their potential to contain early period evidence. Some of these sites are better known for their use in later prehistoric and early historic times. These caves include Torrs Cave, Kirkudbright, where a complex series of drystone structures, including a blockhouse, stairway and platform were found to have been constructed inside the cave. The earliest of these structures appear to have been constructed during the Iron Age, though the cave appears to have been utilised up to the eighteenth century. The excavator reports that nine distinct archaeological layers were identified within the cave, which included two dating to the Iron Age (Morris 1937). A considerable quantity of faunal remains were recovered from these deposits, including the bones of sheep, pig and cattle, deer antler and marine shells, the latter being dominated by whelk and winkle. A number of the animal bones displayed signs of working and the artefacts created included needles, toggles and a fish hook.

Another cave in this region to have provided evidence of late period activity is the Borness cave (A/17), also in Kirkudbright, which was excavated in 1872 utilising the same techniques as adopted for the excavation of Kent's Cavern in Devonshire (Corrie et al 1874). Three occupation layers were identified and all of these were found to contain animal bones and marine shells. The animal bones included cattle, sheep, pig and red deer. Detail on this material is limited but the excavation report does note that pig bones were virtually absent in the upper layer but in those beneath they were found in almost equal quantities to the other species. Burnt bones were found associated with charcoal in all layers and a single carbonised cereal grain of wheat was also recovered, though from which layer is not made clear. Marine shells were well represented in many parts of the cave and a wide range of species was identified, including limpet, mussel, oyster, winkle, whelk and scallop, though many of these were found in small numbers with limpet and periwinkle being the only species to be found in large numbers. It was noted that shells were commonly found related to fire spots and hearths and were often burnt. A few fish bones were also recovered.

A varied assemblage of artefactual material was also recovered from the Borness cave, including worked bone in the form of combs and decorated toggles, the use of the latter being uncertain, though it is suggested that they may have been used as clothes fasteners (Morris ibid, 496). Pins of bone and bronze were identified and evidence for metalworking took the form of slag and lumps of what may be iron ore. A number of perforated stones were recovered and it is suggested that these were loom weights, although with the presence of fish bones their use as net weights cannot be discounted.

Limited evidence in the form of type III deposits has been identified. The region is perhaps notable for the presence of Teroy (A/29) the most southerly of the brochs to provide evidence for marine exploitation in the form of marine shells. Despite this distinction it must be noted that this evidence was nothing if not limited, as the excavator states: "Besides some particles of burnt bone, a fragment of a cockle shell, and a small bone of an ox, no other food refuse was seen" (Curle 1912). This observation stands in stark contrast to the findings of those excavating brochs further north (region D), where faunal remains appear in substantial quantities.

The only other notable Iron Age contexts to have provided relevant evidence in this region are the crannogs at Lochspouts (A/10) and Ashgrove Loch (A/3), both in Ayrshire. Both of these sites were investigated by Smith, who must take the credit for recording a large proportion of the evidence from region A. At Lochspouts the excavation of a grassy mound on the margins of a drained lake revealed preserved timbers representing an oak beam floor contained within a circular arrangement of piles. Beneath the pavement were found large quantities of limpets and periwinkles. Finds from the site included sherds of samian which suggest a late date for the occupation of the timber structure, while the presence of the marine shells beneath the timber floor may suggest that they may relate to an earlier phase of activity.

The site at Ashgrove, which Smith (1895) describes as a crannog, is unusual in that it appears to be built from stone, whereas the majority of known crannogs appear to have been built from timber set into rubble foundations. A midden deposit apparently related to the site included a large quantity of periwinkles, along with animal bones and red deer antler. The artefactual assemblage included a bone fish gorge of a type often found on late prehistoric sites.

These crannog sites are notable in that they include marine shells but are situated a considerable distance from the present coastline. The site at Lochspouts is located some 9km to the east of the nearest stretch of coast at Turnberry Bay, while the Ashgrove site is some 3km to the north of the nearest coastline. The movement of shellfish in their shells over relatively long distances is somewhat at odds with the general perception of shellfish as a foodstuff of poor nutritional value and Ayrshire has never been considered as an agriculturally marginal area, a factor which has been used to explain the widespread utilisation of marine resources further north. The presence of a fish gorge at Ashgrove may suggest that marine fishing was also practiced, but these implements are equally effective on freshwater species.

The late period evidence from region A is extremely limited with the majority of sites represented by caves. The only type III deposits are those represented by the broch and crannogs. However, the evidence for structural elements from St Ninian's Cave demonstrates that even the most complex of classificatory systems could not accommodate the full variety of archaeological sites. If nothing else the presence of structures within this cave should make us think a little more about what are all too easily are regarded as simply defined single spaces accommodating a multitude of activities within that space. A common failing of early cave excavations is to distinguish between variations in deposits within caves.

Region B

Region B is best known for its early period evidence, with the Obanian sites dominating much of the discussion of marine exploitation. However, there is some evidence relating to later period activity, much of it dating from the Iron Age rather than the Bronze Age.

A somewhat fragmentary picture of the nature of Bronze Age coastal settlement has been obtained through the excavation of Bronze Age deposits at Killelan Farm (B/71), Islay. Here the erosion of sand dunes once again revealed evidence for human activity in the form of artefacts and stone structures. Excavation revealed a substantial spread of midden material which consisted of 'dark brown mottled sand, rich in pottery, flints, shells and bones. Incorporated within it are irregularly-shaped spreads of peaty black midden, full of shells and other rubbish, and in some places...crammed with sherds" (Burgess 1976). This material post-dated the use of various structural elements which included a stone-lined drain, various pits and postholes, horse-shoe shaped stone settings and areas of rough paving.

The function of these structural elements remains uncertain and the excavator suggests that they may have existed outside an area of settlement, which may have since disappeared in sand blow-outs or exist in an unexcavated area close by. The only midden deposits which appear to be contemporary with these structural elements is a substantial heap of winkles, which had been deposited over a bank to the north. It is suggested that this deposit may represent a specialised function for some of the features, with the area representing a processing and cooking facility specifically geared to shellfish. The presence of trough-like features which could have been used in cooking (see chapter 7) are cited as further evidence for such an interpretation, though it is admitted that the absence of much burnt material makes this less likely (Burgess ibid, 192).

The substantial deposit of occupation refuse which covers the structures includes more marine shells and the bones of cattle, with some sheep and possibly a few pigs. Shellfish distributions appear to vary with limpet predominant in the area directly over the structures and to their south, while to the south-west of the structures limpets are still predominant but a larger proportion of winkles appear. Fish bones were absent and there were very few wild animal bones. Evidence for crop cultivation in the form of carbonised cereal grains or querns was also absent, though a deatiled sieving programme does not appear to have been implemented. On the basis of recovered information alone subsistence practice appears to be largely pastoralist with the only wild resource exploited to any degree being shellfish. Such a simplistic picture should be tempered by the likelihood that this midden deposit does not represent an area of occupation itself but a dump removed from the main focus of activity - structural remains and further midden deposits were located in a *sondage* trench some fifty metres to the southwest of the excavation. Excavation of this area could very possibly reveal material which could modify this interpretation.

The island of Coll (region B), has provided a tantalising glimpse of Beaker activity. At Sorrisdale (B/70) a sand dune site revealed a portion of curved drystone walling which may well represent the wall of a structure, perhaps similar in form to those identified at Northton. In the area immediately outside this structure was a deposit of midden material, which included marine shells, into which had been inserted a burial, with an accompanying beaker (Ritchie and Crawford 1978). The concurrence of midden deposits and human remains is one that occurs widely and will be discussed in more depth in chapter 11.

Limited evidence for Bronze Age marine exploitation may be represented by some of the Oban sites, with the recovery of food vessel sherd and human remains from the shell midden at Cardingmill Bay (B/42). Further south at Crarae (B/7), in Kintyre, a Bronze Age cairn (discussed in previous chapter) was found to have been constructed over a shell midden situated on the raised beach. Faunal remains in this deposit included cattle, sheep and deer, along with some horse bones (Scott, 1961b).

A small number of marine shells were recovered from the ground surface beneath the Bronze Age cairn at Kintraw (B/15) (Simpson 1967). A contextual relationship between marine resources and funerary activity is also evident at Sorrisdale, Coll, where a beaker burial was inserted into a type IIIb midden deposit, including marine shells, which had apparently built up outside a stone built structure (Ritchie et al 1978). The previously noted rockshelter at Crinan, near the river Add was associated with a Bronze Age cist inserted into shell midden deposits (Mapleton 1881). Interestingly, this discovery was made by a traveller who was using the cave for shelter in the late nineteenth century, thus demonstrating the long use of these caves in this part of Scotland.

Iron Age evidence is somewhat more common than that for Bronze Age in region B. As in region A some of this evidence has been recovered from caves (type I). Notable here is the Keil Cave (B/37), situated on the southern tip of Kintyre, from which was recovered a rich assemblage of metalwork. These finds included a bronze penanular brooch, with the presence of iron slag indicating that metalworking was carried out on the site. Other finds included bone combs, one of which was found in two pieces, with one fragment recovered from the top of the deposit and one from the bottom, thus suggesting disturbance (Ritchie 1967). Faunal remains included the bones of sheep, cattle, horse, pig or boar, deer and patches of shell midden material. This site appears somewhat isolated from activity taking place elsewhere, though evidence for Iron Age activity in the form of duns and hut circles are common place in Kintyre none of these are to be found in the immediate vicinity of the cave.

Other cave sites include the Crystal Spring Cavern (B/30), on Colonsay, from where pottery and metalwork were recovered from deposits including shells and animal bones (Stevenson 1881, Grieve 1883). A cave site which appears to be more obviously integrated within the wider context of contemporary activity is to be found on Bute. The cave at Dunagoil (B/21) not only contained an extensive collection of worked bone artefacts and faunal and shell remains but is also situated beneath a plateau occupied by two forts, Dunagoil (B/22) and Little Dunagoil (B/24). Both of these sites included marine shells, and at Little Dunagoil a deposit of shells was integrated within the rampart (Marshall 1964). It is possible that the cave was utilised at the same time as the fort sites, possibly representing a location from which fishing and shell fish collection was co-ordinated, though it is also possible that the site may have been occupied by groups denied access to the forts.

Type III deposits are reasonably well represented in Region B, both on the mainland and on islands. On the mainland the occupation of the stack site of Dun an Fheurain (B/46), in Oban, led to the formation of a midden deposit at the base of the stack. This deposit was composed of animal bones, including pig, sheep, and possibly horse and deer. The presence of a bovine horn core also points to the use of cattle. Marine resources were represented by the bones of mackerel and salmon, no marine shells were recorded (Ritchie 1971). These fish bones are unusual in that they represent rare occurrences of bones relating to fish which are commonly found in Scotland and must have been exploited to a greater degree than evidence suggests. For instance it has been suggested that salmon fishing played an important role in the economy of the Iron Age settlement at Lairg, Sutherland, despite the lack of direct evidence (McCullagh 1993).

The midden deposit at Dun an Fheurian also contained a relatively large number of finds which included combs and pins. A number of querns provided evidence for the processing of cereal grains, representing another element in a mixed economy which included herding, cultivation, hunting and fishing, with the latter evidenced not only by fish bones but also a fish gorge.

Another dun to include evidence for marine exploitation was excavated at Kildonan (B/38), in Kintyre. Again midden deposits were located at the foot of the slope beneath the site. However, the excavator concluded that this material had not been cast down from the site above but had been purposefully deposited to provide a firm floor foundation, though the purposes to which this were put are unclear (Fairhurst 1939). This material included stones, shells and bones the latter of which included wild and domestic species. The dun itself included shell refuse in several contexts, including the floor, stairwell and entrance area. Deposits of marine shells were also identified within the walls of the dun, the excavator assuming that this material was deposited there during a phase of activity which pre-dated the strengthening and thickening of the walls, at which time these deposits were covered over (Fairhurst ibid). However, as will become more apparent later, it appears to have been quite common to deliberately incorporate redeposited material, including marine shells, within the makeup of walls.

On the islands type III deposits have been identified at the broch site known as South Fort (B/41), on Luing. The first deposits to be identified were located in the entrance where marine shells and animal bones had been deposited (MacNaughton 1891). The marine shells were represented by oysters, cockles, razorfish, mussels and whelks. An equally varied range of mammal bones were also identified, including red deer, roe deer, pig, cattle and seal. Within the broch proper were found various deposits of faunal remains, with marine shells and animal bones being deposited on the floor of the intra-mural chamber. Similar remains were found throughout the structure and within the rubble collapse which filled the structure. Bones and shells were also found on the slopes around the broch (MacNaughton 1893).

Shell deposits on the islands of Coll and Tiree also appear to be related to structures, though of less substantial nature than the broch previously noted. These sites are located in sand dune areas and manifest themselves as what are traditionally are referred to as kitchen middens, though further examination may reveal a rather more complex nature to these deposits. One such deposit revealed itself to be a circular spread of compacted material, including marine shells, which appears to have represented the floor of a structure (Mann 1906). Pottery, was found on the surface of this deposit close to its edge, probably representing material swept to the edges of the structure while the site was occupied. Some of these sites may represent Bronze Age activity but on the whole they appear to be later structures.

Region C

In region C evidence from Bronze Age settlement sites is generally limited to Beaker sites in the Outer Hebrides, the site at Rosinish discussed in the earlier part of this chapter. In general though Bronze Age settlement sites are not well known in this area, a factor which may be due to a lack of field survey on the mainland and an over concern with the excavation of Iron Age sites on the islands. These have provided plentiful evidence for marine exploitation, much of it represented by type III deposits, though there is more limited evidence for type I deposits.

Beaker period activity removed from chambered tombs and funerary ritual has generally been limited to settlement sites located in sand dune and machair regions in the Outer Hebrides and the coast of mainland north-west Scotland (region C). These sites are usually related to marine exploitation, with marine shells being ubiquitous. Excavation at Northton (C/10) on the island of Harris has revealed a complex sequence of occupation extending from the Neolithic to the Medieval and post-Medieval periods. The evidence for the earliest Neolithic activity rests directly on boulder clay, while subsequent occupations rest upon and are buried beneath layers of wind-blown sand (Simpson 1976). The second phase of Neolithic activity produced a radiocarbon date of 2461±79 BC (BM 705).

Environmental analysis based on terrestrial mollusc assemblages has indicated that the first phase of Neolithic activity at Northton was related to a reduction in the amount of woodland cover, while the predominance of cockles in the midden deposits is indicative of low sea levels which revealed large tracts of inter-tidal sand (ibid, 221). This picture changes in the Beaker levels, which have provided radiocarbon dates of 1654±70 BC (BM 707) and 1531±54 BC (BM 707), when there is a regeneration of woodland and a predominance of limpets, which, Simpson suggests, may be indicative of a return to higher sea levels and the submergence of the sandy littoral. A change in the nature of the configuration of the local coastline is apparent but whether this was actually due to a rise in sea levels is uncertain. A process of environmental change which may have removed marine sand and exposed rocks, from which limpets were collected, would have been the movement of sand from the sea onto the land. This event may have marked the initiation of dune and machair development, and certainly the first beaker horizon is separated from the second by a layer of wind-blown sand.

Structural remains related to the Neolithic occupation of the site were limited to a line of dry-stone walling, while in the beaker phase the remains of one well preserved and one quite denuded 'U' shaped structure were identified. These are described as being built in the lower beaker midden (Simpson ibid, 222). Unless the lower midden deposit actually accumulated while these structures were occupied it seems likely that other structures may have been related to this initial Beaker activity. What ever the actual sequence it is reasonable to classify these midden deposits as type III deposits.

The laminated nature of the Beaker deposits has suggested to the excavator that settlement at this time may have been of short duration and sporadic (Simpson ibid, 222). A similar interpretation has been applied to the presence of thin beaker horizons identified on the

Ardnamurchan peninsula (Bradley 1978). Whatever the cause of the change in the nature of the coastline it does appear that the beaker activity is related to a period of change, in both the environment and in material culture.

Sheep and cattle bones were plentiful in both the Neolithic and the beaker deposits, and the presence of abundant red deer bones in the latter indicates at least a continued reliance if not an upsurge in the role of hunting. The total absence of charred cereal grains or grain impressions on pottery has been taken as indicative of a pastoral economy practised without recourse to arable production (Simpson 1976, 226).

The erosion of sand dunes on the island of Benbecula, immediately to the south of North Uist, revealed an extensive midden deposit at Rosinish, some 150m x 65m, from which was recovered an extensive beaker ceramic assemblage (Shepherd 1976). Excavation was limited to a 10% sample using meter square pits in a random configuration, though some larger areas were also opened. No structural remains directly related to the midden deposit were identified, though it must be remembered that total excavation did not take place. A 'U'shaped feature similar to that at Northton was identified but this appeared to post-date the midden itself (Shepherd ibid, 214). The feature may therefore be classified as a type II deposit with its relationship to settlement being somewhat uncertain. However, despite marine shells being detected within the midden deposit this appears to be largely constituted by a rich organic deposit and therefore cannot be described as a shell midden. It may have more in common with midden deposits or occupation layers detected on settlement complexes. In one area a distinct concentration of marine shells was detected, with a deposit of winkles underlying a thin layer of razorshells, which in turn underlay a deposit of limpets.

Perhaps the most interesting feature of the Rosinish site (C/71) is the presence of ard-marks sealed beneath the midden deposit. The stratigraphy therefore appears to indicate a change in the nature of land use on the site, with land previously turned over to agriculture being replaced by the deposition of material which included evidence for marine exploitation. However, the recovery of cereal grains from 50% of the test pits does not suggest that this local shift in land use was related to an overall abandonment of cereal cultivation. Midden material was used widely as a form of fertilizer, being spread on areas of arable land, but it seems unlikely that a deposit of this nature represents material tilled into the soil.

Beaker levels have also been identified at the Udal, which occupies the north west coast of North Uist, which sits to the north of Benbecula and to the south of Harris. Other midden deposits known to include Beaker pottery, include the site at Ensay on Harris and that at Bosta (C/18), on Uig (Smith 1989), at least the latter of which is though to relate to a structure.

As discussed in the previous chapter, the classification of type II deposits is somewhat problematic. This is nowhere more obvious than in the case of deposits situated within the sand-dune areas or machair regions, which make up much of the coastline of the Outer Hebrides. Many deposits are first revealed due to either the action of the wind or the sea, with the former uncovering materials in blow-outs and the latter creating eroded sections on the shore. Both of these erosive agencies tend to reveal only parts of a previously concealed or buried site at any one time. The revealed component may well be a deposit dominated by marine shells, which without the benefit of excavation may appear to the archaeologist as a shell midden deposit of the type classified in this work as type II. The marine shell deposits may appear to exist independent of and isolated from other archaeological features which include structural remains. However, in some circumstances elements of structures may be revealed along with shell-rich deposits, and thus indicate that they were related to the use of structures (type III), which may well have represented the site of habitation.

There are several examples of sites which first manifested themselves as type II midden deposits only later, after excavation, revealing themselves to be only part of complex settlement complexes which included substantial structural elements. The site at Links of Noltland (D/93), in Orkney (region D), first came to light due to the identification of midden material within dune blow-outs. It was only with excavation that the related structural remains were discovered. It should also be remembered that Skara Brae itself was first revealed as a section of midden material exposed when a heavy storm caused a sand-dune blow out (Petrie 1868). Similarly, on South Uist the identification of midden deposits exposed in an eroding section at Cnip (C/19) prompted further investigation. As excavation extended further inland it became apparent that the midden deposits were directly related to an Iron Age wheelhouse complex (Armit, 1988, 1992).

The problems related to differentiating between type II and III deposits have to be faced when dealing with a number of sites in the Outer Hebrides. The area around Galson, at Borve in Lewis, has proved very rich in archaeological remains, and discoveries have included an 'earth house' (C/22) (Edwards 1924). Work by Baden Powell and Elton (1937) established that midden deposits extended along the eroding dune front for a distance of some 200 yards, and included marine shells and animal bones, some of which appeared to have been deposited on stamped clay floors. In this same vicinity a number of Iron Age cist burials were detected (C/22), though their relationship to the midden deposits is difficult to establish. These graves represent a rare occurrence of obvious type IV deposits as late as the Iron Age (Ponting 1989 - see chapter 10).

Deposits similar to those recorded at Galson, and usually described as 'kitchen-middens', are a relatively common occurrence in the sand dunes which punctuate the coastline of the Outer Hebrides. These often included marine shells, animal bones and sherds of pottery, which very often had eroded from their original context and lay scattered across loose sands. It is probable that many of these sites relate to structures which may at the time of discovery be only partially visible or even totally obscured by sand. These sites include, Daliburgh (C/67); South Uist, Cladh Hallan (C/66); South Uist, Loch na Buile (C/43); North Uist and Sithean Mor (C/45); North Uist. At the time of occupation many of these sites, which probably relate to Iron Age activity - though without excavation the possibility of earlier activity cannot be discounted, are likely to have been situated somewhat further inland than they are at present. The Outer Hebrides have suffered extensively from marine erosion and people today are aware of considerable marine encroachments taking place in their lifetimes (Armit 1988). Such a consideration makes it even more likely that these deposits represent settlements located at some distance removed from the shore. It is reasonable to suggest that the majority of primary exploitation and processing stations (type II deposits), of both early and later periods, which are usually situated in the immediate vicinity of the shore have been lost to the sea long before now.

A number of settlement excavations have taken place in the Outer Hebrides, the work at Cnip being just one of a number of more recent excavations carried out in a programme of archaeological work by Edinburgh University. Earlier excavations include the wheelhouse sites at Allasdale (C/1), on Barra (Young 1953); A Ceardach Bheag (C/65); a wheelhouse in South Uist (Fairhurst 1971); and the nearby site at A Cheardach Mhor (C/64) (Young 1960). Excavations carried out at Sollas (C/46), North Uist, carried out by Atkinson in 1957, have only recently been published (Campbell 1991). All of these sites are situated in machair and all of them have provided evidence for mixed economies, which included marine exploitation.

Marine shells were identified from all of the above sites, in a number of contexts, both internal and external to the structures themselves. Wheelhouses are so-called because of the radial bays which extend from the walls toward the centre of the circular structure. At A Cheardach Mhor these bays have provided a number of depositional contexts, with a heap of razor shells being recorded in bay 6, while beneath the paving in the angle of the wall was found a quantity of closely packed limpets. It has been suggested that these may have been stored for the specific purpose of providing temper for pottery, though no mention of shell temper is made in the ceramic report (Young 1960). Pottery which did utilise shell temper has been recovered from the site at A Cheardach Bheag (Fairhurst 1971). Another of the bays at A Cheardach Mhor included a number of pottery sherds beneath a deposit of large limpet shells, while a quern stone was recovered from a lower level. Marine shells were also recorded throughout the wheelhouse floor levels, including oyster, mussel, razor and large whelk shells. Other types of marine exploitation were evidenced by a whalebone cup, and whalebone post sockets. A couple of possible fish gorges were also recovered from the site, though only two fish bones were recovered. However, it is likely that decay and depositional practice may well be responsible for the small number of fish bones recovered, without the benefit of sieving, factors which perhaps weaken the specialist's case that "fishes were clearly of no significance" (Clarke in Richardson 1960, 169). Unfortunately the other wheelhouse excavations do little to elucidate the question of fishing, with the A Cheardach Bheag report lacking a faunal report and making little mention of economic evidence, though a fish gorge was reported (Fairhurst 1971).

The variety of settlement structures which relate to the later period becomes even more obvious when one considers the so-called 'earth houses', some of which may represent souterrains, while others appear to represent more substantial subterranean or semi-subterranean dwellings. A number of these have been discovered in both the Outer Hebrides and the Orkneys, some of which have been found to contain marine shells and other marine residues. In region C these include the site at Bac Nic Connain (C/35), in North Uist from which whalebone was recovered (Callander 1932) and those at Galson and Gress (C/23) in Lewis, all of which have included marine shells and other midden deposits (Edwards 1924, Liddel 1874, MacKie 1966).

The earth house at Galson was found to be a complex structure with four cells, each of which was found to contain midden material which included marine shells such as limpets, periwinkles along with a few mussels and scallop (Edwards 1924). An eroding section revealed that this structure fell out of use and was covered by a deposit of wind blown sand prior to the accumulation of further deposits of midden material (ibid).

Region D

Evidence for Bronze Age activity in the far north of Scotland is generally limited to funerary sites, with very few settlements recorded. There is a good probability that at least some of the coastal 'midden sites' recorded in the corpus will relate to Bronze Age settlements but excavation would be required to establish this suggestion as fact. The settlement pattern on Orkney is dominated by Neolithic and Iron Age sites, the former represented by complexes such as Skara Brae, Rinyo, Barnhouse and Links of Noltland, while the broch appears to have been an important component of the cultural landscape of the Iron Age. Many sites appear to have undergone protracted periods of settlement and it is likely that at least some of these Iron Age settlements are sited upon Bronze Age sites.

Considerable numbers of Bronze Age funerary monuments, in the form of burial cairns, are known to be distributed throughout the archipelago (Downes 1993). Though evidence for bronze age settlement is poorly represented on Orkney the best preserved and most thoroughly investigated bronze age settlement in Scotland is to be found in the northern isles, though at Jarlshof, in Shetland, which included a good deal of evidence for marine exploitation and this is discussed in more depth in chapter 10.

Despite the presence of a Bronze Age phases at Jarslhof it is to the Iron Age that we must look in order to find a substantial body of evidence relating to late period marine exploitation. The greatest proportion of known evidence for prehistoric marine exploitation can be seen to be related to Iron Age activity and much of that is presently known to exist on the Orkneys. As reference to the corpus will make apparent, much of this evidence relates to brochs, which for a long time have provided a focus for interest by archaeologists, having been subject to investigation, of a varying standard, for well over a century now. Several investigators have noted kitchen middens in the immediate vicinity of brochs, some of which at least must relate to the use of these sites. Though the contents of these deposits are rarely itemised the term kitchen midden is most commonly used in relation to deposits which include marine shells and so their presence here is likely. The threat posed to these deposits by modern human agency is demonstrated by the observation that kitchen midden deposits outwith the broch at Knowe of Skogar (D/87) were utilised by farmers as manure (Hedges 1987), as has also been noted for several other midden deposits elsewhere.

A number of brochs, both on Orkney and the mainland, have been subject to more recent excavation, and so have provided more information on the nature of economic practice and its archaeological residues. Notable here are the excavations at Bu (D/143) on Orkney and Crosskirk (D/4) in Caithness. Like the previously discussed site of Dun Mor Vaul (B/63) on Tiree these sites have provided valuable evidence for marine exploitation.

Outwith broch sites Iron Age evidence takes a number of forms, with early references to 'earth houses' noting the presence of marine shells. However, these sites have generally failed to attract the same interest as brochs and so remain poorly understood. On Orkney a good deal of the available evidence takes the form of eroding sections; including those at King's Craig (D/84), Papa Westray, Balfour Castle (D/55), Shapinsay and Runthell Shore (D/47), Stronsay. A number of these eroded sections, which include shell midden deposits and sometimes structural elements, appear to be related to broch sites, perhaps representing related external settlements, as at Benni Cumi (D/48), Stronsay and Hill of Fea (D/75), South Ronaldsay. However, it is likely that a good proportion of these eroding sites are not related to brochs but must be subject to excavation before any further conclusions can be drawn.

It has already been pointed out that earth houses in the north of Scotland are indicative of the wide variety of settlement structures known to have been utilised during the later period. This variety is further highlighted by the presence in region D of two further classes of monument, these being souterrains and wags. Subterranean or semi Subterranean structures have been noted in the case of so-called earth houses in both the Orkneys and in the Outer Hebrides but these appear to differ somewhat from 'true' souterrains, indeed structures such as the wheelhouse at Cnip, on Uist, can also be described as subterranean, being built into stabilised sand dunes. Souterrains cannot be so readily interpreted as dwelling places, being more limited in size and quite often associated with more obvious dwelling structures such as hut circles. They have been variously interpreted as places of refuge, places of storage - rather like cellars, or as byres for livestock. This work does not intend to pursue this debate, but the broad range of types may again point away from a single function. One example within region D is noteworthy, that being the structure on the eastern shore of Loch Errable in Durness. This souterrain, which is structurally related to a hut circle, was found to contain a deposit of midden material which included marine shells (Morrison forthcoming). However, this deposit appears to have fallen into the souterrain, which was covered by stone slabs, once it had fallen out of use.

Another class of monument in Region D, and one which is unique to the area, and more specifically to Caithness, is the Wag. The name derives from Uamh which is Gaelic for cave, a derivation probably relating to the cave-like spaces beneath the orthostat supported slabs which are a feature of these sites. Very few have so far been excavated, one of those which has is the Wag of Forse (D/22), in Latheron parish (where the great majority of Wags are situated). Though excavation has done relatively little to clarify the function and character of these sites they do appear to represent Iron Age settlement sites. The site at Forse has also provided evidence for the use of marine resources in the form of marine shells inserted into the matrix of a wall (Curle 1948, 280).

The insertion of marine shells and other types of midden material into the walls of Iron Age domestic structures is also demonstrated by another monument located with Latheron parish. Recent restoration work on Dunbeath broch resulted in the identification of domestic and wild animal bones, along with various species of marine shells, inserted in the wall matrix of the structure (Banks 1992). This is a depositional context which recurs widely on broch sites in particular and will be discussed more fully later in this work.

That the north of Scotland is far from devoid of good quality agricultural land is clearly demonstrated by the broch sites at Keiss, which have already been touched upon in chapter three. Two of these sites, excavated during the latter half of the nineteenth century, have provided evidence for marine exploitation, though as noted in the previous chapter, some of this material may relate to an earlier period. The first of the sites excavated, the Harbour mound, is situated on a raised beach terrace in close proximity to the sea. Its landward side is today occupied by large fields which support intensive cereal crops. The more inland of the two sites, the cemetery mound is, like the harbour mound, a highly complex structure, consisting not only of a broch but also a series of related buildings. This site is located the best part of a kilometre from the coast, within the arable land noted above, but has still provided evidence for marine exploitation in the form of marine shells. Clearly then, marine exploitation cannot simply be written off as a side-effect of poor agricultural potential, as it is likely that the land around these sites has for a long time provided a rich source of agricultural produce.

Region E

Bronze Age evidence, which has been somewhat lacking in the other regions, is represented by a small number of sites. Again, sand dune systems and machair have been found to be richly populated by late period sites, many of which have provided evidence for marine exploitation. Here, the sands of Fivie, the Culbin sands, the Tentsmuir sands, and the Links around Berwick are notable. Both type II and III sites are well represented, though again there is some difficulty in differentiating one type from the other, with sites which may appear isolated (type II), possibly relating to structures no longer visible. Excavation of the previously mentioned midden in the Culbin sands (E/80) revealed a series of deposits of Bronze Age date with limited evidence for structures within the deposit, though the site had been heavily disturbed in recent times. It is suggested in the report that a post slot may be related to a temporary structure related to the first of two midden deposits (Coles and Taylor 1970) while no such evidence was identified in relation to the second deposit. The site is presently situated over a kilometre away from the shoreline and there is little evidence to suggest that this distance was any less during the use of the site. Though shellfish were obviously valued, being transported over considerable distances, they were not important enough to influence the location of the site, from which evidence for pastoral and arable cultivation, in the form of cattle, sheep and pig bones, along with some cereal grains, was also recovered.

Another Bronze Age shell midden was identified by Curle at Tusculum, North Berwick, at the turn of the century. This site represents something of an archaeologist's dream as Curle literally discovered it in his back garden! The site first came to light when Curle was strolling in his garden and noticed marine shells on the surface, further investigation soon brought sherds of Medieval pottery to light. Having decided to sacrifice his lawn to excavation Curle came across a Medieval stone-paved floor which overlay a substantial deposit of marine shells, dominated by whelks, which also contained beaker pottery and an assemblage of flint and bone artefacts (Curle 1908). A second midden deposit was found to extend beneath the house, though evidently Curle was not prepared to sacrifice his home in the name of archaeology! This second feature contained fragments of urn, some of which included cereal impressions, and so may post-date its neighbour. Curle noted a number of stone built pillars and deposits of clay related to the first midden (ibid). This may suggest that these deposits were related to structures, and so bring them within the class III category.

Marine residues within ritual contexts (or type IV deposits) are represented by a limited number of sites in region E. Here, the corbelled burial chamber located in Gullane Sands is probably the best example. This was found to contain marine shells as well as human remains (Paul 1905) and its similarity to the corbelled burial chamber at Rosinish in Uist (region C) has already been noted.

Evidence relating to Iron Age marine exploitation in region E is somewhat thinner on the ground than for the preceding Bronze Age, a pattern which contrasts strongly with region D. Despite this apparent sparsity the evidence that has been recovered can again be seen to originate from a variety of contexts, which include caves, a souterrain, hillforts and various sand dune sites.

Caves have produced probable evidence for Iron Age activity and include: the Weymss Caves (E/), Fife (though these are best known for their Pictish carvings), Kinkell Cave, near St Andrews and Constantine's Cave in Fife, within which evidence for several paved floors was identified. It has been suggested that an apparent scarcity of fish bones at the latter two sites, in comparison with other caves, indicated that hunting was more important than fishing (Wace and Jehu 1915). Further south the caves at Archerfield near North Berwick have also been found to contain evidence for Iron Age activity, including marine shells and domestic animal bones (Cree 1908).

Though region E lacks the large quantities of stone-built structures which characterises region D the association between settlement sites and marine deposits is still apparent on at least two hillforts. At Traprain Law, Lothian, the bones of ling and seal were recovered (Ritchie 1916), while at Broxmouth, in East Lothian, the bones of fish, whale and seal were among those identified (Barneston 1983). Despite the limited number of these occurrences it should be kept in mind that materials such as animal bone are much less likely to survive on these open rural sites than in stone structures which may well be situated in alkaline sands.

Relatively few souterrains have been excavated in region E, despite their presence in numbers unsurpassed elsewhere. Only one of the sites so far excavated has been found to contain evidence for marine exploitation. This was limited to a small pit containing marine shells which had been cut into the earth deposits which filled the souterrain at Ardestie, Angus (Wainwright 1963, 119). This material is clearly later than the use of the souterrain and does little to suggest a strong correlation between marine resources and souterrains. The only evidence which may relate to the use of a souterrain therefore comes from St Kilda, and that from a poorly reported excavation (Stell and Harman 1988, 35).

It has already been noted that deposits located within shifting sand dune deposits can be difficult to interpret. Despite long being a focus for antiquarians and archaeologists dune sites on the east coast of Scotland have generally evaded the full scale excavations which have been so common in similar locations in the Outer Hebrides. It is not surprising that sites which have generally been observed only as eroded section or as blow-outs are poorly understood. However, it cannot be doubted that Iron Age activity is represented by at least some of the sites in areas such as Berwick Sands, Culbin Sands, Tentsmuir Sands and the various other links and dunes which skirt the east coast of Scotland.

v. Conclusion

The number of sites known to include evidence for later period marine exploitation can in general be said to greatly outnumber those known for the earlier period. However, evidence for Bronze Age settlement is somewhat limited, with known sites limited to machair regions, though little obvious evidence is known to exist in the largest expanse of machair in the Outer Hebrides. It is highly likely that a number of those sites identified over the past century in localities such as the Tenstmuir sands, Culbin sands and other areas were Bronze Age or at least had Bronze Age elements. There does appear to be some similarity between the evidence which is known, with structures at Ardnave bearing close resemblance to the earliest phase at Jarlshof. These sites will be considered in more detail in chapter 10.

The high number of probable Iron Age sites in the Orkneys is perhaps most striking, many of them exposed as eroding sections along the coastline of the archipelago, though it cannot be doubted that levels of marine erosion perhaps only equalled in the Outer Hebrides has been partly responsible for this exposure. This picture contrasts with areas further south, where evidence is a lot thinner on the ground, but again it is difficult to ascertain whether this pattern is meaningful or a result of differential visibility.

This chapter, and the one before it, outlined the nature of evidence for prehistoric marine exploitation. Though it has not been possible to discuss every site in the corpus these chapters have hopefully provided a coherent review of material which is wide ranging in both distribution and character. The following chapters will now use this material to further our understanding of the nature of coastal economy and society in prehistoric Scotland.

Chapter 7

You are what you eat: material culture and procurement practice

i. Introduction

The previous chapters have provided an overview of the various archaeological contexts from which marine residues and material culture related to marine exploitation have been identified. This chapter will now go on to consider the nature of marine exploitation and the techniques utilised in the procurement and processing of marine resources. This discussion will cover the various elements of material culture and the implications of their use for depositional practice and site organisation. This, it is hoped, will provide the foundation for an approach which will go some way toward a fuller understanding of the integration of marine exploitation with other elements of prehistoric social life and economy.

Eating is a necessary function of life. The procurement of food is and always has been an essential element of the human experience. As such the means by which people in the past obtained their food has long been of interest to archaeologists. This interest has at least in part been stimulated by the fact that much of the archaeological record comprises material evidence related to the procurement, cultivation, processing and consumption of food. A large proportion of archaeological sites have provided some form of evidence for one or all of these activities. The technology of economic practice has spawned a rich and varied material culture, ranging from barbed points to flint arrowheads, from rotary querns to ard tips, not forgetting one of the most common components of the artefactual corpus: pottery. Despite the aforementioned interest in subsistence it is interesting to note that the archaeological study of ceramic vessels has for the most part totally divorced them from the purpose for which many of them were made: the storage, preparation and serving of food.

In Scotland, more so than anywhere else in Britain, we are fortunate in that this material culture is complemented by the availability of direct evidence for subsistence in the form of faunal remains. Due to their high alkaline levels, marine shells, either in a cultural context such as shell middens or in a natural context such as shell sands, have a tendency to promote the preservation of organic materials. This quality has led to the association of marine shells with animal bones - some of which have been modified into artefacts. The term 'fact mine' was earlier introduced to describe the perception of these deposits as rich sources of evidence. However, as this discussion progresses it will also become evident that much has failed to survive, with the result that the nature of certain procurement techniques remains uncertain. Here anthropological and ethnohistoric material may be utilised in order to explore some of the many possible responses to the marine environment and the resources to be found within it.

ii. Shellfish procurement

The material culture related to the procurement of shellfish such as limpets and periwinkles may be of a very basic nature. Force is usually required to remove limpets firmly attached to rocks, and this may well be applied through the use of a beach pebble or 'limpet hammer', with the best known examples recovered from the Obanian shell middens. The technology is simple, readily available and requires no manufacture. Martin, from observations on Skye, eloquently documents the hunt: "The limpet creeps on stone and rock in the night-time, and in the warm day; but if anything touch the shell and then no hand is able to pluck it off without some instrument: and therefore such as take 'em have little hammers, called limpet hammers, with which they beat it from the rock; but if they watch its motion, and surprise it, the least touch of hand pulls it away: and this that is taken creeping, they say, is larger and better than that is pulled off by force" (1716, 142).

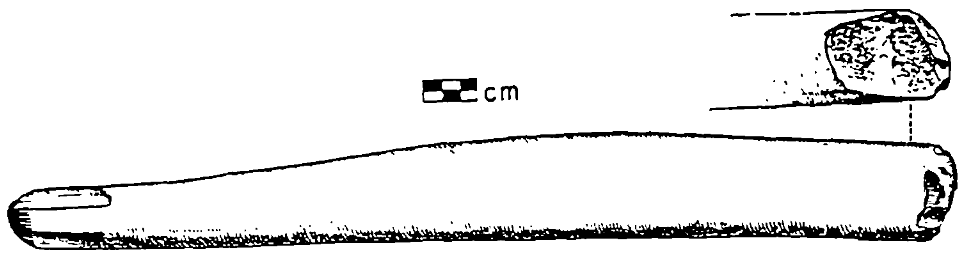


fig 10. Typical limpet hammer (from Lacaille 1954)

Periwinkles certainly require no implements other than the hands to remove them from the rocks, the same being true of whelks. Burrowing shellfish, such as razor shells and cockles, which conceal themselves in sand at low tide, require an extractive tool, though anglers have been known to force razors to the surface by pouring salt down their burrows. Though rakes and forks are commonly used in the modern period these implements could easily take the simpler form of a digging stick or a piece of bone or antler. The use of terrestrial resources, such as deer antler, in the procurement of marine species represents an interesting juxtaposition, and it should not be assumed that those utilising such equipment were not aware of it. As Foxon has so rightly pointed out: "material culture plays an active role which both structures and is restructured by society. Objects are not simply the result of actions but integral to them" (1991, 241).

Extraction and removal may therefore require the use of very basic implements or none at all. However, the containment and transport of marine shells, which may have been collected in large numbers, would obviously demand baskets or bags of some sort. These require the input of labour in their manufacture and may have taken a variety of forms. Baskets from willow or other flexible wood, pleated vegetable fibre or grasses or reeds may have been used in this process; alternatively bags, bowls or trays of animal hide, bark, pottery or trays of wood may have been used.

iii. Shellfish processing

Alongside limpet hammers, 'limpet scoops' were identified as a common component of the Obanian directly related to the procurement and processing of shellfish. As the name suggests these were originally thought to have been used like a spoon to scoop limpet flesh from the shell. Bishop even went as far as to make concrete replicas of these polished and bevel-ended implements which in reality were of bone, antler or stone (Lacaille 1954).

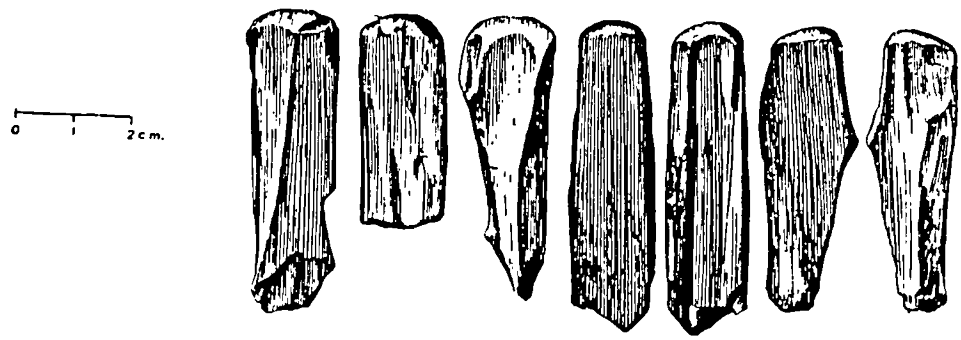


fig 11. Bone and antler 'limpet scoops' from Risga (from Lacaille 1954)

Bonsall (forthcoming) has suggested that these were used in the removal of limpets from rocks, but until this is established experimentally the present writer remains highly sceptical, finding it hard to equate bevelling and polish with the force required to remove firmly attached limpets from rocks. It has more convincingly been suggested that these artefacts were used in the working of skins or in some other task which would result in the rounding and polishing of the ends (Finlayson pers comm). Anyone who has eaten limpets raw, which is still regularly done in the Outer Hebrides while other shore-based tasks are being carried out, will know that the best way to remove a limpet from its shell is simply to use the fingers to poke it out. However, the application of heat will assist in the removal of limpet meat, as it will for most of the species of shellfish. Bivalves especially open most readily once they have been boiled, after which the meat can easily be removed with the fingers. Winkles and whelks are another matter, for even when heated they will require a pin or splinter, a 'winkle picker', to remove the cooked flesh from the shell. It has been suggested that bone pins recovered from the deposits within the Sculptor's Cave, Covesea, which included quantities of limpet shells, may have been used in this capacity (Benton 1931). Today, scallops tend to be shelled prior to their sale by fishmongers (see photograph of modern shell midden resulting from this process in chapter 8), but fishmongers were few and far between in the prehistoric past.

The boiling of shellfish requires the utilisation of a certain technology if it is to be carried out efficiently. Burnt mounds, with their masses of burnt stone and related troughs, have been widely interpreted as cooking sites (Barber 1990). Though the type of cooking activity evidenced by burnt mounds does not necessarily include the boiling of water - the steaming of food in cooking pits is well attested in the anthropological record - hot stones, or pot boilers, are an efficient means of raising the temperature of water very rapidly. This technique is far more efficient than placing a vessel, ceramic or metal, over a fire and waiting for the water to boil.

As Barber has pointed out burnt mound material has been identified on a large number of settlement sites (1990). Similar material was also present beneath the shell mound of Cnoc Coig on Oronsay (Mellars 1987). Judging from its context this material may well relate to the heating of water and the cooking of shellfish. It must be noted, however, that no troughs were identified on Oronsay. These features are almost ubiquitous on the substantial settlement sites found in regions C and D. These range from the Neolithic site of Skara Brae to the numerous broch sites. A variety of interpretations has been offered for these troughs or tanks, which are usually stone-lined. At Skara Brae Clarke has suggested that they were used for keeping shellfish fresh prior to its use as bait, with the shells being immersed in salt water (1976, 243). A similar interpretation is put forward by Fairhurst at Crosskirk (1984), while MacGregor has suggested that a sealed stone cist in the broch of Burrian was used to preserve seafood, birds' eggs and seal meat (1974). The recovery of mussel and periwinkle shell fragments from the bottom of one of these troughs or tanks was used as further evidence for this interpretation (Fairhurst 1984). Alternatively, Hamilton suggested that the troughs in the Bronze Age phase at the Jarlshof settlement were used to keep clay fresh and moist (1956).

It is equally valid to suggest that at least some of these tanks were used for the purposes of cooking shellfish and other foodstuffs. It was noted in the previous chapter that the excavator has suggested that some of the evidence from Killelan (B/71), which includes a trough, may have been geared toward the cooking of shellfish (Burgess 1976, 192) The tank identified in the interior of Bu broch was built into a large hearth which appears to have provided a focus for activity within the structure (Hedges 1987). The close relationship between hearth and tank may therefore indicate a cooking function - but as at Killelan no burnt stones or pot-boilers were reported in the vicinity. A rare example of a possible cooking trough found in relation to a shell midden was reported following the excavation of an extensive deposit at Inveravon, near Falkirk (Stevenson 1947). Here a deep pit was found to be cut through the shell deposits, in which were identified burnt shells and fire-cracked stones.

The boiling of shellfish in their shells has further implications for our understanding of the processes of deposition related to marine shells. Shells which have been boiled will tend not to smell as much as those which have been deposited uncooked even with the meat removed - residues of flesh and tissue are more likely to remain in a shell which has been emptied in its raw state than one which has been emptied once boiled. Substantial deposits of shellfish, particularly scallops, are sometimes bought by farmers from fish processing plants in order to provide material suitable for liming fields (the prehistoric equivalent of this practice is discussed later). The flesh from these shells is removed in its raw state and the smell from these heaps once the residual flesh decays, is anything but pleasant. Though admittedly based on twentieth century western perceptions of what constitutes an unpleasant smell, this is a factor rarely considered in the discussion of shell midden sites. These places would have had their own distinctive smell which people, especially those coming across one of these sites for the first time, would have been aware of. As archaeologists we are accustomed to considering the role of sight in our consideration of the prehistoric past (intervisibility, design and style etc) but we should perhaps also be aware of the other senses, such as smell and hearing, in our discussions of archaeological material.

Though the question of troughs has been raised with regard to their possible relationship to cooking shellfish, it is likely that a much simpler means of cooking shellfish was more widely used. Rather than go to all the trouble of building a trough and heating stones, one can cook shellfish just as efficiently simply by placing them in the embers of a fire. The presence of multiple firespots or informal hearths within the deposits of most shell middens may suggest that this technique was widely practised and many reports do include references to burnt shells. Bonsall (forthcoming) has suggested that the presence of shell middens in caves may be indicative of the need for shelter from the wind in order to carry out this process. However, it is as well to remember that shellfish represent only one form of food which was cooked, and it is also the most likely to be eaten raw. The presence of large numbers of apparently unburnt shells in midden deposits may indicate that it was not unusual to eat them without cooking, though the raw state could also indicate that they were used for bait in fishing.

iv. Fishing

Having dealt with the material culture related the procurement and processing of shellfish, we now move onto the evidence for fishing. It is to be expected that the technology involved in the procurement of fish will be somewhat more complex than that used in shellfish collection. However, the elements of prehistoric material culture known to be related to fishing are not well represented within the archaeological record. It is suggested that a number of factors are responsible for this apparent sparsity, perhaps the most important of which is the nature of the technology employed and the raw materials utilised.

The ways and means by which fish are caught demonstrate a diversity equal to if not greater than most other forms of subsistence procurement. Anthropological literature has been more than generously served by studies of fishing communities and the various methods and forms of technology utilised by them (Von Brandt 1964). The techniques adopted in prehistoric Scotland are also likely to have taken various forms, with only some of them represented by material remains. The scarcity of artefactual material is mirrored by the sparsity of fish remains recovered on archaeological sites. Much has been made of the problems relating to the tendency of fish bones to decay and this has certainly done little for our understanding. The fragility of fish bones has done little to promote detailed taphonomic studies of prehistoric fish bone assemblages. With their poor levels of survival allowing for little more than the identification of species or the assessment of weight and age of fish. The work on saithe otoliths recovered from the Oronsay shell mounds stand at the forefront of fish studies, with the results demonstrating that specific sites appear to be have been used at certain times of the year (Mellars and Wilkinson 1980). What is little understood is the way in which fish were processed and prepared once they were brought to shore. Work on the fish-rich Norse middens at Freswick and Robert's Haven has clearly demonstrated that the study of fish bone taphonomy does have the potential to provide an insight into processing activities (Barrett 1993), though preservation levels at Robert's Haven do appear to be somewhat exceptional, perhaps because these deposits are younger and therefore have not been subjected to the same levels of attrition as those on prehistoric sites.

Fish remains recovered from Scottish prehistoric sites do tell us, when species have been identified, that though many species were exploited a limited range appear regularly. As the environmental chapter pointed out some of these species are limited to specific habitats, while others shift from one to another on a seasonal basis. It is this seasonal movement which brings a number of species from deep to shallow waters in large numbers and it is while they inhabit these coastal waters that they fall within the range of people with the skill and technology to catch them. Today these fish can be caught in the deep water phase of their life cycle but this is unlikely to have been the case in the prehistoric period. Only with modern trawling and netting techniques can fish such as the cod be caught in its deep sea habitat where it is found in waters up to 600m deep (Muus 196 4). Fish at this depth are clearly beyond the reach of the prehistoric fishing technology. However, the cod can be found closer to shore and regularly feeds on Herring (Gray 1978). Today it can be caught with a rod and line from the shore in many parts of Britain. If a fish can be caught from the shore then it cannot be doubted that it would have been well within the technological range of prehistoric groups who exploited marine resources.

Cod are among the most commonly found fish on Scottish prehistoric sites, being identified at Morton Farm (Mesolithic-E/), Cardingmill Bay I (Mesolithic/Neolithic-C/42), Knap of Howar (Neolithic-region D) Peirowall Quarry, Orkney (Iron Age-D/108), Freswick Links (Iron Age-D/193), to name but a few. It is clear then that cod were exploited throughout prehistory across a wide geographical range. Though cod can be caught from the shore, it has also been suggested that the presence of large cod at the Neolithic settlement at Knap of Howar on Orkney is indicative of deep sea fishing from boats, using lines, perhaps

2 to 5 miles out at sea (Wheeler 1983), while similar expeditions are thought to have been within the capabilities of Mesolithic groups at Morton (Coles 1971). Line fishing is usually associated with the use of hooks. However, despite the likelihood that line fishing was commonly practised very few fish hooks have been recovered from prehistoric contexts.

The only example from an early context was recovered from the Risga site and may represent a Mesolithic implement, perhaps modified from an antler barbed point. Though this piece may appear unsuited to the task of catching fish, lacking as it does a barb, it is not dissimilar from known Mesolithic examples from the Continent, where the introduction of the barb appears to be a late Neolithic innovation (it is not unknown for modern sport fishermen to remove barbs from hooks in order to increase the 'sport' in landing them).

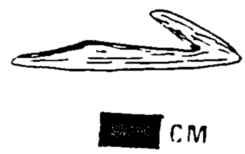


fig 12. Bone fish hook from Risga

A number of bronze fish hooks with barbs were recovered from the Drynan sands in Wigtownshire (Wilson 1881), though assigning a date to these implements is very difficult. It would certainly be naive to suggest that they were Bronze Age simply because of the raw material from which they were manufactured. Likewise, the presence of iron fish hooks on the surface of sand dunes in close proximity to shell middens at Brisges, Loch Spynie, near Elgin (Lubbock 1863), and in Culbin sands, does not necessarily indicate an Iron Age provenance. The possibility that metals were not used in the manufacture of fish hooks until very late may be suggested by the presence of a perforated fish hook of bone in late Iron Age deposits in Torrs Cave, Kirkudbright (Morris 1937). This small, but varied, assemblage appears to represent most of the known examples of prehistoric fish hooks to have so far been identified in Scotland; surely this tells us more about the likelihood of deposition outside excavated sites and the difficulties of survival, in the case of organic examples, and recovery than it does about the limited use of this technology. It is probable that many fish hooks were lost at sea while in use and so are beyond recovery.

The limpet is the most ubiquitous form of shellfish present on Scottish archaeological sites, with many deposits dominated by this species. Clarke, in his provisional report on the most recent excavations at Skara Brae has suggested that limpets were generally used as bait and only turned to as human food at times of extreme hardship (1976, 243) and quotes Lockhart (1837), who recorded that the inhabitants of Orkney regarded the eating of limpets as: "being the last of human meanness". This out of hand rejection of limpets as human food is somewhat at odds with historical accounts of the use of this species. Martin, in his travels reported that limpets were highly regarded in various places for their medicinal properties (1716). It is also worth remembering that the limpet has a relatively high calorific value, ranking well above cockles and being more nutritious than the oyster (Bailey 1978). A conflict of interests between the kelp industry and those requiring access to shellfish resources was noted on Orkney in 1762 when the removal of kelp from rocks left limpets unshielded from the sun and so they tended to bake and fall off (Fenton 1978). This pattern is repeated at Harray, where a portion of the foreshore was traditionally allotted to the poor in famine years so that they could collect limpets and other shellfish (Fenton ibid). This tendency to view shellfish as a starvation food is one which has long been associated with shell middens and has tended to perpetuate their image as artefacts of impoverished groups living a hand to mouth existence. However, this point should not detract from the fact that shellfish can represent an important fall-back resource, and their function in this role at various times during prehistory should not be underestimated.

These reports vary in their opinions as to what does and does not constitute food worthy of consumption. Some caution should perhaps be exercised when utilising historical sources to gauge prehistoric perceptions of what is and what is not good to eat. Today oysters are regarded as an expensive luxury, a prestige food. The promotion to luxury status may have occurred as long ago as the medieval period, where they regularly occur on prestige sites such as castles and tower houses, sometimes removed from the sea by some considerable distance (eg Smailholm Tower, Roxburghshire). It is highly unlikely that this species, given their common appearance in many archaeological contexts, was viewed in the same light during prehistory.

Though limpets were undoubtedly eaten during prehistory it is also likely that they were commonly used as bait in fishing. Historical accounts record the use of limpets to bait hooks and also their use as ground bait in fishing from rocks. Mashed limpets were often stored in bait-holes carved into the rocks and were periodically thrown into the water to attract fish such as the saithe to the surface, where it could be caught with a hook and line or a net (Sands 1882, 459; Fenton

1992). It is worth noting, in anticipation of later discussion, that a series of bait-holes can be seen carved into the rocks which front the present shore in close proximity to the shell midden on Risga. Though the limpet was often used as bait the most favoured shellfish for this purpose, in historic times at least, appears to have been the mussel, which in some places was so prized that whelks, which along with starfish, feed on mussels, were removed in vast quantities for no other purpose than to preserve the mussel beds (Fenton ibid).

Though there are a number of problems in establishing the processes responsible for the deposition of small animal bones in chambered tombs, see chapter 10, Hedges suggests that the presence of small inshore species of fish in the Isbister tomb is indicative of "small scale exploitation of tidal areas and shallow waters from the shore, not involving the use of boats. One or two individuals could have taken the species involved. There is no indication of large scale co-operation or investment of technology" (1983, 156). What is not foreseen here is the potential use of these smaller accessible species as bait in the catching of larger, more 'profitable' fish. Before this use is expanded upon it is perhaps worthwhile pointing out another slight short-fall in Hedges' thinking. Though these small fish may represent the activities of individuals rather than large scale co-operation it is likely that a more embedded form of co-operation is at the root of this activity; in that while these individuals were fishing they were not working in the fields, herding animals or building tombs (it can though, be suggested that fishing was at times carried out outwith those periods given over to other activities and this will be discussed later). The identification of these small fish on the settlement site of Knap of Howar, along with the bones larger fish, sheep, cattle and evidence for cereal production, strongly suggests that the rewards of this individual effort were shared in return for those of more obviously communal activities, the emphasis on individual effort, which resulted in procurement, perhaps being dissipated at the processing and consumption stage. The ultimately communal nature of these individual activities is again emphasised by the placement of these resources within a communal tomb.

It may be that this 'individual' activity also lies behind some of the small problematic sites, such as the Ellary boulder cave (region C), which are more difficult to tie in to the idea of community and group activity. These sites may represent shelters occupied by individuals while pursuing this littoral exploitation, an interpretation which would place these seemingly isolated sites within a wider context, taking in settlements farther away. The build-up of deposits which include marine shells, hearths and pottery sherds may indicate that these larger settlements were somewhat further removed from the shore. Journeying to and from the coast may therefore have been time consuming but still deemed worthwhile.

Though it has been suggested that the general absence of fish hooks may well be the result of depositional factors and inadequacies in retrieval techniques, it may be that alternative means were also employed in catching fish. These means may include the use of nets and traps, which are discussed below, but also include another method of line fishing. The use of the gorge is well attested by a number of finds from Scottish prehistoric sites. Though most commonly reported from Iron Age sites the gorge has been found on sites dating as far back as the Neolithic and its use in the Mesolithic cannot be discounted, despite a lack of finds.

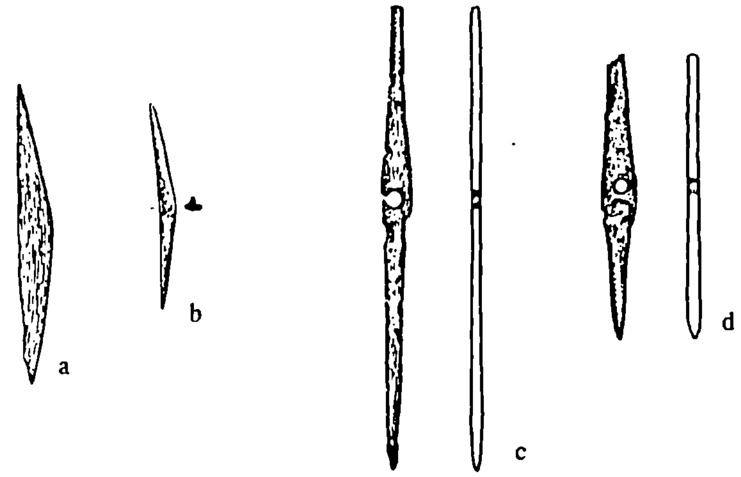


fig 13. Bone fish gorges from Jarlshof (a) Knap of Howar (b) and metal examples from Clickhimin (c and d), scale 1:2. From Hamilton (1956 and 1968) and Ritchie (1983).

The principle of fishing with a gorge is simple: the fish swallows bait, usually a small fish, which contains a length of wood or bone which becomes lodged in the throat of the prey-fish. Once the gorge has become lodged the fish can then be hauled to the surface on the line. Gorges are easily manufactured and it is possible that the simplest forms may take the form of minimally modified lengths of bone or wood. The most commonly identified forms are lozenge-shaped with many including a perforation in the central widest part of the gorge, in order that the line can be attached. However the perforation is not an essential feature and some fish gorges display a pinched waist around which the line can be wound while some may bear no evidence for line attachment. In this respect the examples from the Neolithic site at Knap of Howar, Orkney, and that from Bronze Age levels at Jarlshof, Shetland bear distinct similarities (fig 13 a and b). The only known examples of metal fish gorges are of bronze and were recovered from the Clickhimin excavations (fig 13 c and d).

One reason for the under-representation of these artefacts is probably a failure to identify them for what they are, and instead classifying them as pins or bodkins, as Hedges appears to have done with examples from Gurness (1987,98).

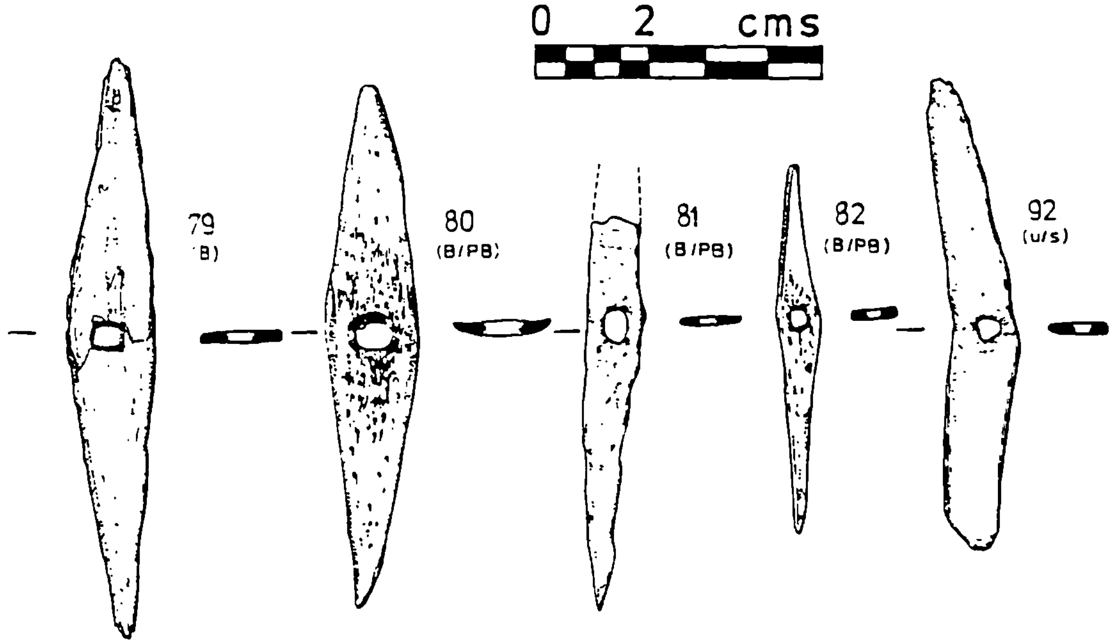


fig 14. Fish gorges from Gurness broch (from Hedges 1987)

The use of the gorge implies a two stage procurement practice depending as it does on the concealment of the gorge within a bait fish. Bait fish may have been caught with nets from rock pools or shallow inshore waters as noted above. Gorge fishing would have required a greater investment of labour than fishing with a hook, where shellfish such as limpets may have been used as bait, though small fish or pieces of fish may also be used to bait hooks. Once the bait had been caught the gorge could then be inserted, either simply by pushing the gorge down its throat or by slitting the abdomen and lodging the gorge within. The energy expended in catching bait fish and the size of gorges suggests that the fish caught with this method were relatively large, with the cod family being obvious candidates. It should also be noted that species such as the cod were generally larger during the prehistoric and early historic period that they are today, where over-fishing may be one cause of a reduction in size in the modern period (McGovern 1994).

The context of these finds is important. A large number of gorges have been recovered from settlement sites, including the Neolithic site at Howar, where a gorge was recovered from midden deposits outside one of the houses. A number have also been recovered from brochs and wheelhouses. The presence of these finds on settlement sites therefore suggests that fishing was highly integrated within the activities taking place on these sites, with fishing tackle being manufactured, stored and finally deposited in the settlement. Eventually the gorge appears to have been rejected in favour of the hook, as there does not appear to be a tradition of gorge fishing, at least in a marine context, in the historic period in Scotland.

v. Harpoons

One of the best known types of artefact identified in Scotland and thought to be related to marine exploitation is the barbed point. These have become the type 'fossil' of the Obanian and have been fully discussed by the present writer elsewhere (Pollard 1986). Though the barbed point is generally regarded as an artefact of the Mesolithic, its use in marine exploitation may have been more general both on a geographical and temporal scale, a fact which further suggests that the Obanian culture is the result of biased data recovery and interpretation. Other examples similar to those from Oban (fig.15) include the antler point from Shewalton in Ayrshire, which was recovered from the river, and the example from Cumstoun, in Kirkudbright (Lacaille 1939). A somewhat different, uniserially barbed point was recovered from the a peat moss at Glenavon, Banffshire (Paterson and Lacaille 1936). A bone harpoon (fig. 16) was recovered from Iron Age midden deposits at Dun Tomaidh on North Uist (Callander 1939), which has only two barbs but is not wholly dissimilar to the cut-down Obanian biserial point from the MacAthur Cave (fig 15.4). An example made from iron was recovered from Largo Bay in Fife, though this has been interpreted as an eel spear (Munro 1901). It is not unlikely that these implements were used, at least partially, in the hunting of marine mammals such as seals and cetaceans (whales and dolphins). There are several obvious ethnographical parallels for the use of barbed points as harpoons in the hunting of marine mammals. The much studied Eskimo hunt whales and dolphins from boats and from blow holes in ice flows. The Obanian barbed points are very similar to those prehistoric examples from Scandinavia which have been linked with seal hunting (Clark 1946). Woodman has suggested (1989, 18) that there is little evidence for the use of harpoons against marine mammals, citing an absence of marine mammal remains in Oban. However, a single seal jaw was reported from the Distillery Cave (Lacaille 1954, table V) and it is not unreasonable to suggest that the animal bones were held in lesser regard than artefacts by the early excavators and so many bones may have been disregarded. The presence of perforated butts on one of the MacArthur Cave points and a double perforated butt from Risga does suggest that these implements were used as harpoons at sea, with the detatchable head being retained on a thong.

In suggesting that the presence of seal bones in the Cnoc Coig midden on Oronsay is indicative of a use for the antler mattocks found in the same deposits in the butchery of marine mammals Woodman (ibid, 19) fails to explain the presence of a mattock fragment in Oban. Though it should be noted that recent microwear analysis of some antler mattocks has suggested other uses for them (see mattock section) it does not seem unreasonable then to suggest that marine mammals did play a role in the economy of those using the Oban caves and that the barbed points were utilised in their procurment. It is noteworthy here that marine mammals appear to have been absent from the Nether Kinneil shell midden, in the Forth valley, and also from the Morton midden (both excavated with modern techniques). Another notable absence from these sites have been both harpoons and mattocks, antler mattocks have been found in the Forth valley but in relation to isolated whale remains. This pattern once again points to a use for these implement types in the procurment and processing of marine mammals it may also. These finds of whalebone away from the Forth shell midden sites also demonstrates that we should cannot assume that shell middens lacking cetacean bone are indicative of the total absence of cetacean exploitation. It has been argued elsewhere (Smith and Kinaham 1984, 95), that the size and weight of many whalebones would not encourage those exploiting either hunted or beached whales to carry the bones very far from where the carcasse came ashore -though as will become apparent in later chapters it is obvious that at least some whalebones were moved from the shore to settlements. Though it cannot be established for certain that those exploiting the Forth whales were the same people who accumulated the shell middens the possibility of such 'off-site' activity should be taken seriously in any attempt to understand prehistoric marine exploitation.

Prehistoric whaling is a problematic issue, for whale bones need not relate to hunting as beachings are a fairly common occurrence (see below). Unlike line fishing it is highly unlikely that the hunting of marine mammals was ever carried out by individuals, though fishing may also have been a communal activity. The hunting of marine mammals is likely to have been dependent on team work and co-operation, with the possible use of several boats in hunting expeditions.

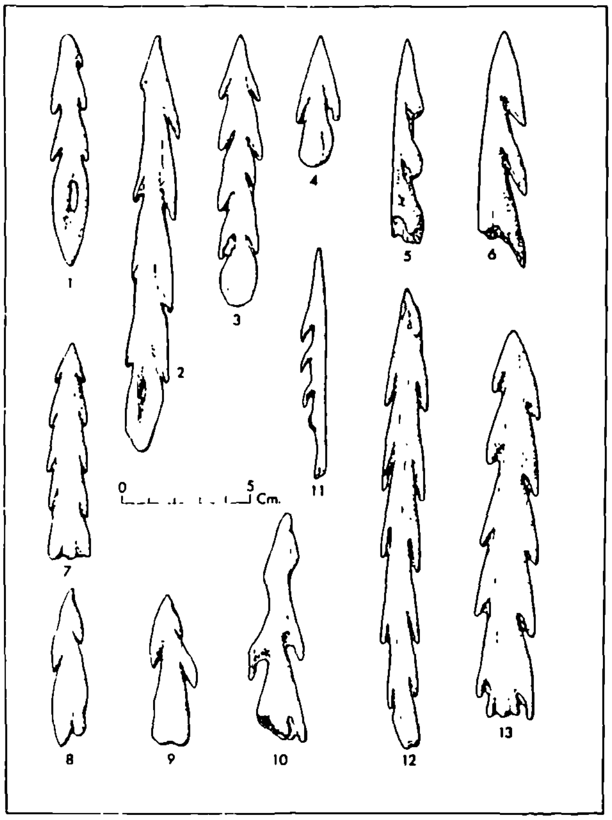


fig 15. Bone and antler barbed points. Whitburn, Co. Durham; 2-4 MacArthur Cave, Oban; 5,6, Druimvargie rock shelter, Oban; 7-9 Caisteal-nan-Gillean I, Oronsay; 10 Cnoc Sligeach, Oronsay; 11 Glenavon, Banffshire; 12 Shewalton Ayrshire; 13 Cumstoun Kirkudbrightshire. (From Morrison 1980).

fig 16. Bone harpoon from Dun Tomaidh, North Uist (From Callander 1931).

It is also possible to envisage barbed points or harpoons playing a role in fishing. Fish spears or leisters were used to catch saithe from boats on Loch Broom as recently as 1912 (Bathgate 1949). They could also be used in shallow tidal water, where flat fish such as the dab and flounder would provide ideal prey.

vi. Nets, traps and weirs

It has been suggested that the lack of artefactual evidence for fishing is in part due to the nature of the raw materials utilised in their manufacture. The susceptibility to decay of artefacts such as baskets, which were made from organic materials, mean that they are unlikely to survive. The same can be said for fishing lines and nets, which are also likely to have been made from organic fibres, including animal hide and sinew, woven vegetable fibres etc. A rare surviving example of the similar use of organic materials is the length of plaited straw rope from the water-logged Neolithic islet site of Eilean Domhnuill a Spionnaidh, on North Uist (Armit DES

1989, 70). Aside from a suggested netting needle from Dun Cuier, Barra (Young 1956), material culture related to fishing with nets is limited to what have been interpreted as net weights from a number of sites, again particularly from those of Iron Age date (a probable gorge from the midden at Dun Fherian, Oban was also described as a netting needle [Anderson 1895b, 280]). Net weights usually take the form of simple perforated stones which may have been attached to the lower parts of nets in order to ensure that they were properly deployed when in the water - though the possibility they were used as loom weights should also be considered.

Netting is an efficient and highly productive fishing method and may well have been practised to varying degrees throughout prehistory, though net weights appear to be absent from Mesolithic sites. A number of techniques may have been used. Perhaps the simplest of these involves the use of small poke nets which were used when fishing off rocks or in shallow water from boats (Fenton 1978). Estuaries and rivers may well have provided an important focus for fishing activity, and site locations suggest that these areas supported substantial populations. Fishing activity may have been synchronised with seasonal migrations of fish from the sea to fresh water spawning grounds in the case of salmon. Where such fishing is still practised, for instance in parts of Wales, the season for this type of fishing may extend from the beginning of March to the end of August (Jenkins 1974).

Seine netting involves the deployment of a long net across the width of rivers or estuaries using a boat to carry one end of the net while the other is fixed on the shore. The boat, still retaining the end of the net, then returns to the shore, usually down stream of the shore end of the net. The net is then drawn into the shore along with any fish trapped within its encircling action. This use of nets requires not only weights to keep the net vertical in the water but also floats to ensure its suspension from the surface. Floats may have been constructed from wood or inflated bladders and so, like the nets themselves, are unlikely to survive.

Techniques such as seine netting may have operated to strict rules governing which netting teams use the river at certain times, as only one net can be used on the river at once. Netters today may draw lots to decide who fishes on certain days (Jenkins 1974), while other types of fishing may be controlled through the allocation of pitches. The way in which access to resources was controlled and organised is vital in any consideration of prehistoric exploitation practice and is an issue which will be discussed more fully later in this thesis. Nets may also have been utilised on the open sea from one or several boats. Again, the presence of fish close to the surface would be important here as nets are likely to have been of limited size in the prehistoric period. Fishing expeditions may well have taken place in the evening or even at night when fish, such as the saithe, swim closer to the surface.

Netting and line fishing are techniques which usually require the active participation of either individuals or groups in the capture and procurement of fish, either from boats or from the shore. There is limited evidence to suggest that more passive techniques were also utilised. Fish weirs have been recorded in several places around the Scottish coast, where they are also known as yairs (Bathgate 1949). Those structures which have been identified have survived because they are of dry-stone construction, though there is evidence from the ethnographic record that timber weirs have been used in various parts of the world (Von Brandt 1964). In northern Scotland timber or wicker weirs placed in tide-ways are known as cruives (Bathgate 1949).

The fish weir is essentially a barrier over which a high tide allows fish to pass but which prevents their returning sea-ward once the tide recedes. Because of their dependence on tidal action these features tend to be found in estuaries, lochs or other inlets which have a marked tidal amplitude. Various types of weir have been identified; some are enclosures while others take the form of bottle-necks, which may even have integrated basket traps in their narrowest parts. These features are almost impossible to date and it is likely that many of the examples so-far recorded date to the historic rather than prehistoric period, as similar features have been in use up until relatively recent times. Despite this uncertainty it should not be doubted that the use of such features was well within the capabilities of many prehistoric groups, familiar as they were with the action of the tides and the behaviour of fish. It is likely that many of the earlier examples will have long ago been submerged beneath alluvial silts and so identification is extremely difficult.

Evidence does exist for the use of passive devices in the procurement of mobile animal resources in prehistoric times. A series of pits associated with Neolithic pottery in the Myre plantation, east Rhinns (region A), have been suggested to represent pit-fall traps intended for deer (Mann 1903), with some of them having sharpened stakes in their bottom. Timber also appears to have been used to construct a fence which restricted the movement of animals and channelled them towards the pits. Though deer traps may be described as passive devices it is possible that active participation by relatively large numbers of people played a vital role in the use of these traps. Deer may well have been driven towards the traps by gangs of 'beaters', and the communal nature of this activity may have extended to the butchering and sharing of meat trapped in this way. Similarly, fish weirs, which can be described as passive devices, may have involved group participation. Once fish are trapped behind a weir at low tide they must then be collected and removed from the shallow water. This may have been accomplished by groups rather than individuals, depending on the size of the area contained behind the weir. Small hand nets may have been used to collect fish from the shallow water behind the weir. Group involvement would not be so necessary in the case of weirs which utilised basket traps, the emptying of fish from baskets not requiring the same communal input.

Fish traps can very effectively catch large numbers of fish in a single instance, with many traps having the potential to take two catches in a single day, each corresponding to the withdrawal of the tide. It has been reported that a weir located on the northern shore of Loch Broom (region C) succeeded in trapping at least 1,000 baskets of herring on a single occasion. The number of fish present was so great that a quantity were left to decay in the weir, once the local community had taken their fill, and resulted in the temporary pollution of the whole end of the loch for quite some time (Bathgate 1949). Similarly a cruive pool near Thurso (region D) succeeded in trapping 2560 salmon in a single day (Bathgate ibid). It is clear then that these features can be highly efficient and it has been noted that they may have played an important role in providing a surplus which could be stored, and indeed in making a sedentary lifestyle a viable option (Rowley-Conwy and Zvelebil 1989).

vii. Fish processing

It has already been noted that the fragmentary condition of prehistoric fish bone assemblages is not conducive to taphonomic analysis. Nowhere within prehistoric contexts in Scotland is it possible to make statements regarding the nature of fish processing - whether, for instance, fish were gutted and filleted in one place then transported and consumed elsewhere. Though this hypothesis is an attractive one the presence of bones such as otoliths and pharyngeal plates on a variety of sites suggests that some fish at least retained their heads while they were transported from the place of procurement to the place of consumption.

Fish have the potential to provide an important storable resource if preserved through drying or smoking. It has been suggested that post and stake-holes found in some shell middens may represent the foundations for drying racks (Mellars 1987). Drying may have been more widely practised than smoking, the latter requiring more complex facilities. It should be noted however, that caves such as those in Oban would provide ideal environments within which smoking could take place, and these deposits have certainly not been devoid of charcoal and fire spots.

viii. Seabirds

The bones of seabirds are fairly common on sites which have provided evidence for marine exploitation and despite the possibility that some were deposited by animal predators it cannot be doubted that marine birds were hunted. There is an old film, which I remember watching as a child, in which a boy marooned on an island made himself a bow and arrow and in his quest for food successfully killed a flying seabird only to watch helplessly as it plummeted into the sea. The boy, being a creature of the land, was unable to retrieve the bird, and so went hungry. The lesson to be learned here is not to hunt seabirds while they are in flight but when they are stationary, on the ground.

Many seabirds facilitate their own capture on the ground, spending long periods on cliffs or rocks, or as in the case of the now extinct great auk, being totally flightless. This factor along with their seasonal congregation in large colonies makes seabirds an ideal resource. It is also probable that not only the birds themselves were valued but also their eggs.

Seabirds remained an important source of food in certain parts of Scotland until fairly recently. The most striking example of sea bird exploitation comes from St Kilda, the cliffs of which provide important breeding grounds for several species, including puffins, fulmars and gannets. The local population relied heavily on sea bird exploitation and became extremely adept at scaling the cliffs in order to catch these birds. Martin reported that: "the solan geese (gannets) are very numerous here, in so much that the inhabitants commonly keep yearly above twenty thousand young and old in their little stone houses...The natives make a pudding of the fat of this fowl, in the stomach of it and boil it in their water-gruel, which they call Brochan." (Martin 1716, 281-2). The importance of this resource on St Kilda is further emphasised by the lack of a fishing tradition and the practice of agriculture only on a limited scale. Various devices were developed to aid the capture of these birds, including nets and long handled nooses. Like fish these birds could be dried and stored and the island is covered in small dry stone structures known as cleitan (Martin's "little stone houses") which were used for this purpose.

It is doubtful whether seabirds were exploited to the same degree outside St Kilda - these islands representing an adaptation to an extreme environment dominated by the presence of some of the largest sea-bird colonies in western Europe. However, it is clear that seabirds can represent a valuable and reliable source of nutrition and any study of marine exploitation must consider their role. Though bird bones are a common occurrence on prehistoric sites, with 30 species of shore or marine birds identified at Knap of Howar (Noddle in Ritchie 1983), there is little direct evidence to suggest how they were procured or processed. No artefacts can be unequivocally be related to the catching or killing of sea-birds. These artefacts may have taken various forms, with ropes, nooses, nets and baskets all helping hunters get close enough to capture birds and allowing their carcases to be carried back to the settlement. A general absence of skulls and the bones of feet from the Howar assemblage has suggested that initial butchering took place near the place of procurement prior to removal to the settlement (Bramwell 1983, 103).

ix. Seaweeds

Seaweeds have the potential to be utilised in a number of ways, only one of which is consumption as food (Clarke 1976). Seaweed may have provided an important winter fodder for livestock and even today in northern parts of Scotland sheep can be seen on beaches grazing on the exposed kelp beds. In 1745 Linneus reported the mixing of boiled bladder wrack with bran to produce pig food on North Ronaldsay. At that time black faced sheep were fed exclusively on seaweed for ten months of the year, only being put onto pasture during the lambing season (Bell 1981).

Seaweed, or seaware as it is known in Scotland, is an invaluable form of fertilizer, containing as it does more nitrogen and potassium than manure, though less phosphorus, making it ideal for sandy soils which are usually deficient in potassium (Fenton 1978). In Orkney the collection of seaweed for use as fertilizer is traditionally a winter pursuit and rights of access to ware are laid down in many 17th century feudal charters (Thomson 1983). In Orkney at least seaweed was much preferred to farm yard manure as a source of fertilizer and the Old Statistical account includes references to manure being dumped at sea (ibid). Some farmers preferred to put the ware on the land as soon as possible after collection while others stored it in a Kossel, a hollow above the shore, prior ploughing it in during the spring (ibid).

In more recent times the burning of kelp *(laminarea)* has played an important role in the economy of Orkney. The product of this was used to make glass and soap and the industry has generated its own set of archaeological features. A stone-lined feature cut into the shell midden on Risga appears to represent a kiln used to burn the kelp (see chapter 8).

Despite the potential importance of seaweed, which has been described as the most important of the beach resources (Thomson 1983), its presence on archaeological sites is difficult to establish. Like various other marine resources, including fish, this is due largely to its biodegradable nature (Bell 1981). Though direct evidence for seaweed on prehistoric sites is almost unknown, apart from a fragment of *Lamour* from Ardnave (Dickson in Ritchie and Welfare 1983), its presence can be inferred from the identification of small marine shells such as *Patina pellucida* and *Littorina littoralis* which may have been brought on to site attached to seaweed, and being noted at the Neolithic site at Knap of Howar, on Orkney (Ritchie 1983, 57) and from the Bronze Age site at Ardnave, Islay (Evans 1983).

Like shellfish, fish and other marine resources, various types of seaweed have their own environmental niche, though all of those exploited would have been found within the littoral or sub-littoral zones. Some species such as *Fucus serratus, Ascophyllum, Fucus spiralis* and *Fucus vesiculosus* are found attached to rocks in the immediate littoral. These species may have been readily available at times of low tide and may well have been collected at the same time as shellfish. However, other species such as *Laminarea* and *Hyperborea* are generally found in greater concentrations in deeper water, and even at low tide collection would have been no easy task. It is possible that collection of these deeper water species generally relied upon storm freed tangles being swept up on to the shore.

x. Whalebone and the whaling issue

It has already been suggested that small cetaceans such as dolphins and porpoise may have been hunted during the Mesolithic. Though pieces of whale bone are a common find on early and, even more so, on later prehistoric sites, particularly in areas C and D, the nature of their procurement has never been satisfactorily established. One explanation for their presence on archaeological sites is that they were removed from the carcases of stranded whales (Clark 1947), while it has also been suggested that they may have been hunted (Grigson and Mellars 1987, Hamilton 1968, MacGregor 1974).

The first proposition does not seem unlikely, as a relatively high number of whale, dolphin and porpoise-strandings are reported in Britain each year, with 151 reported from Scotland alone in 1993 (Reid pers comm). However, it is difficult to say whether such high numbers can be extrapolated into the prehistoric period. Studies of strandings have suggested that shortages of food, particularly in the form of fish larvae, may be responsible for increased numbers of strandings (Sheldrick 1976). The depletion of fish stocks through modern fishing techniques may be at least partly responsible for this scarcity of fish larvae. It may therefore be that during the prehistoric period fewer whales died due to a lack of food, with fish being more plentiful. The issue is a difficult one and other factors such as changes in current, water temperature and chemical content have also been suggested as causes of increased incidence of stranding (Sheldrick ibid).

It should not be doubted that prehistoric groups had the ability and technology to successfully hunt whales, particularly the smaller species of which many bones on archaeological sites appear to represent. The previously discussed barbed points from Oban and other sites would be ideally suited for the purpose of hunting whales, while the colonisation of islands from an early date equally suggests a competence in navigation and the presence of reasonably substantial boats.

Archaeological whale remains are most likely to represent the result of both strandings and hunting. Indeed, in some cases both mechanisms may have been combined, as suggested by Martin, who in describing the techniques of catching whales in Lewis writes: "the natives imploy (sic) many boats together in pursuit of the whales, chasing them up into the bays, till they wound one of them mortally and then it runs ashore; and they say that the rest commonly follow the track of its blood, and run themselves onto the shore in a like manner" (1716, 269). It is not difficult to imagine Mesolithic groups making the best use of the confines of the Forth estuary to drive ashore whales which had the misfortune to leave the open sea.

Whatever the case, it is important to realise that both mechanisms (hunting and stranding) imply communal activity and social interaction, which included the partition of spoils. After all, a naturally stranded whale would provide as much food and other resources, as a hunted whale, and in doing so may have involved a degree of communal effort and co-operation in the processing stage - which may have included mechanisms to relieve any interpersonal stress in the appropriation of such windfall resources. Evidence for such mechanisms exists in more recent times: a Medieval charter granted by Malcolm IV gave monastic houses in the vicinity of the Forth the right to exploit stranded whales for their oil (Regesta Regum Scottorum 1960 - Malcolm IV 1153-1165).

A further social implication of whale strandings is suggested by the fact that they may be unforeseen, except in the case of induced strandings, and so provide unexpected quantities of food which, unless smoked or dried, would presumably need to be consumed fairly rapidly (the death of whales at sea prior to stranding will usually preclude their consumption as putrefaction will set in prior to their washing ashore). These auspicious circumstances may have prompted periods of feasting and celebration, at which time ritual activity may have focused on the sea and the gifts it can provide. These activities are archaeologically unprovable but do suggest some of some of the possible implications of evidence which has in the past been somewhat overlooked by archaeologists.

Clark suggests that many of the spatulate blades of whale bone which are fairly common on iron age sites in regions C and D may well represent blubber mattocks (1947) and they do compare well with Eskimo types. The finds of several whale skeletons in association with antler mattocks in the carse of Stirling has provided more direct evidence of the exploitation of whales. As many as twenty instances of whale remains have been recorded (Morris 1925). However, in only seven of these cases were whale remains associated with artefacts. The dominant form of artefact is the so-called antler mattock; of a type which have been recovered from several of the Mesolithic shell middens on the west coast. These finds are very difficult to date, but the location of the Meiklewood mattock within the Carse clays puts its deposition somewhere between 6,550 BC and 2,170 BC (Smith and Bonsall 1985). This activity may have been contemporary with the exploitation of oyster beds evidenced by the formation of substantial shell middens which have been dated to the Mesolithic/Neolithic (Sloan 1982). Clark saw strong parallels for these artefacts in Mesolithic assemblages of the Baltic area (1947) and it has even been suggested that the groups utilising these tools in the Firth area moved westwards to the coast of Argyll, to become Obanian, once the regression had commenced (Mackie 1971). Despite their discovery in association with whale remains the relationship between mattocks and whale processing has been questioned and a more general use as a digging implement suggested, with the procurement of burrowing shellfish being among the tasks to which they may have been put (Smith 1985).

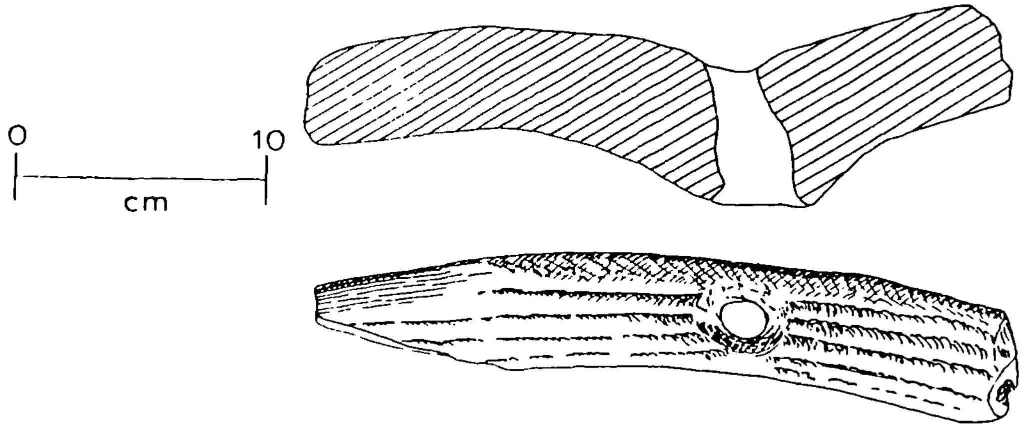


fig 17. Antler mattock from Meiklewood, Forth Valley (from Smith 1985).

Antler mattocks are regarded as typically Mesolithic (Smith 1985). However, it has recently come to light that a similar antler mattock lodged in the Hunterian Museum, Glasgow, and described by Clark as Mesolithic (1956), is in fact Bronze Age (MacKie pers comm).

fig 18. Antler mattock from cist in Orkney (from Cursitor 1910).

This later find, recovered from a Bronze Age cist in Orkney (Cursitor 1910), strongly suggests a longer use for these objects than was first thought but does not detract, in its Orkney context, from the impression that these implements were related to marine procurement. As such the Orkney mattock has an added importance as it represents a very rare occurrence of a possible marine related implement - rather than a resource residue - accompanying a burial. Artefacts which may be related to terrestrial exploitation, such as arrowheads, are more commonly found as grave goods (see chapter 9).

If antler mattocks were utilised in the removal of blubber and flesh from the whale carcase then they represent the use of an implement made from a terrestrial resource being used to process a marine resource. The Obanian barbed points provide a similar juxtaposition, though they were being utilised in marine procurement rather than processing. The way that people's perceptions of raw materials may or may not change when such materials are transformed into artefacts is rarely considered by archaeologists. As already suggested the removal of material from one environment to another is nowhere more clearly demonstrated than in the case of marine procurement. The dramatic nature of this transformation and knowledge of raw material origins may have influenced the way that people regarded these artefacts. Unfortunately these perceptions are not traceable within the archaeological record but it can be suggested that a shift from the use of antler mattocks in the earlier period to whalebone in the later period may have been the result of factors other than those of a simply pragmatic nature, perhaps indicating a change in the way that marine procurement was regarded.

xi. Boats

Many of the procurment strategies described above would be at least partially dependent on access to the sea, be it to catch fish, hunt whales or simply to travel to other places. Evidence for prehistoric boats in Scotland is in the main limited to numerous finds of dug-out canoes, the majority discovered during the 18th and 19th centuries. Munro (1899) notes a number of canoe finds; including two from the Carse clays of the Forth estuary. In 1726 a canoe hewn from a single oak trunk, some 36 feet long and 4.5 feet wide, was reported to have been recovered from 13 or 14 feet underground (Munro, ibid, 66). Similarly a canoe was found some 5 fathoms beneath the clay in the vicinty of Falkirk (Munro, ibid, 67). Other canoe finds include a pinewood example from a brick-clay pit at Friarton, Perth, one from Lochar Moss in Dumfries and Galloway (Munro, ibid), and one from the Tay in the vicinty of Dundee (Hutcheson, 1897).

By far the richest area for canoe finds has been the Clyde estuary, from which at least 18 were recorded prior to 1854 (Munro, 1899, 70). Two canoes discovered during the latter half of the 19th century are especially noteworthy as they were found to contain polished stone axes. The first example was discovered below Milton island in the vicinty of Douglas. The canoe is reported to have been 22 feet long and contained 6 polished stone axes, a wooden club and a qauntity of deer antler (Munro, ibid, 71). The second was located during the excavation of foundations for St Enoch's church in the centre of Glasgow. The find was made some 25 feet beneath the surface and consisted of a canoe which contained a single polished stone axe (Wilson 1851, 53).

These canoes are very difficult to date and though many of them are reported to have been recovered from considerable depths of silt and clay this cannot really be taken as an indication of their age as these deposits build up very rapidly in alluvial environments. Certainly, the presence of polished stone axes in two examples does indicate a date before the second millenium BC, though some of course are likely to be earlier and some later than the period generally associated with polished stone axes. It has been suggested that some of what have been reported as canoes may actually represent wooden troughs used in conjunction with heated stones in cooking food (Sayce 1945), with Irish burnt mounds providing some evidence for the use of wooden troughs. This explanation should not be discounted, particularly in the case of some of the smaller examples from non-coastal sites. It is worth noting that this issue again brings us back to burnt mounds, which were discussed earlier in this chapter and will be touched upon again.

The discovery of canoes which contain polished stone axes may indicate depositional processes more complex than the simple abandonment or accidental sinking of canoes in estuaries or on mud-flats, though the fragmented condition of canoes such as that from the Tay is more suggestive of decay or damage prior to submersion in preserving silts. It is suggested here that the stone axes represent votive deposits deliberately placed within the canoes, which in turn may have played a role in ritual activity focused on the water's edge. Though it is impossible to establish the true nature of this activity it is perhaps worthwhile to consider the nature of the materials involved and their relationships to one another.

Dug-out canoes represent the transformation of tree trunks through the use of fire and wood-working tools. As such they are also related to changes in the nature of the terrestrial environment, through the clearance of trees. Tree clearance played an important role in the preparation of land for both settlement and arable agriculture. The polished stone axe has in the past been closely associated with this process of forest clearance (eg. Nichols 1967), and in this case may be identified not only with the chopping down of trees but also their transformation into canoes. However, it has more recently become apparent that fire probably served a more important role than the axe in the clearance of forest (Edwards and Ralston 1984, Edwards 1990). Fire also played an important role in the production of dug-out canoes, being utilised to burn out the heart of the trunk, prior to finishing with an axe or adze. It should be noted here that a characteristic of Scottish Mesolithic stone tool assemblages is the total absence of the core-axe component which is found further south and in Ireland. The reasons for this difference are not understood, and though examples may yet appear it is peculiar that not a single example has been recovered from a Scottish context. Their absence does have important implications for the present discussion. Axes play a vital role in the construction of canoes, both in chopping down the tree and in shaping the canoe, even if fire is used to hollow the trunk. It is possible that antler mattocks may have lent themselves to the removal of charred wood from a canoe interior, however, it is not possible to see them being used in the shaping of wood. The adoption of the polished stone axe may therefore symbolise a change in the mode of marine transport with the use of boats built from lighter wooden frames, possibly serving as armatures for hide-hulled vessels (see below), being abandoned or at least supplemented by craft constructed from heavier timber components. If the apparent absence of Scottish core axes is real and dug-out canoes in Scottish contexts do prove to be Mesolithic in origin this may suggest that they were built further south and sailed northward: thus they would represent direct evidence for the seaborn movement of people from the south.

It had previously been suggested that the use of artefacts of terrestrial origin, in the form of antler mattocks, within the marine environment, in the procurement of marine shells or the processing of whales, may have meant more to people than is at first apparent. The possibilty that canoes containing polished stone axes were being deliberately sunk close to shore may represent a more overt recognition of the importance of processes of change and transformation. As noted above there are a number of transformations and shifts of context represented here. The agencies of transformation, axe and fire, are found within the canoe, which facilitated movement from the terrestrial environment, which was itself undergoing change from a forested to cleared landscape, to the marine environment. The presence, in one of the canoes, of a qauntity of deer antler, which as noted above was also utilised to manufacture mattocks, may represent a further reference to woodland, with deer commonly being associated with forests or their fringes. Just as the removal of trees facilitated arable agriculture; the harvesting of the land, so the transformation of cleared trees into canoes also permited fishing; the harvesting of the sea.

There is an interesting ethnographic account of canoe building among the Tikopia people of Polynesia, which though it cannot be used as a direct analogy for the depositional processes described above is worth noting because it also involves a series of transformations which are imbued with a symbolism centred on the relationship between land and sea. The Tikopia carve their canoes from tree trunks using adzes made from giant clam shells, which are procured from the nearby reef or the sea bed. The construction of these canoes, which itself is highly ritualised (Firth 1967, 216-117) therefore involves the use of a marine resource (clam) to transform a terrestrial resource (tree) and in doing so enable movement from one environment to another (land to sea) and in doing so permit the procurment of more clams.

It should perhaps also be noted that the polished stone axe recovered from the Glasgow canoe was made from jadeite, a raw material not found in Britain. It is believed that the majority of jadeite axes originated in Brittany or the Rhineland (Smith 1963, 148). Among other things this movement involves the passage of axes, or at least the raw materials from which they were made, over the sea. It is therefore apparent that the Glasgow axe had previously been in close proximity to the sea and that an acknowledgement of this past relationship may have played a part in its deposition in the canoe (Taylor pers comm).

Reference should also be made here of the role of driftwood as a coastal resource. It is likely that some areas of Scotland, such as the Orkneys, and small islands such as Oronsay, never had what could be described as heavy forest cover, and what few trees did grow in these areas may have been consumed in building or as fuel over a relatively short period of time. In these localities driftwood would represent an important wind-fall resource. In the absence of driftwood another coastal resource; seaweed, may well have been utilised as a source of fuel (see chapter 10). The provision of timber by the sea represents a striking contrast to the series of relationships involved in the deployment of timber boats at sea discussed above. Though it would be taking things too far to argue that this contrast was strong enough to cause this driftwood to be used in different ways to timber procured from land, especially in areas which had only limited terrestrial timber resources, it is not unreasonable to suggest that people were very aware of this contrast.

This alternative reading of what have generally been regarded as straight-forward components of prehistoric material culture suggests that people were utilising these materials in a ritually controlled manner to rationalise and negotiate processes of social and environmental change. These deposits express an appreciation of the complex and vital nature of the relationship which existed not only between people and the world in which they lived, but also the intimate bond which existed between the contrasting environments of land and sea.

That the relationship between land and sea was regarded as special may be further suggested by the appearance of a rock carving on the side slab of a Bronze Age cist in the cairn at Ri Cruin in Kilmartin Glen. This image has been interpreted as a canoe with rowers and bears some similarity to examples of Scandanvian rock art and a carving in the chambered tomb at New Grange, Ireland (Craw, 1930, 134).

Other than dug-out canoes the only other direct evidence of prehistoric boats in Scotland takes the form of a possible coracle from the Bronze Age funerary site at Barns Farm, Dalgety, Fife (Watkins 1982). Here the coracle appears to have been used to cover a crouched inhumation, again indicating the importance of coastal enviroments in ritual activity. The coracle indicates the use of materials other than timber and the long tradition of leather boats in Ireland should not be overlooked in this respect. Experimental work has established that leather craft of the type thought to have been used by early Christian missionaries, such as St Brendan, were capable of crossing the Atlantic (Severin 1978). It is not unreasonable to assume that the timber galleys known to have plied trade routes in northern Scotland during the Medieval period represent the flowering of a long tradition of timber boat building, which may stretch back to the prehistoric period, though a Norse influence is likely to be important here (Gunn 1986). Certainly there is evidence from southern England of composite timber boats of some considerable size dating back to at least to the Bronze Age, with the Ferriby boats being a spectacular example (Wright 1990).

Though there is little direct evidence boats other than canoes in prehistoric Scotland, mention should be made of the various 'boat-shaped' settings which may again indicate a role for water-craft in ritual practice. Though these features are best known in Norse contexts, where boat-shaped settings of stone are used to mark burials. These features appear to represent a variation on the Norse practice of burying corpses in boats, as evidenced by the recently discovered boat burial at Scar on Sanday, Orkney (Dalland 1992).

There is some evidence to suggest the use of 'boat-shaped' ice in Bronze Age funerary practice in Orkney. Excavation of a Bronze Age barrow cemetery at Linga fold on Orkney revealed a 'boat-shaped' setting of stones erected around a cremation and sealed within one of the mounds (Downes 1995). A further example of such a practice appears to be represented by the remains of a central setting of stones within a cairn at Geord of Nears, Rousay. The surviving portion of this setting may represent the pointed prow of a boat, which in this instance holds within its hull a small cist which contained fragments of a steatite urn and cremated bone (RCAMS 1946, 210).

The presence of numerous boat-shaped settings on St Kilda may also represent Bronze Age activity, with a radiocarbon date of 1833 +/- 47 BC (SRR-316) coming from organic deposit within one of these settings. However, this date must be treated with caution as the association between the organic deposit and the stone setting is not fully understood (Stell and Harman 1988, 25). Two of these features were recently excavated, with the aim of clarifying their role and function. Though dates have still to be obtained a Bronze Age date may be suggested by the low platform cairns which were found to surround these settings. These bear some resemblence to the platform cairns found in Morvern, the nearest portion of the mainland (Ritchie and Thornber 1975). As in the case of the Linga Fold example no direct evidence for burial was located (Morrison and Pollard forthcoming). It is suggested here that these monuments represent cenotaphs constructed in memory of those lost at sea, though the deliberate burial of people at sea should also be considered, and is known to have been practiced by some Eskimo groups. The sea is a dangerous place and those who relied upon it as a mode of travel and source of food in prehistoric times would have been subject to the same risks as those who take their living from the sea today. This association between the sea and death will be further investigated in chapter 10, when the evidence for ritual activity related to marine exploitation is discussed.

xii. Other uses for marine shells

Marine shells deposited on archaeological sites have so far been regarded as a waste product. Shell middens appear to be related to either the consumption of shellfish or the use of shellfish as bait. In both cases the desired resource is the shellfish and not the shell, the latter being discarded once the shellfish has been removed from it. However, the shells themselves can be put to use in a number of ways.

Perhaps the most obvious of these uses for marine shells is their modification into artefacts. In some cases shells have apparently been utilised as implements, with their edges being damaged or re-shaped through their use as cutting tools, as evidenced by *pecten* (scallop) shells from Oronsay which display edge damage (Lacaille 1954). The basin-like shape of the upper valve of the pecten, which makes them ideal ash trays today, would make them suitable for use as lamps, with fish or whale oil being used as fuel and vegetable fibres as wicks. Purposefully made stone lamps have been recovered from a number of broch sites (Hedges 1987) but the use of natural basins such as scallop shells should not be discounted. It has also been noted that limpet shells recovered from Skara Brae were used as containers for ochre (Clarke 1976), and large fish vertebrae were also used as containers (Foxon 1991).

The use of shells in less practical ways is reflected in their modification into beads, of which two main types are known. The first of these is created through simple perforation. Several sites have included examples of perforated shells, the most common species being the cowrie. The small size and appearance in relatively small numbers in shell middens make the cowrie an unlikely candidate for consumption, when so many other edible shellfish are readily available. The cowrie shell also has an aesthetic appeal, being gracefully folded and fluted and sometimes coloured, with a pellet-like shape which makes it ideal for use as a bead. Examples have been recorded from Cnoc Sligeach (Bishop 1914), Caisteal nan Gillean II (Mellars 1987), Ulva Cave (Bonsall 1989), Cardingmill Bay I (Connock et al 1992), Risga (Lacaille 1954, 233) and Links of Noltland, where fish vertebrae were also modified into beads (Foxon 1991). The clearest examples bear double perforations which would facilitate their stringing, either together as bead necklaces, or singly as pendants. Their use as bodily adornment need not be limited to necklaces and pendants as it is well known that other types of beads can be sewn onto clothes or other fabrics (Simpson forthcoming). Excavations at Skara Brae also recovered a small number of beads made from winkle shells (Clarke 1973).

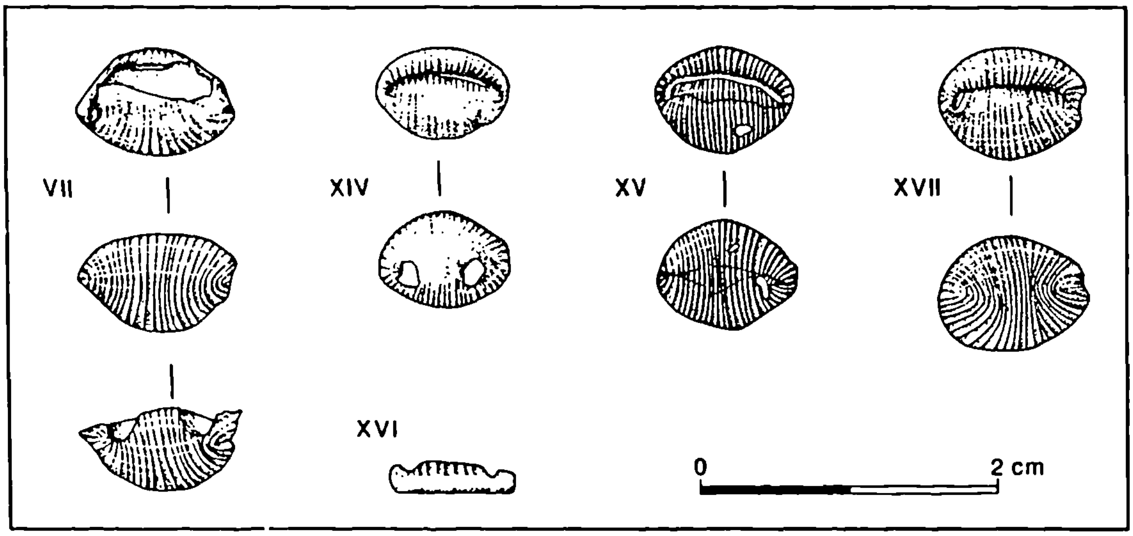


fig 19. Perforated cowrie shells from Cardingmill Bay (from Connock et al 1992).

The conversion of winkle and cowrie shells into beads was simply achieved through the perforation of the shell. The possibility that cowrie shell beads at least had a 'special' significance should not be ignored and their recovery from shell middens which also included human remains does not negate their use in this capacity.

A more obvious occurrence of shell beads within a ritual context was identified at the chambered tomb at Isbister (D/82), Orkney. A number of beads of bone, tooth, antler and shell were recovered from the infilling of the chamber. Only two of the fourteen beads were of shell with the majority being of bone. It has been suggested that their inclusion in the deposits was the result of an accident, with a necklace worn by one of the back-fillers snapping and the beads falling down into the chamber (Hedges 1983). This is an attractive snapshot of a simple accident, frozen in time. However it seems a little unlikely that people carrying out heavy labour would have had ornate necklaces swinging from their necks and deliberate inclusion seems more likely, though as will be discussed later (chapter 10) deliberate does not necessarily mean selected.

The two shell beads from Isbister are fundamentally different to the cowrie beads recovered from west coast sites and the winkle beads from Skara Brae. The only thing that makes the cowrie and winkle shells into beads are the small perforations cut through their surface; otherwise they are unmodified. The same can be said for a mussel valve with 'v' bore perforation, recovered from a Bronze Age cist at Rosinish, Benbecula (Crawford 1977). The Isbister beads are the result of a more involved process of modification, which verges on total transformation, with shells being cut, ground and polished until they are resemble shells no longer but perforated discs. These beads are indistinguishable from those of bone, tooth or antler, though there may have been some variation in colour. Though the final product may have been indistinguishable from other raw materials these differences would have been very obvious in the production stage with the different qualities of these materials requiring variations in manufacturing technique.

What these latter types of beads represent are the removal of a variety of resources from contrasting environments prior to their transformation into objects which display little variation, perhaps then being strung together to form a necklace. This bringing together and transformation of materials representative of different resources and environments is a theme which will be returned to again in this work.

Another possible type of shell bead was recovered from Isbister, represented by a collection of 24 limpet shells with their apices removed. These were found in one of the stalls associated with disarticulated human bones. Hedges interprets these shells as a necklace (1983). However, the removal of the apice need not be related to the creation of a bead as it is common for such a removal to occur when force is applied to a shell in order to remove it from a rock. Though it is doubtful that these shells are in fact beads it should not be overlooked that they have been removed from rocks by human agency and inserted in the tomb along with human remains by that same agency, and it is this very act which imbues them with a symbolism as strong as that produced by any process of manufacture.

Marine shells have also played a part in the manufacture of other artefacts. Their use as temper in pottery has been noted on a number of occasions. Pottery with shell temper has been recorded from Knap of Howar, on Orkney (Ritchie 1983) and at A' Cheardach Bheag, in South Uist (Fairhurst 1971), while mussel shells were utilised as temper in some of the pottery recovered from a Bronze Age midden in the Culbin Sands (Coles and Taylor 1970). Pottery recovered from the excavations at Barnhouse, Orkney, appears to have contained shell temper, though this interpretation is based on negative evidence. The soils at Barnhouse, an inland site, are acid and do not promote the preservation of bone or shell. Examination of the pottery revealed voids resulting from the decay of an organic temper, which was probably shell (Richards pers comm).

The provision of shell temper would involve crushing shells into usable fragments and the first excavations at Knap of Howar revealed a pile of razor shells deposited next to a quern stone (Traill and Kirkness 1937, RCAHMS 1946). Experimental work during the more recent excavations revealed, perhaps unsurprisingly, that razor shells could be readily ground into usable fragments in a quern (Ritchie 1983). Similarly a heap of razorshells in the wheelhouse at A Cheardach Mhor, on South Uist, have been interpreted as a store of shells to be used in providing shell temper (Young 1960. Examination of the Howar pottery also revealed that oyster shells had been used as temper, a use which may explain the presence of more top valves than bottom valves in the sampled oyster deposits (Ritchie 1983, 54).

As well as being incorporated in pottery as temper marine shells have also been used to apply decoration to pottery. Shell decoration has been identified on Bronze Age pottery recovered from Killelan Farm (Burgess 1976) and Ardnave (Cowie

1983), both of which are on Islay, though shell temper was not reported. It is probable that the edge of either limpet or cockle shells, which were found in quantity on the site, were impressed into the damp clay to produce a short straight incision with convolutions visible along both edges.

xiii. Flint exploitation

The coasts of Scotland have not only provided plant and animal resources. In an area where drift deposits of flint are largely absent pebble beaches represent an important source of this raw material (Wickham-Jones and Collins 1978). Particularly important in this respect is the coastline of southwest Scotland (areas A and B), where pebble flint is believed to be derived from the Antrim deposits across the Irish sea. The mechanism by which this material was transported to the Scottish coast is little understood and, in light of the amount of material present, the suggestion that attachment to floating seaweed (Wickham-Jones and Collins 1978) may be responsible is not wholly convincing. Recent studies have established that flint nodules are in fact thrown up from the sea bed by tidal action (Marshall forthcoming).

Lithics have been found in large quantities on the raised beaches and the areas behind them in places such as Girvan, in Ayrshire. The presence of substantial proportions of decortical flakes and material related to core preparation suggests not only that lithics were being manufactured here but also that flint was undergoing initial processing prior to its movement to other areas. The movement of flint via exchange networks is apparent in its presence in Neolithic and Bronze Age assemblages found further inland, such as on many of the sites recently excavated along the course of the A74 upgrade (Pollard 1992 a & b). It is likely that the procurement of this raw material was carried out in conjunction with the exploitation of marine resources, though evidence for prehistoric marine exploitation is not as apparent in area A as it is areas D and C - a difference which may suggest that lithic exploitation was the main reason for coastal activity in this area. A similar combination of activities has been envisaged as the motive behind the Mesolithic presence at Morton, Tayport (area E) with a variety of marine resources, terrestrial species and lithic types being exploited from a coastal base camp (Deith 1986).

Lithic material recovered through fieldwalking on the island of Arran, and recently examined by the present author, may suggest an important shift in the nature of stone procurement taking place on the island during the early period. Those assemblages which appear to be Mesolithic in character, dominated by blade technology and microliths, are composed largely of flint with very little pitchstone. In contrast, those assemblages which are more likely to be Neolithic, dominated by flakes and including leaf-shaped arrowheads, are characterised by the predominance of pitchstone with only limited quantities of flint being utilised. This pattern suggests that the exploitation of beach flint played an important role during the Mesolithic, while during the Neolithic this resource is largely disregarded in favour of pitchstone sources further inland. This hypothesis has further implications. The shift in sources also implies a shift in exploitation practice, with the quarrying of pitchstone perhaps necessitating a greater degree of effort which may have been communal, while in the Mesolithic the collection of beach flint may have been integrated within other foraging strategies related to marine exploitation.

xiv. Conclusion

This chapter has described the varied nature of the material culture related to prehistoric marine exploitation. The ways in which this material culture may have been utilised within various exploitation strategies has been outlined. Perhaps most importantly this chapter has considered the importance of the context of use and deposition and in doing so has expanded discussion beyond the treatment of this material as simple artefacts. The possible ramifications and implications of utilising marine resources has been touched upon, and though it is acknowledged that some of this discussion is heavily speculative it is believed that it is only through a consideration of factors not always evidenced within the archaeological record that we will begin to more fully understand the nature of human/environment relationships. This general approach will be maintained in the next three chapters, in the discussion not only of the economic role of marine exploitation in early (chapter 8) and later prehistory (chapter 9) but also its integration with social and ritual activity (chapter 10).

Chapter 8

Down through the Ages I: marine exploitation in early prehistoric Scotland

i. Introduction

The way in which marine resources have been treated by archaeologists in Scotland tends to depend on the period involved. When dealing with the early prehistoric period, sites such as shell middens, which obviously relate to marine exploitation, have generally been the subject of some considerable attention, though this can only be said of a limited number of sites. The focus of attention on these features has tended to promote their study with little regard to their role within the wider spectrum of procurement practice. This somewhat blinkered approach may have something to do with the fact that shell middens represent one of the few types of early period (especially Mesolithic) evidence to survive to any great degree.

This contrasts with the treatment of material from later period sites, where the role of marine resources has been ignored completely or given only the most cursory of treatments. Again, this imbalance may have something to do with the nature of material surviving from the period. The later prehistoric period is well populated by impressive upstanding structures which have overshadowed the less 'interesting' residues of marine exploitation. It is intended that this section (Down through the Ages I and II) stand as something of a corrective to these prevailing attitudes. This can only be attempted by situating marine residues within their wider context and in doing so pave the way for a more integrated approach to this particular component of the archaeological record. This will be achieved, in the first instance, by taking a fresh look at one of the best known but perhaps most taken for granted elements of the Scottish early prehistoric record: the so-called Obanian sites on the west coast.

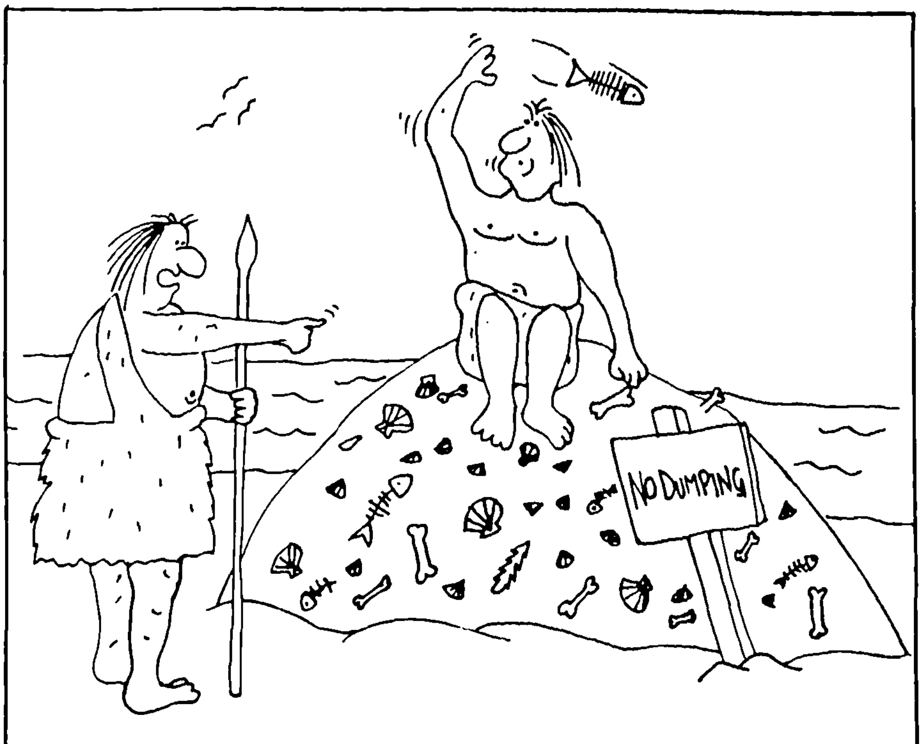
Much of this section is based on a paper previously published by the author but differs in that the ideas first put across there (Pollard 1990) have since been revised and criticisms levelled at that paper (Finlayson and Armit 1992) taken on board, if not entirely accepted. The programme of work recently carried out on Risga, and discussed here, has also gone some way to modify the contents of this section. The discussion which follows is offered in an attempt to place the shell midden sites in Oban, along with those on Oronsay and Risga, within a framework which takes on accommodates issues such as multi-period occupation, the deposition of funerary remains and terrestrial as well as marine exploitation. The wider implications of this discussion, particularly in relation to the role of shell midden deposits within prehistoric ritual practice, are expanded upon in chapter 11 (Food for thought).

ii. The Mesolithic/Neolithic transition

The transition between the Mesolithic and Neolithic has caused much heart-searching of late, with many preconceptions about the clear-cut nature of this apparently dramatic period of culture change being examined and questioned (eg Armit and Finlayson 1992, Barrett 1994, Tilley 1994, 86-87). At the core of the idea of the Neolithic is the adoption of agriculture and the related sedentism of populations which were thought to have previously lived an almost nomadic lifestyle, moving through the landscape exploiting various natural resources at different times of the year. Several models have been proposed to explain the process of change from hunter-gatherer to agriculturally based lifestyle. The earliest of these was based on the idea of difussionism, with the movement of populations being the most obvious and plausible explanation for the rapid spread of apparently similar cultural traits over much of Europe (Childe 1925, 22-23). Favoured more recently has been the concept of acculturation, where ideas and material culture may be passed from one group to another without the accompanying movement of people (eg Zvelebil and Rowley-Conwy 1984, Zvelebil 1986), such a model negating the need to consider unfashionable issues such as invasion, subjugation and warfare.

The picture in Scotland is extremely complex, with no clear cut division between the two types of lifestyle. Discussion of this problem is certainly not aided by the use of the terms Mesolithic and Neolithic, which themselves serve only to pigeon-hole and strait-jacket the issues. However, if these terms are going to be used, and it would be difficult to find unproblematic alternatives, it is preferential to use them to refer to types of lifestyle rather than chronological periods. It is worth noting here that factors relating to marine exploitation have been central to the recognition, in Scotland at least, that the three age system may not be the most suitable framework through which to view the prehistoric past (the tendency for archaeologists to study one period while largely being ignorant of all others did little to change this situation). It was the excavation of the Nether Kinneil site in the Firth of Forth which went some way to promote a reassessment of these attitudes (Sloan 1982). Though the shell midden did provide radiocarbon dates which may correspond to Mesolithic activity, as had the Inveravon site (MacKie 1972), it also threw up dates which could not be so readily assigned to the Mesolithic, and indeed appeared to be fairly securely situated within the Neolithic. Again, here we have a chronological framework being utilised to express an understanding of past lifestyles. It is perhaps to the discovery of the bones of domestic cattle within certain parts of the shell deposit to which we must turn in order to more fully understand the difference between the Mesolithic and Neolithic. The presence of cattle bones is indicative of pastoral agriculture and as such represents a shift away from a purely hunter-gatherer lifestyle, the latter being the most important defining characteristic of the Mesolithic. Here were juxtaposed two diametrically opposed resources. Though this distinction may provide a more valid approach to our understanding of the past it can still be tempting to regard one lifestyle as superior to another. On the one hand the shell midden is composed of massed accumulations of marine shells, representing the exploitation of a simple, calorifically impoverished and technologically unchallenging resource; while on the other, the bones of cattle represent the subordination of nature by culture with the breeding and maintenance of domestic herds requiring considerable skill and labour. However, the contextual relationships of these two resource types does indicate that marine shells were still being utilised at a time when at least pastoral, if not arable agriculture, was being practiced. One way in which we may further move away from past approaches to this material and the nature of social change in prehsitoric Scotland is to consider the motives which underlie this juxtoposition, rather than viewing one lifestyle as more intrinsically superior to another (this issue is returned to later in this chapter).

Though the foregoing demonstrates that our conception of what is meant by 'Mesolithic' and 'Neolithic' is deeply set, it has long been realised (Lacaille 1951, 1954, Bradley 1978, Armit and Finlayson 1992) that groups in northern Scotland, which have elsewhere been regarded as Neolithic - in both chronological and material culture terms - appear to have continued to pursue an essentially hunter-gatherer lifestyle in an area not ideally suited to agriculture, but rich in marine and terrestrial wild resources (the term gatherer-hunter is now sometimes preferred as it overcomes what might be considered a 'meat fixation' while acknowledging the important role of vegetable and other non-'hunted' food stuffs). While some writers see late Mesolithic groups as indigenous populations which in some places managed to hold off the Neolithic onslaught (Scott 1971), others have viewed the maintenance of a hunter-gatherer lifestyle as a pragmatic solution to environments unsuited to agriculture (Lacaille 1954) - the importance of land availability is discussed further in chapter 10. It has been further suggested that those groups maintaining an essentially hunter-gatherer lifestyle may have adopted other elements of the 'Neolithic package', such as pottery, and utilised them as a means of negotiating and maintaining social relations within the group (Armit and Finlayson 1992).



Hey! Gatherer-hunter...hunter-fisher...fisher-farmer, *bloody* gatherer...whatever the hell you are, can't you read?

It has been suggested that coastal activity during the Mesolithic may represent a near-sedentary lifestyle. The term complex hunter-gatherer has been introduced to indicate a shift from a nomadic, very seasonally-oriented lifestyle to one which may involve more limited movement through the landscape centred on long-term base camps situated in close proximity to stable resources (Rowley-Conwy 1983). It has further been suggested that the Oban sites may represent satellite 'task sites' related to such a settlement (Finlayson 1990, 52) As it has been suggested that the roots of sedentism were firmly in place during the Mesolithic (Finlayson ibid) so it has also been suggested that the concept of Neolithic sedentism may have been somewhat over-emphasized (Armit and Finlayson 1992, Barrett 1994), having long been regarded as an essential characteristic of a society capable of constructing substantial monuments and practicing agriculture. This latter realisation is certainly not at odds with the picture presented by the historic period in northern Scotland, where transhumance, the seasonal movement of people and livestock, along with the exploitation of a broad resource spectrum, played a central role within an agricultural economy. This chapter will now go on to consider the role of the Oronsay shell middens within Mesolithic hunter-gatherer subsistance before going on to consider how the exploitation of various elements of the landscape, including the marine environment, may have been integrated within 'agricultural' economies in northern Scotland.

iii. The Obanian shell midden sites: a case study

iii.i The Oronsay sites and Mesolithic marine exploitation

The importance of the Oban cave sites has been discussed elsewhere in this work (chapter 2 and 5) and so the history of their discovery and treatment thereafter will not be dealt with in depth here. It is enough to reiterate that they have played a prominent role in the definition of a Scottish Mesolithic. The series of sites first came to the attention of archaeologists in the later nineteenth century as a result of the growth of the town. The presence of organic elements such as barbed points and large quantities of marine residues were taken to indicate a specific and highly specialised adaptation to marine exploitation. Indeed the striking nature of the material culture, its apparently limited geographical distribution (Oban, Oronsay and Risga) and its presence in similar types of context were viewed as indicative of a single, culturally distinct group, hence the coining of the term 'Obanian' (Movius 1940), though before its introduction the terms 'Oronsay culture' and 'Scottish Azilian' were sometimes used (Bishop 1914).

It is only fairly recently that attempts have been made to integrate these sites within wider spheres of social and economic activity (Pollard 1986, Finlayson 1990) and not to consider them simply as settlements in their own right. A recently excavated lithic scatter in Oban, possibly related to structural elements (Bonsall et al 1993, 76), appears to represent a further element to this wider spectrum of subsistence practice and settlement only partially represented by shell midden sites in the area. Similarly Mesolithic activity not represented by shell middens has also come to light on Colonsay (Mithen and Finlayson 1991) in close proximity to Oronsay, and also on Risga in close proximity to the shell midden there (see below). The shell middens may therefore represent sites at which specific tasks related to marine exploitation were carried out, a status which may explain the lack of extensive lithic components within many of the middens (Pollard 1986).

Precise dating of the activity represented by the shell refuse and artefacts is somewhat problematic. Antler implements recovered from the Druimvargie and MacArthur caves were subjected to radiocarbon dating by Bonsall and Smith as part of an ongoing programme of dating organic artefacts (1989). The radiocarbon determinations obtained were 5,860±90 BC (OXA 1948) and 4,750±80 BC (OXA 1949) respectively. However, it should perhaps be noted that these should not be regarded as the date at which the artefact and the material related to it was deposited on the site. The date obtained merely refers to the death of the animal from which the bone was extracted, or the date at which an antler was shed. What is not ascertained is the date at which the bone or antler was modified into an artefact, used as an artefact or finally deposited; these events may post-date the radiocarbon date by some considerable time.

This point is especially germane in the light of suggestions that material such as the reindeer antler in the cave at Inch na Damph, Sutherland, may represent a cache from which raw material was obtained as and when needed. It is therefore possible that this material was modified from its raw state into artefacts some considerable time after its procurement and initial deposition (Lawson and Bonsall 1986). All caution aside these dates do not conflict with a Mesolithic date for the use of the site and may indeed suggest activity taking place earlier than the very late Mesolithic as was generally previously assumed. (Lacaille 1954, MacKie 1971). These dates also are in keeping with those obtained from the Oronsay middens, though some of these do suggest continuation of activity into what might be regarded as the Neolithic, though the drawbacks of such chronological criterea have already been criticised. More recent dates have been recovered from the Cardingmill Bay I site, also in Oban, and it has been noted elseweher that this may suggest contemporanity with early Neolithic evidence elsewhere in Scotland (Connack *et al* 1992).

The question of the longevity of use of the Obanian sites is one which cannot be discussed without also considering a rather neglected, but apparently ubiquitous element of these sites. Human remains have been recovered from a number of the Oban sites, including the MacArthur Cave. The most thorough treatment of this material is to be found in the overview of the Oban sites by the surgeon Sir William Turner (1895). In that paper Turner compared the bones to those recovered from English barrows. Though the osteological techniques which claimed to identify specific racial groups and populations have now been discredited it must be admitted that the depositional nature of the MacArthur bones, which are disarticulated, does bear resemblance to some elements of Neolithic funerary practice.

Though it cannot be denied that the activity evidenced by the Oban sites does have its origins in the Mesolithic there are other elements, finds of pottery being even more suggestive than the human remains, which indicate later activity on these same sites. However, an unfortunate legacy of these sites being passed down into the literature as 'classic' Scottish Mesolithic sites is that they have become fossilised as artefacts, a 'setting in stone' which denies them a dynamic role in the processes of culture change. Though the presence of this later material has been noted by researchers it has usually been brushed off as something of a side issue to the real business of the Mesolithic use of the site (eg Lacaille 1954, Wickham-Jones 1994).

Finds of pottery from the Gasworks Cave have been compared to the Neolithic assemblage recovered from the enigmatic pit sites at Easterton of Roseisle, Moray (Young 1896). Human remains were also reported to have been removed from this cave but their character and context are not known (Turner 1895). Excavation of a recently discovered open shell midden at Cardingmill Bay (B/42), immediately to the south side of Oban Bay, recovered, along with human remains, a rim sherd from a Bronze Age food vessel (Connock *et al* 1992). Further sherds of food vessel were recovered from a rock shelter (B/54) situated at the northern end of the island of Kerrera, which shelters Oban Bay from the Sound of Lorne. Like the sherd across the water at Cardingmill Bay these were found in association with marine shells and animal bones (Lethbridge 1950). Evidence for cremation was recovered from the second shell midden at Cardingmill Bay (B/43), with fragments of burnt bone recovered from the same levels as sherds of coarse, urn-like pottery (the present writer worked on this site - in the absence of an interim report reference to this site is based on personal observations made during excavation).

There can be little doubt, then, that sites which appear to have their origins rooted well within the Mesolithic continued to provide a focus for activity well into the Bronze Age. In order to provide an explanation for this longevity of use we must first turn to the Oronsay sites, which, thanks, to detailed excavation, first by Bishop (1914) and more recently by Mellars (1987), have provided a wealth of information. Among the evidence recovered from the latest series of excavations are a number of human bones, which again seem to indicate the insertion of disarticulated human remains into shell midden deposits. These bones, recovered from Cnoc Coig (B/57), Caisteal nan Gillean II (B/55) and Priory midden, were dominated by those from the hands and the feet (Mieklejohn and Denston 1987). All problems of differential preservation aside, this may be taken to suggest that parts of the body were being deliberately selected for deposition. It is perhaps noteworthy that this dominance of the bones of hands and feet is also mirrored by the Cardingmill Bay site (B/42), where bones were recovered from a number of contexts (Connock et al 1992). It is possible that earlier excavations in Oban, and on the other Obanian sites, may well have failed to recover these bones, as they are small and the primary concern then was the recovery of artefacts.

If these human remains are Mesolithic, which seems likely for at least the Oronsay finds, then they are of great significance in that they represent, in Britain at least, an almost unique example of funerary practice relating to this period. Though similar patterns of bone deposition are found on a relatively large number of European sites (Meiklejohn and Denston 1987), they may force us to re-evaluate some of the widely held perceptions of the nature of culture change in Britain. The process of disarticulation implies that bodies may have been excarnated elsewhere, a practice which has been associated with communal burial in chambered tombs during the Neolithic, though it has been noted that this practice may not be as ubiquitous as was first thought (Barber 1988, Richards 1988) and it would now appear inappropriate to assume a general pattern of funerary practice during the Neolithic. Chambered tombs are one element of what has been described as the Neolithic cultural package, and as such have been regarded as indicative of a shift from hunting and gathering to agriculturally dependent modes of lifestyle. Culture change, if no longer expressed in terms of diffusionism, is usually seen as a process of acculturation, in which ideas are picked up from one group and adopted by another, with Mesolithic groups transforming their lifestyles through the adoption of agriculture and the construction of chambered tombs. However, the material on Oronsay may suggest that the roots of what has been viewed as Neolithic cultural behaviour were already in place during the Mesolithic. Similar possible precursors have been recognised on the Continent, where the insertion of Mesolithic burials into shell middens at Teviec and Hoedic, off the coast of southern Brittany, have been suggested as evidence for the emergence of formal disposal areas for the dead (Chapman 1981).

The presence of up to nine shell middens on Oronsay (see below), suggests that it represented an important focus for marine exploitation during the Mesolithic, while it has recently been suggested that the neighbouring island may have been utilised for deer hunting (Mithen and Finlayson 1991). It could be argued that the Oronsay sites represent the activities of one group, moving from one location to the next at various times of the year. This idea of seasonal movement fits well with ideas of Mesolithic mobility, with settlement location being dictated by the limited availability of a given resource. Work on saithe otoliths from the Oronsay sites has certainly suggested that there is a degree of seasonality involved (Mellars and Wilkinson 1980). However, otoliths have only been examined from four of the five excavated sites and the presence of at least a further four may suggest that more than one group occupied the island at any one time.

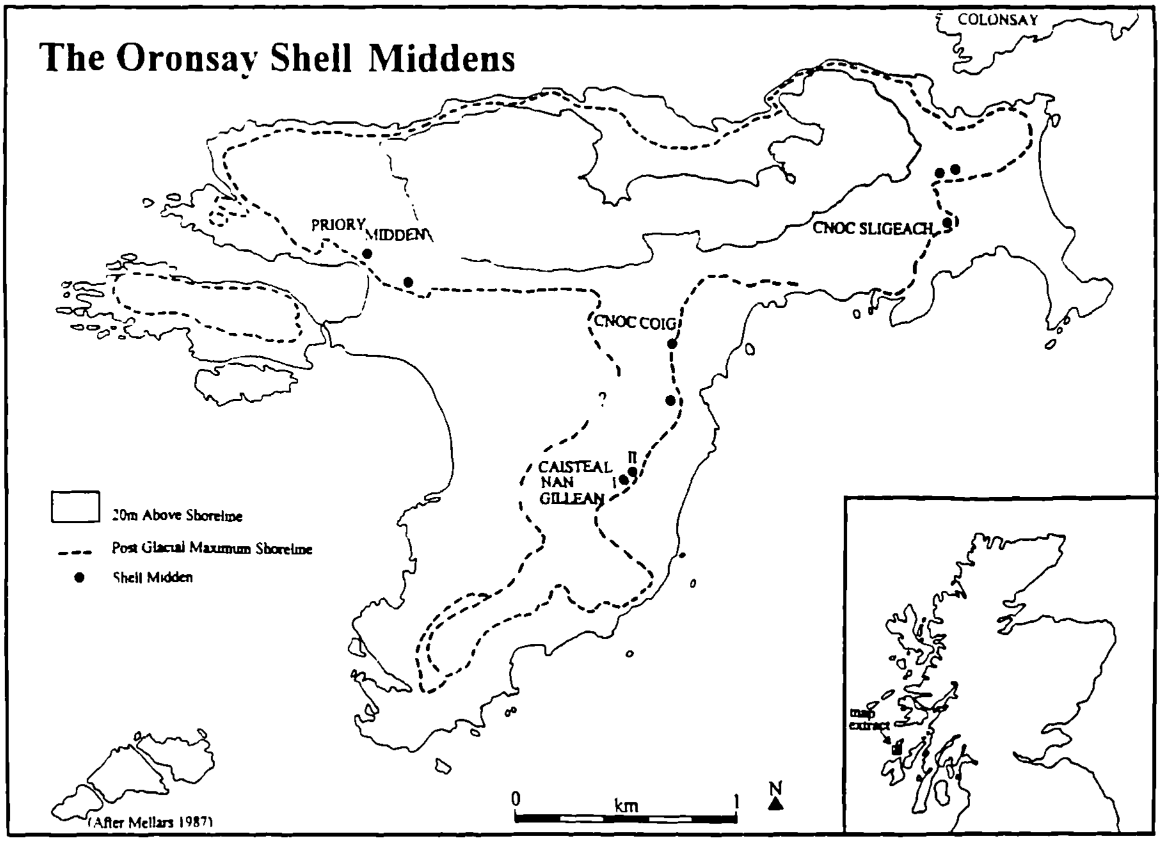


fig 20. Distribution map of the Oronsay shell middens

It is unlikely that people lived on Oronsay on a permanent basis; it would have been considerably smaller at the time of the maximum transgression and it is doubtful whether it would have supported large prey species such as red deer (though these animals are competent swimmers and will often swim quite considerable distances - and can regularly be seen on the island of Risga after swimming from the mainland). It has already been noted that deer may have been hunted on Colonsay, and it is probable that the red deer bones found in the Oronsay middens originated from here (Mithen and Finlayson 1991). Colonsay may have supported a more permanent, but limited human population, being considerably larger than Oronsay. It is also possible that people travelled as far afield as the mainland, to the west, or even from other islands such as Mull, to the north, from where Oronsay is clearly visible. A number of Mesolithic sites have also been identified on the nearby islands of Jura (Mercer 1971 etc) and more recently on Islay (Mithen et al 1993).

The sites appear to have represented a focus for marine related activity for considerable periods of time, with radiocarbon dates suggesting usage over periods of up to 600 years. Activity on some sites appears to have commenced later than on others, but discrepancies may be due to the fact that only limited parts of most middens were excavated, with the possibility for earlier or later phases yet to be identified (Switsur and Mellars 1987, 144).

This longevity of use suggests that the island was regarded as an important resource base with visits representing an important component of seasonally based exploitation strategies. It may even be suggested that the very idea of going there may have become as much of a draw as the resources it offered. The act of following the paths of those who had gone before may have established traditions with which people were reluctant to break. The island may well have been in constant sight of people as they spent time on the mainland or other islands and therefore remained within their collective and individual consciousness as a place with which they had an attachment, though it should be noted that the island stands higher in the water today than it would have prior to marine regression. The placement of the remains of the dead within the shell midden deposits would certainly do much to strengthen these bonds and identify groups with given points in the landscape.

However, the deposition of human remains within the shell middens could have served an added, more 'practical' function. The shell middens on Oronsay represent quite intensive levels of procurement, with shell layers up to a metre in depth representing the removal over time of millions of limpets from the shore. Shells constitute the most obvious component of these sites and may well represent only a subsidiary resource, providing a food supplement and also bait for the catching of fish such as saithe. Fishing undoubtedly represented an important activity on Oronsay, with the island giving ready access to these shoaling fish. Other activities such as sealing, and even the hunting of dolphins and small whales, may also have played an important role. Some areas may have favoured given species, perhaps at different times of the year, with proximity to local seal populations, shellfish beds and fishing grounds being of some considerable importance. An example of location being dictated by proximity to a resource may be indicated by the evidence for seal hunting at Cnoc Coig, where the presence of most parts of the skeleton and the bones of young seals may suggest that breeding grounds were to be found very close by (Grigson and Mellars 1987). The shell middens may therefore occupy 'prime spots' which were greatly valued by those who returned to them year after year.

The number of shell middens known to exist on Oronsay may well increase. However, the difficulties of locating sites in areas of heavy dune activity mean that new sites, other than those revealed in blow-outs, will only be detected through the implementation of thorough surveys with heavy test-pitting components (Mellars

1981). The presence of so many sites on such a small island suggests that there may have been some pressure on resources. Thus, the maintainance of access to these resources would have been important. The shell middens may therefore have represented more than sites where food was processed; they may have represented the physical manifestation of rights of access to a given territory or catchment area, and as such were important components of the landscape. The importance of the establishment of, and maintenance of access to, fishing territories has been noted in the anthropological literature, with communal 'ownership' being only one means by which this is achieved (Palsson 1991).

It has been suggested that chambered tombs may have served as territorial markers which could have legitimized a particular group's access to resources, possibly including agricultural land (Renfrew 1974, Chapman 1981, 1987). Shell middens, though not purposefully constructed like chambered tombs, would represent obvious features of a cultural landscape, with bleached shells reflecting sunlight and therefore visible for some considerable distance (see photo). These sites may have been especially obvious from the sea, even more so when fires were lit on them.

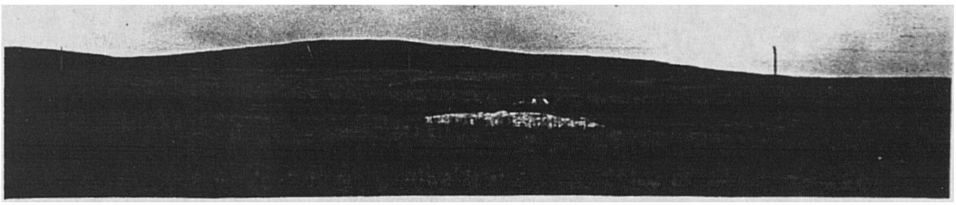


plate 1: deposit of scallop shells (modern) which demonstrates visual effect of massed accumulations of shells in landscape.

The interment of human remains in chambered tombs and the veneration of ancestors would further serve to tie a group to a place and indeed legitimate their presence by demonstrating continuity through the presence of the ancestors. It is suggested here that the placing of human remains within the Oronsay mounds served a similar function to that proposed for chambered tombs. The need to demonstrate continuity in order to legitimate access may have been especially acute in a situation where people were not present on the site all of the time, so returning to that site would take on board a special significance. The places of excarnation could have been located at the place of origin, perhaps on the mainland. The selection of small parts of the body for inclusion may have been governed by the need to carry remains over some distance. Alternatively, it can be suggested that only those who died on the island merited incorporation within the deposits - their presence on the island at the time of death perhaps reinforcing rights to access in a way which the importation of remains could not achieve. In this case the apparent preference for hands and feet may be related to the importance of these parts of the body in the procurement and processing of food.

Since completing this work the writer has discovered that unpublished work has identified a similar relationship between human remains and shell middens in North Carolina, in the United States. Here it is thought that human bones, again usually hands or feet, were carried on the seasonal round prior to their interment at the shell midden, perhaps for motives similar to those suggested here (Hargrove pers comm).

Though the dominance of certain types of bone may be suggestive of selection and purposeful deposition other depositional processes may be responsible for their presence in the Oronsay deposits. Very small bones, such as those of the hands and feet, are those most likely to be lost or overlooked if a corpse is allowed to decay to bare bones prior to their removal to a place of interment. This process of excarnation appears to be responsible for the disarticulated bones found in many chambered tombs. Thus, the Oronsay shell middens may represent sites upon which corpses were left to decay, perhaps during the period when the group was not on the island. Upon the return to the island the clean bones may have been collected and removed elsewhere for interment. Though this process of deposition is very different to that described previously the presence of the corpse on the shell midden may still have served to legitimate a group's right to use a given shell midden and associated territory.

iii.ii. Territoriality and tenure

Having suggested that the Oronsay shell middens played a part in legitimising access to resources it is now necessary to more fully consider current approaches to the issue of territoriality and landscape use. Ideas of site catchment analysis and the concept of territoriality were touched upon several times in the earlier parts of this work. In discussing the intellectual history of the study of marine exploitation (Chapter 2) these concepts were identified with the development of least-cost models based on nutritional analyses. Since the introduction of those ideas there has been a growing realisation that ideas of territoriality as utilised by archaeologists are largely based on a western concept of landscape as an inscribed surface, "which can be measured, mapped, described and depicted" (Kuchler, 1993, 85). Concepts such as site catchment analysis and the archaeological use of terms such as territoriality were introduced during the 1970s when processual archaeologists were keen to develop scientific tools capable of explaining past human behaviour (as discussed in chapter 2). However, in trying to apply a series of universal laws to archaeological material they tended to mask its complex nature. These models were founded upon the assumption that archaeological sites such as settlements (Jarman 1972) or chambered tombs

(Renfrew 1974) existed at the centre of a definable territory, which though not necessarily actively defended (Jarman 1972, 708) represented the domain of specific groups exploiting the resources available within that territory.

It has recently become apparent that the nature of human/landscape relationships is far more complex than that suggested by maps overlain with concentric site catchment rings or thessian polygons. The landscape represents much more than a stage upon which the human play is acted out (Ingold 1993, 152; Kuchler 1993, 85). In recognition of this, archaeological approaches have attempted to become more sophisticated and the landscape is now attributed with an active, if nuanced, role in the creation of cosmologies: those belief systems which rationalise people's place in the world (e.g. Barrett 1994, Tilley 1994).

It is apparent that past approaches have presented a rather confused impression of human territoriality (Barrett 1994, 140). The confusion over the terms *site catchment analysis* and *exploitation territory* was noted in chapter two. More recently Ingold has noted that the term *territoriality* is often confused with *tenure* (1986, 132), and it is *tenure* to which Barrett refers when he notes that it is the means by which access to resources was negotiated rather than the recognition of territorial behaviour which should concern archaeologists (1994, 140).

Ingold has recognised that tenure need not involve exclusive rights of access to land, but may operate within a more abstract framework in which forms of tenure are established with reference to spatial dimensions. Thus, tenure can operate within a zero dimensional plane, in the case of a fixed place within the landscape; a one dimensional plane, in the case of movement along paths or tracks; or a two dimensional plane, in the case of the ground surface (summarised in Barrett 1994, 137). What such approaches attempt to achieve is a way beyond the fossilisation of the landscape promoted by earlier processual techniques. As Bender has noted what is now more apparent is that "The landscape is never inert, people engage with it, re-work it and contest it" (1993, 3).

Though the development of the models based on site catchment and territoriality involved the walking of transects by archaeologists this represented a map-oriented analytical technique designed to establish the temporal and spatial bounds of a site territory (Jarman, Bailey and Jarman 1983, 32) and not an opportunity to engage with the landscape. This is what Tilley attempted to do in his recent book

A Phenomonology of Landscape (1994). Here he suggested that "named topographic features (ridges and rock outcrops) would have been invested with sets of local meanings and would have had the effect of pin-pointing the position of camp sites and their inhabitants to populations moving around in the coastal flatlands or waters and marsh areas surrounding them" (1994, 83). Tilley is refering to the coastal hinterlands of southwest Wales, but his observations are wholly in keeping with the way in which the present author envisages Mesolithic groups relating to the Scottish coastal landscape.

Though this thesis has emphasised the importance of access to resources it is hoped that foregoing discussion of the Oronsay shell middens has demonstrated a sensitivity for the landscape and the various means by which people established their place within it. It is recognised that the establishment of tenure involves much more than the straight-forward securing of rights of access and use. It is the means by which people identified with places and one another. Important here was a recognition of past practice which was reinforced through the presence of the ancestors within the shell midden deposits. This discussion will now go on to consider the role of the Oban shell middens within subsistence strategies which may have included an agricultural component.

iii.iii. The later use of shell middens in Oban

The area around Oban is generously populated with Neolithic and Bronze Age monuments. However, as the forgoing discussion will have indicated, the social and historical dimensions of these sites and the communities responsible for their construction are little understood. It is the present writer's belief not only that the Oban sites must be viewed in the context of this wider spectrum of evidence, but also that the Oban sites themselves may provide a foundation upon which this complex archaeological landscape can be understood.

A series of monuments are to be found clustered around Loch Nell, some 3km to the south of Oban (see map). Among these is the chambered tomb of Dalineun, situated at the western edge of the loch, which was found to contain a Clyde-type chamber and later cists (Ritchie 1972). The site failed to provide any radiocarbon dates but was evidently used over a long period, during which time the monument underwent structural remodelling in order to accommodate changes in burial practice, which may also be reflected in the various types of funerary remains in the Oban deposits. In close proximity to the chambered tomb are a number of Bronze Age burial mounds, among which is a large cist built into the esker known as the Serpent Mound.

This concentration of monuments most probably reflects the attraction of the valley floor to prehistoric agriculturalists. The practice of arable agriculture, at least in the Bronze Age, is evidenced by the discovery in the area of a wooden yoke, probably used in harnessing plough oxen, which has been dated from between 1950 BC and 1525 BC, making it the earliest dated yoke in Britain and Ireland (Sheridan pers comm). Even today the valley floor represents the best agricultural land in the vicinity, though as is demonstrated by the Moss of Achnacree, present conditions do not always reflect those of the past. This now peat covered glacial terrace is situated at the mouth of Loch Etive, some 5km to the north of Oban (see map). Located on this flat, low lying area of land are at least two chambered tombs; Achnacreebeag and Achnacree. As with Dalineun, the excavation of the Achnacreebeag site revealed evidence for a complex history of use, involving structural remodelling and the utilisation of a variety of burial practices (Ritchie 1970). Fieldwork carried out in the vicinity of Black Crofts, also on the Moss, has revealed a series of banks and ditches, previously concealed beneath peat, which from radiocarbon dates appear to have been constructed in the 2nd millenium BC (Barrett et al 1976). It is thought that these boundaries were used in the control of livestock (Barrett et al ibid), with podsolisation and increased wetness suggesting that arable returns would have been low (Ritchie et al 1974).

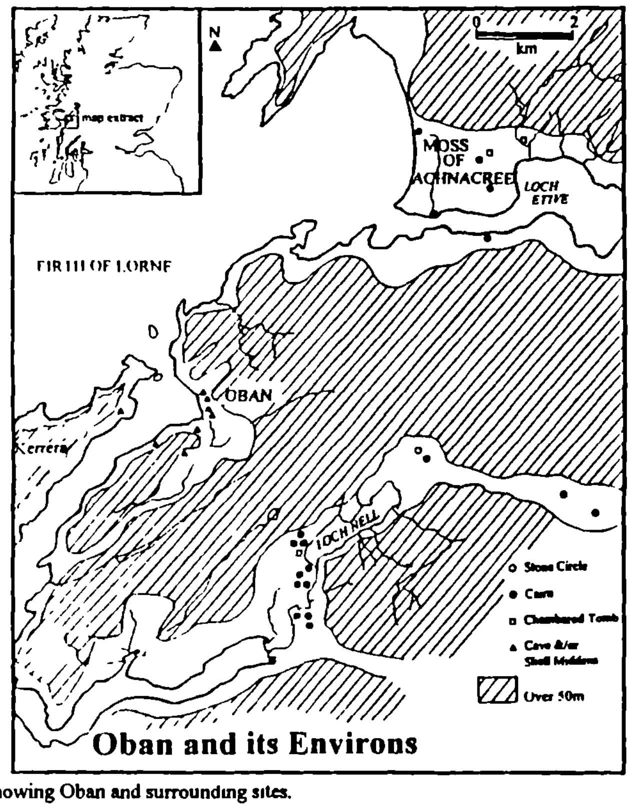


fig 21. Map showing Oban and surrounding sites.

Much of the evidence for Neolithic and Bronze Age activity immediately outwith Oban is of a ritual and funerary nature (exceptions being the yoke and Black Moss boundaries). There is also evidence in Oban itself for funerary activity outwith the shell middens. These take the form of cists with inhumations, and food vessels and urns with cremations, several of which were inserted into the raised beach (RCAHMS 1975). It could be argued that much of the evidence for the later period from the cave and midden sites is also related exclusively to funerary activity. Elsewhere, caves are known to have provided a focus for burial, and a number of Neolithic inhumations in caves exist in the Pennines (Gilks 1989). The fact that caves provide natural chambers has been used to suggest that they were utilised as a form of chambered tomb (Armit and Finlayson 1992). There are certainly parallels between the way that the ritual related to chambered tombs and caves functioned but these cannot be divorced from the presence of shell middens in the caves (see below and chapter 10). The general proposition behind this argument is that the middens were no longer used as sites related to marine exploitation during the Neolithic and Bronze Age. The position of the human remains in the MacArthur cave, in a soil layer above the shell deposit, has been used to defend such an argument, despite the presence of bones actually within the shell matrix (Lacaille 1954). A further argument against the contemporaneity of use as shell middens and places of burial has been that the shell middens in caves with human remains are generally a minor component in these caves (Armit and Finlayson 1992, 69). This is clearly not the case at MacArthur Cave where the upper shell deposits are described as covering the entire area of the cave, some 30 feet by 20 feet, to a depth varying between 27 inches and 3 feet (Anderson 1895a, 215). Reference to cartloads of shells being removed from the Gasworks Cave (Turner 1895) also does little to suggest that the cave middens were minor affairs.

The roots of this argument can be traced back to the traditional pairing of the Mesolithic with hunting, gathering and fishing and of the Neolithic with agriculture. What has not been fully considered is the possibility that the shell midden sites continued to play a part in marine exploitation in both the Neolithic and the Bronze Age. The presence of marine shell and lime deposits adhering to the cliff face, up to half a metre above the upper level of human remains at Cardingmill II, would also suggest that the use of the site as a shell midden continued well after the deposition of these remains - the upper shell deposits, represented by the concretions, having been largely removed when the site was initially disturbed by the removal of talus for a garden extension.

The present discussion is largely based on the assumption that the later use of the Oban shell middens represents the utilisation of marine resources by groups which also practised agriculture; this is not to totally negate the possibility that they could have been used by groups which chose not to practice agriculture but did adopt pottery. However, the presence of agricultural communities, and their associated settlements and lands, in such close proximity to Oban may well have impinged heavily on terrestrial hunting and gathering territories and so made the continuation of a purely Mesolithic type lifestyle an unviable proposition (cf. Hughes 1988, 50).

Land suitable for agricultural production has probably always been in short supply in this part of Scotland, where areas of low-lying flat land with tillable soils are generally limited to alluvial valley floors or raised beach terraces. Other factors such as soil exhaustion, high rainfall and crop disease would have made arable production a risky undertaking, and as a single reliable source of food a totally out of the question. Certainly the husbandry of livestock, such as cattle, in conjunction with arable production provides a more balanced resource base with greater security, but even here the risks of disease, pressure on land and the need for fodder (discussed again later) would ensure that hunting and gathering continued to play a role throughout prehistory. It is here that coastal and marine resources would have played a vital role in providing a fall-back which could make good any deficiencies (Sloan 1984, Bradley 1983). Though it is probable that greater reliance was placed on these wild resources at times of crisis within the agricultural system, it is also likely that they continued to play a constant, if perhaps limited role, within the every day subsistence strategies of these 'agricultural' communities (Deith 1989, 116).

Though it has been suggested that once shell midden sites became removed from the sea, following regression, they were no longer regarded as viable locations from which to practice marine exploitation (Armit and Finlayson 1992) there is only limited evidence in Scotland to suggest that this was the case. Certainly, the back of the Nether Kinneil midden is earlier than its shore-facing front (Sloan 1982). Perhaps the most obvious example of this movement is indicated a shell midden located almost equidistant between the Nether Kinneil site and the present southern shore of the Firth. This site, which from cut-marks in antler tines appears to date to a period when metal tools were used (Callander 1929), therefore represents the use of a site in closer proximity to the shore of the Firth following its regression from the vicinity of the Nether Kinneil site. This shift in location does not appear have occurred in the Oban sites, though it is also noteworthy that the retreat of the sea to present levels involved much shorter distances than those evidenced in the Firth of Forth. The presence of caves in Oban may have been an added incentive to retain sites of long standing, being considerably more sheltered than they would have been at the time of the maximum transgression.

It is not unreasonable to view those groups who, once they had taken up agriculture, tilled fields and tended cattle, as the direct descendants as those who once collected shellfish and fished as part of a Mesolithic lifestyle. It should therefore come as no surprise that these later groups should wish to continue to pursue these activities on the same sites which had earlier proven so suitable for this purpose (cf. Hughes 1988, 51); the importance of motives such as continuity, memory and tradition, have already been outlined in the case of Oronsay. Thus, the shell midden sites in Oban may have been visited periodically by people who spent most of their time elsewhere, in closer proximity to agricultural land, in order that they could exploit the littoral and the areas of sea beyond. It is probable that some of the resources procured here were later transported inland to be consumed or stored, though the debris which makes up the shell midden deposits suggests that a good amount of consumption took place in-situ. The ability to store food is essential if groups are to establish and maintain the capacity for agriculture, which is itself seasonally orientated (Meillassoux 1972, Rowley-Conwy and Zvelebil 1989) and the readiness with which fish can be preserved by drying or smoking may have encouraged a move toward an almost sedentary lifestyle during the Mesolithic (Rowley-Conwy 1983, Finlayson 1990). The caves, within which many of the shell middens in Oban are situated, would have made ideal smoke houses. This function may help to explain the use of sites which would, at times, have provided less than comfortable dwelling places, especially at the time of the maximum transgression when at least the MacArthur cave appears to have been prone to marine inundation (Anderson 1895a). However, it is unlikely that inland movement of preserved fish could ever be established archaeologically as fish bones are so susceptible to decay.

It is therefore suggested that the continued importance of marine resources during times in which agriculture was practiced is one way of explaining the presence of later activity at the Oban sites, which is mainly evidenced through the presence of human remains. The legitimizing of access to marine resources was achieved through physical presence of the ancestors at that site, and this in itself appears to be a practice maintained from the Mesolithic, as demonstrated by the finds from Oronsay, and perhaps some of those from Oban itself. The presence of disarticulated bones may not only imply the use of excarnation but also the movement of human remains from one type of site to another, with some of the bones perhaps even originating from chambered tombs (the role of redeposited materials in ritual activities is discussed more fully in chapter 10).

The utilisation of marine resources during the Neolithic is also strongly suggested by the presence of marine shells in a cave known as Uamh phort luinge Mhic Ruaridh, on Islay (B/33), from which a polished stone axe and a leaf shaped arrowhead were recovered (Mitchell 1898). At Duntroon (B/11), some 30km to the south of Oban, a collapsed cave was found to include human remains along with shell deposits and deer bones (Mapleton 1873) and may represent activity similar to that in Oban. The nearby monumental landscape at Kilmartin appears to represent a focus on limited agricultural land similar to that described for the Loch Nell area.

This discussion has centred on Oban and Oronsay with little or no mention of the other classic Obanian site: Risga. In light of the fact that Risga has provided more artefactual material than all the other Obanian sites put together, it is perhaps a little ironic that we know virtually next to nothing about the site itself. It was the desire to provide a context for this material that served as partial motivation for the present writer instigating a fieldwork project centred on the site.

iv. Risga reconsidered

iv.i Historical background

The shell midden on the island of Risga in Loch Sunart, Argyll, represents the most northerly of the classic Obanian sites, the others being in Oban itself and on the island of Oronsay. All of these sites are characterised by substantial deposits of marine shells from which specific types of artefactual material have been recovered. All of the sites are situated on former shorelines, with the majority of those in Oban being located in caves and those on Oronsay within areas of sand dune. The site on Risga is situated on a rock platform some 33 feet above the present sea-level. As noted in chapter 3 these sites have been the subject of continued interest over the past century and excavations of varying quality have been carried out, with the most recent taking place on the Oronsay mounds and several new sites in Oban.

The Risga site was the last of the 'classic' sites to come to the attention of archaeologists, investigations being carried out on sites in Oban and Oronsay as early as the 1860s and 1870s (Anderson 1895, Grieve 1885). The site was first examined by Ludovic Mann, an important figure in the history of Scottish archaeology, who had earlier worked with Buchanan on the Oronsay sites (Buchanan 1912). The findings of Mann's work, which appears to have been carried out very rapidly and in a less than rigourous fashion (over a period of 2 days), were summarised in an article published in the Glasgow Herald in 1920 (the only published first hand account of the site). In this article Mann describes his finds of marine shells and animal bones of various species, including marine and terrestrial species. A wide range of fish bones were recognised, including haddock, conger eel, skate, grey mullet, sea bream, black bream, wrasse, angel fish, tope, ray and spiny dogfish. The shells of limpet, whelk, periwinkle, cockle, scallops, mussels and oysters are also listed. A large number of sea birds were evidenced by their bones, as were the otter, rorqual, grey and common seal. The terrestrial species noted were red deer, marten and boar.

Mann's article may have provided the impetus for the most thorough investigation of the site, carried out in 1921 and 1922. This excavation was carried out under the auspices of Henderson Bishop, who had already very competently excavated one of the Oronsay shell mounds (Bishop 1914). Bishop, though a more competent archaeologist than Mann, was also cast in the antiquarian mould and had built up an impressive private collection of artefacts from all over Scotland. He employed a number of agents to supply him with this material, their local knowledge enabling them to quickly get wind of any new discoveries. Keith MacKewan was perhaps the most accomplished of these agents, his movements around Scotland resulting in the accumulation of large amounts of material which found its way to Bishop, and much of which is now lodged in the Hunterian Museum, Glasgow. It was to MacKewan that Bishop turned when he decided to excavate the Risga site, employing him to carry out the excavation and to ship the finds back to Bishop along with written up-dates on his progress.

The work was carried out in late 1921 and well into 1922, with MacKewan keeping in regular contact with Bishop. Though large amounts of material were recovered, the excavation was never written up. This failing may have been due to a number of factors, including MacKewan's lack of experience as an excavator and Bishop's failure to even visit the site. Bishop states in a letter, written to the Hunterian Museum in 1950, that, "Among the letters from Mr MacKewan you will find the only records of the Sunart island shell heap." These letters are now lodged in the Hunterian museum and stand as an important, if imperfect, archive of the excavation of this key site (MacKewan states in one of the letters that he kept notes in a book but this does not appear to have survived). It is in these letters that MacKewan admits his own short-comings: "The technical side of the work is my stumbling block so far, as it is simply the lack of the necessary knowledge, which practice will give, which keeps me back" (11/6/1922).

Despite MacKewan's obvious failings - the only drawing of the site to survive is to be found in one of the letters in the form of a rough location plan of the trench - a certain amount of useful information regarding the original composition of the mound can be gleaned from the correspondence. MacKewan appears to have worked from the eastern edge of the mound, cutting his way to the west along a series of section faces. The site appears to lack the vast quantities of shells which made up the Oronsay shell middens. MacKewan writes of a shell bearing layer, which in places is "very intermittent and rather difficult to locate" (22/10/1921). At the centre of the mound he describes a, "core of sandstone boulders, where burnt earth, bones and fire-fractured stones are the rule...the shell layer well defined". Later he notes " a large number of bone gouges, I call them shell scoops, today some used at both ends, all from the soot layer...Have not spotted any postholes. Hearths are numerous now" (ibid). The site then does appear to have a complicated stratigraphy with shell bearing deposits making up only one element. The site therefore appears to reinforce the suggestion that shell middens cannot be regarded as a simple morphological type. Though they have elements in common they also demonstrate a variance which should call into question many of the assumptions which have caused them to be simply labelled 'shell midden'.

The Risga shell midden has long been regarded as a Mesolithic site, and as such representative of the Obanian. Such a conclusion was supported by the recovery of artefacts very similar to those recovered from the Oronsay shell middens and the Oban cave sites. Most important here are the bone and antler barbed points, of which several fragments were recovered. However, the recovery by MacKewan of more than 18,000 lithics (Stevenson 1978), with quartz being the dominant raw material, does stand in contrast to the other Obanian sites, from which only very small amounts of roughly flaked pieces of flint have been recovered. This difference has largely been overlooked but should again perhaps be taken as an indication of some functional and morphological variance between sites which are too readily regarded as a homogeneous type.

Other artefacts recovered during MacKewan's period on the island clearly suggest that the site may have been used over some considerable time. In his letters to Bishop, MacKewan refers to the recovery of a number of pot sherds, of which there were "two kinds, one very coarse, thick and heavy, the other much finer and altogether a more finished product." MacKewan went on to suggest that, "this may be the stages in the evolution of pottery making as applied to Risga" (11/6/1922). These pottery sherds are now confined to a cigar box lodged in the store room of the Hunterian Museum, where they have remained since Bishop donated his collection to the museum almost half a century ago. Despite the lack of attention paid to these scraps of pottery since their recovery they are of some considerable importance.

Examination of this pottery has established as incorrect MacKewan's proposition that the coarser pieces were the earliest, an assumption based upon their more primitive appearance (such reasoning being a recurring theme in this work), and that conversely the finer pieces represented a later development. In fact, the coarser pieces are Iron Age while the finer sherds appear to be Neolithic. This later material immediately adds a further dimension to a site which had previously been pigeon-holed as a classic product of Mesolithic activity. It is possible that this later activity may have been influenced by motives similar to those proposed for Oban, with the difficulties related to agriculture being even greater in Ardnamurchan. Though no human remains were reported from MacKewan's work it is highly likely that small bones like those which appeared at Oban and on Oronsay would not have been collected.

The use of the Risga site during the Neolithic and its continued use into the Iron Age again force us to reconsider some of the long-held perceptions of prehistoric marine exploitation and the nature of shell midden deposits. Why should this small island attract people exploiting marine resources, even on a discontinuous and sporadic basis, over a period of several thousand years? It has been suggested that Mesolithic lifestyles may have been maintained in the Ardnamurchan area long after the adoption of agriculture in more accessible fertile areas (Lacialle 1954). This hypothesis is based largely on the recovery of artefacts of Mesolithic type from contexts in Ardnamurchan which also appear to contain later material, including Beakers, though the apparent thinness of some deposits has also been suggested as evidence for temporary occupation (Bradley 1983). Sanna Bay is one such area, where over the years a substantial amount of material has been recovered eroding from the sand dunes, including shell midden material (Lethbridge 1927).

iv.ii. Aims and Objectives

The Risga project had several aims:

1) to locate and survey the site. Prior to this work taking place the exact location of the site had been lost. An Ordnance Survey team visited the island in 1972 with the aim of locating the midden but failed to do so. It now appears that they stood on the site without recognising it, noting the presence of a stone-lined structure which is actually built into the mound.

2) to investigate the potential for the survival of elements of the site in order to provide further contextual information on the previously recovered artefactual assemblage.

3) to further investigate the nature of what have been classified in this work as type II deposits, those being shell middens with no obvious structural elements. This would be achieved through the exploration of areas outside the mound where evidence of settlement or activity related to the shell midden may exist.

iv.iii. Results

iv.iii.i. Location and survey

Location did not prove to be a problem, with the site revealing itself as a low grass covered mound situated at the rear of a sloping rock shelf at the eastern end of the island. Cut into the mound was a shallow, stone-lined trough - which appears to be a much later feature related to kelp burning. The termination of the mound was clearly marked on the western side by the presence of a vertical face cut into the side of the hillslope which rises up behind the mound. This face represents MacKewan's final working face, after having worked through the mound along this axis from the east. The implication was that the entire mound had been disturbed, with MacKewan himself stating that he had worked through the entire mound. The mound then appeared to represent nothing more than Mackewan's spoil, but only excavation could establish this for certain. The site was surveyed using a theodolite and a plan can be seen in figure 22.

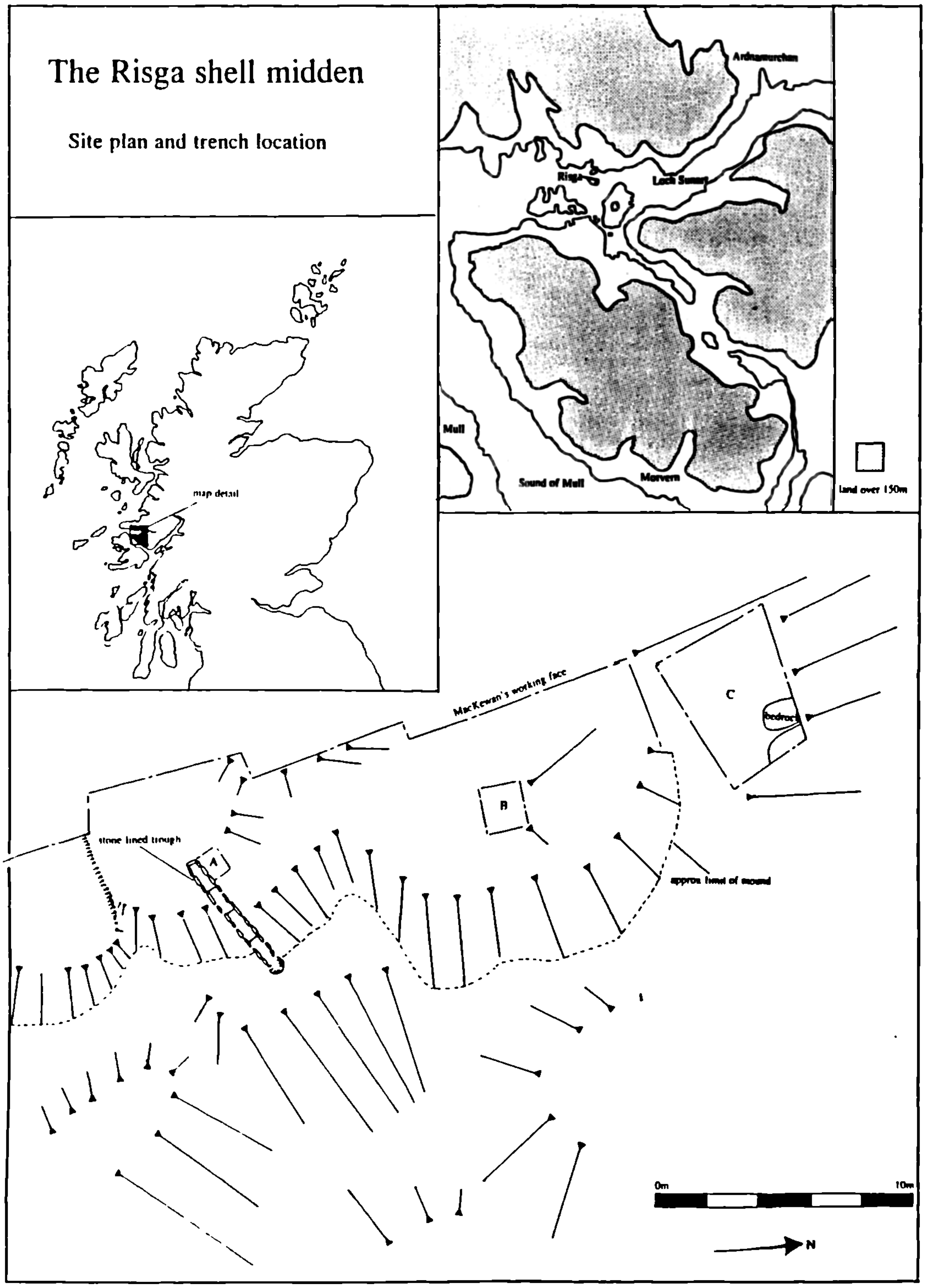


fig 22. Location of Risga and survey of shell midden site

iv.iii.ii. Test pitting

Once surveyed, the physical make-up of the mound was first assessed through the excavation of a series of test pits. These were located both on the mound itself and around its immediate perimeter. The pits within the mound itself established that, as suspected, much of it had been disturbed but some basal deposits appeared to remain intact. Perhaps most interestingly, the majority of those pits located away from the mound revealed quantities of lithics, with quartz, flint and bloodstone. These results clearly merited further excavation, indicating as they did both the potential for the survival of intact deposits within the midden and the presence of material outside the midden which had been undisturbed by MacKewan's excavation.

iv.iii.iii. Excavation

The excavation of a trench though the mound (trench B) resulted in rather disappointing results as the survival of basal deposits was found to be minimal. The section through the mound revealed that the deposits had been thoroughly disturbed by MacKewan's excavation. Visible in the section was an organic deposit which represents a turf bank which he built up behind him as he advanced into the mound, serving to keep spoil away from his working face (plate 2). Despite this disappointment it is possible that excavation elsewhere within the mound will prove more profitable. Sieving of spoil from the mound, which was constituted from a mixture of shells and organic matrix, revealed a number of fragmented bones and some lithics but in general MacKewan seems to have made a fairly thorough job of clearing the site.

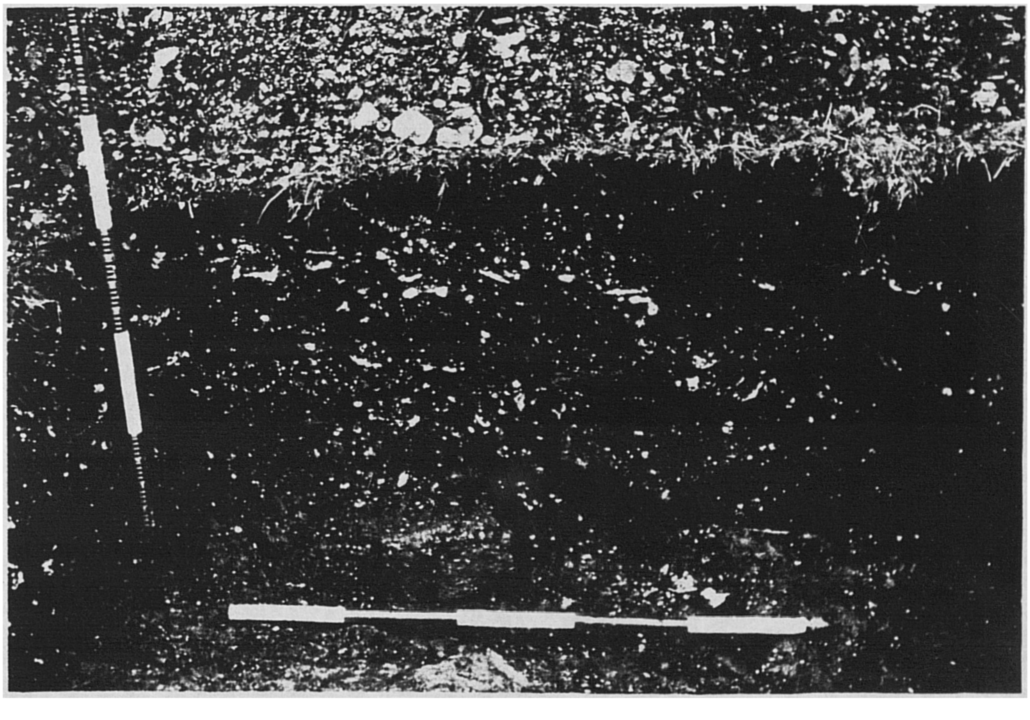


plate 2. Section through mound, trench A, showing disturbance and turf bank

Excavation outside the mound was more encouraging, being centred upon the area from which the greatest number of lithics were recovered during test pitting. These pits were situated to the north of the mound on gently sloping ground. A trench measuring five metres by five metres was opened in this area (trench C), with removal of turf and decayed heather and bracken roots giving direct access to the subsoil and archaeology. Lithics were in such preponderance that they were found to be adhering to the turves as they were cut and lifted. Once cleared of turf the trench was gently cleaned with lithics being bagged by quadrant. Several cleanings were required before features cut into the sub-soil became discernible. These took the form of at least one hearth and a series of differential fills, including material rich in ash and charcoal, which appeared to represent pits and linear slots (see fig.23). A sample of these features was investigated in order to further ascertain their character. Investigation of one of the slot-like features revealed a shallow cut containing stones, which appeared to represent the packing for lightweight uprights. It therefore appears that structures, in the form of temporary shelters, were present on the site in close vicinity to, but separate from, the shell midden.

iv.iv. The lithic assemblage

Though the site is still undergoing investigation, it can already be stated that lithic manufacture was taking place outwith the area defined by the midden, with over 2,000 lithics, much of it waste, being recovered from an area as small as five metres square. The assemblage was dominated by quartz (65%), which is perhaps not surprising considering that it appears in thick veins through the schist from which much of the island is composed. However, other raw materials including flint (32%) and bloodstone (3%) were also utilised.

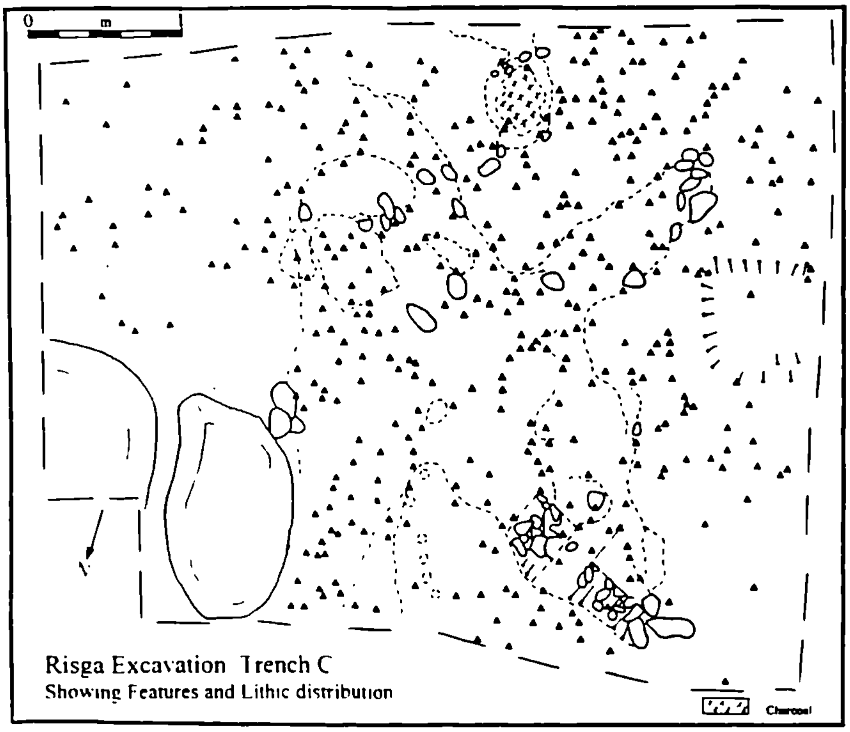


fig 23. Trench C with features and lithics shown.

The artefacts present included a modest proportion of snapped blades and microliths (c. 5%) which appear, along with the lithics from Lon Mor in Oban, to establish that the impression that the Obanian sites represented a marine adaptation without recourse to the use of microlith technology is a false one (discussed further below). Scrapers were also recovered, and may suggest the use of lithics to accomplish a variety of tasks on the site. A bloodstone leaf-shaped arrowhead, which would normally be regarded as Neolithic, provides further evidence, if any were needed, of the problems related to the use of artefacts not only 'date' sites but also to make assumptions about the type of lifestyle represented.

Though evidence for activity external to the shell midden deposits has been identified on Risga it is not yet possible to establish for certain which, if any, phase of the midden deposit, now represented by disturbed spoil, corresponds to this external activity. From MacKewan's descriptions, noted earlier, it is apparent that there was some variety in the nature of these deposits, with deposits of marine shells being interspersed with layers of ash, burnt earth and stones etc. These deposits may well be related to the use of the shell midden as a site for the preparation of marine resources but this will be difficult to establish as fact. Though the recovery of both Neolithic and Iron Age pottery from these deposits has been noted it is impossible to establish the contextual relationships of this material. Though it is tempting to suggest that the site was utilised for the same purpose over several thousand years it can also be argued that the site changed in character over time. Certainly the presence of what appears to be a kelp burning kiln provides later evidence of re-use of the site for a different purpose, though kelp-burning still represents the procurement and processing of a marine resource. Ritchie has suggested that two distinct phases of occupation are suggested by the artefactual material recovered, the first being Mesolithic, taking place prior to 3,000 BC, the second phase being evidenced by the presence of pottery and flint knives like those present in Bronze Age cairns on Arran (1968, 119), but such a sequence is difficult to establish without full records of the earlier excavation.

As there are difficulties in establishing the sequence of activity represented by the midden deposits so there are similar problems in the area outside the mound. Though this area appears to be largely undisturbed, MacKewan's attentions being wholly directed toward the mound and modern ploughing never having taken place on the island, there are problems in establishing stratigraphic relationships. Despite the presence of negative archaeological features, in the form of foundation trenches, pits and hollows, the bulk of the artefactual material so far recovered has been from the subsoil surface - with lithics even being recovered from between the heather roots in removed turves. It is therefore difficult to establish a relative chronology for the deposition of this material, though this is a problem common to many lithic scatters. The presence of microliths and an absence of non-lithic material, such as pottery, strongly suggests that this material is Mesolithic, though as already established the boundaries between what we understand as Mesolithic and Neolithic in this area are extremely blurred. Certainly, the leaf-shaped arrowhead would normally be regarded as an artefact of the Neolithic but there is every possibility that this artefact was one component of a hunting, gathering and fishing lifestyle with no recourse to agriculture - an economic background more closely related to the Mesolithic than to what is usually regarded as the Neolithic. However, it is very possible that the arrowhead was deposited long after the microliths and simply represents a short visit to the island by a group perhaps hunting deer in order to supplement a diet which also included reared meat and perhaps some cereal crops. It is obvious then that a number of interpretations are possible on the present evidence.

Mackewan's recovery of Mesolithic type lithics from the mound may be taken to suggest a Mesolithic provenance for the shell midden. However, as noted above the exact provenance of these artefacts is unknown, and it cannot be said for certain that these were related to shell midden deposits. It is possible that they relate to layers which built up under circumstances unrelated to marine exploitation. Such differential deposition may explain the apparent presence of large quantities of lithics in an 'Obanian' shell midden, which in places such as Oban and Oronsay were largely lithic free. Mellars has suggested that the microliths recovered during MacKewan's excavations were recovered from a basal deposit and represent activity prior to the build up of the shell midden (Mellars pers comm). Woodman has used this supposition to argue that the presence of bone and antler barbed points in 'Obanian' shell middens is indicative of a decision during the late Mesolithic to abandon microlith technology, hence their absence in these deposits (1989, 16). This argument is somewhat weakened by the early radiocarbon results obtained for the Risga barbed point and those from Oban (5th and 6th millennium BC). These strongly suggest that material culture related to the 'Obanian' cannot be taken as indicative of purely late Mesolithic activity. It can also be suggested that there is no direct evidence for the pre-midden provenance of the microliths, though arguing that they do come from shell midden layers is also problematical, even with the benefit of excavation, as the shell midden layers and the deposits beneath them were heavily disturbed by MacKewan's excavation.

It is argued here that the lithics from the mound were deposited as the shell middden deposits built up. The presence of barbed points, one of which has been dated, is strongly indicative of marine exploitation on the site from an early date. Though the periodical presence of deer on the island and the availability of quartz may have provided an attraction for prehistoric groups it is difficult to foresee a presence on this very small island which wasn't at least accompanied by marine exploitation.

It is further suggested here that the activity area located outside the mound was also contemporary with the build-up of shell midden deposits. Again, establishing this archaeologically will be difficult, and it has already been noted that no secure relationship can be established between shell middens and nearby lithic scatters in the Ythan estuary (region E). Hopefully features such as hearths in this external area will provide radiocarbon dates. It is possible that excavation of the area which corresponds to the mound's outer edge and that part of the external activity area closest to the mound may do something to clarify this relationship on stratigraphic grounds. It is possible that shallow elements of the shell midden may remain intact here, undisturbed by MacKewan's investigation. If this is the case it will be interesting to discover whether features which so far appear external to the mound actually carry on beneath it, thus establishing that the structural remains represented by these features are earlier than the formation of the shell midden. However, such evidence, if surviving at all, is likely to be limited to the fringe of the mound. It will therefore be impossible to establish whether a considerable portion of the site, now represented by external features, was submerged beneath the mound or whether just a small proportion of its fringe had become engulfed as the mound deposits grew in extent.

It is regrettable, due to the condition of the site, that many of these problems will be intractable. Only with the excavation of further sites will we be able to clarify the direct relationship between shell middens and external elements. Despite these problems the writer does believe that a reasonable case has been made for both the Mesolithic provenance of at least some of the Risga shell midden deposits and the contemporanity of at least some of the external activity. The following section will discuss the ramifications of this interpretation on our understanding of the 'Obanian' and shell middens in general, and in so doing will hopefully strengthen the case for the chronological relationships suggested above.

iv.v. Risga and Type II deposits, or when is a shell midden not a shell midden?

A number of definitions have been proposed for shell middens, including; "a cultural deposit in which particles of animal shell are the dominant class of refuse" (Muckle 1985, 16). Waskelkov, on the other hand, opted for a more general definition; "a cultural deposit of which the principle visible constituent is shell" (1987, 95). However, it should be pointed out that these definitions refer to features identified outside Scotland, in particular to those recorded in North America. Though it has been noted that marine shells have been recovered from a variety of contexts in North America (Moss 1993), these have taken a back seat to more substantial deposits which exist as mounds (equatable with type II deposits).

Type II deposits are those which appear to exist as isolated units unrelated to structures and settlements, and as such are comparable with Barber's class 1 burnt mounds (1990). It has already been noted that this impression may be due to differential visibility and preservation. The investigations on Risga have suggested that related activity can exist outwith the area occupied by shell middens, but without excavation in these external areas such activity will remain invisible. Such findings may suggest that prior to excavation the type II classification can be taken only to refer to the apparent character of remains as they are visible on the ground, and not carry with it interpretative and functional implications.

The shell midden on Risga, though apparently associated with evidence for structures and peripheral activity, does not appear to represent permanent settlement on the island. The evidence available points more convincingly to temporary and perhaps sporadic activity extending over a considerable period of time. An important motive for that temporary presence on the island appears to be the exploitation of marine resources. This exploitation may have taken place as part of a seasonal round or on a less regular basis at times of crisis or short-fall elsewhere in the subsistence cycle. A shell midden may therefore represent a 'task' site, largely dedicated to the exploitation of marine resources.

As a task site the shell midden may represent an area where primary processing took place, with fish being smoked or dried and marine mammals butchered. Processed food-stuffs and other materials, such as bone for artefact manufacture, may then have been removed from the site to places of settlement, be these either temporary or permanent. It is perhaps this role which has led to the apparent absence of evidence for marine exploitation on a great many settlement sites, some of which are in close proximity to the coast. It has already been noted that substantial quantities of marine shells, as present on most type II deposits, promote the preservation of organic materials. If material is removed from the area of primary processing to other sites then there is a possibility that it will not survive at its place of secondary deposition. It can be suggested that a total absence of marine shells on some sites may be due to the flesh being removed from the shells at the task site prior to their transport to the place of settlement, thus decreasing the weight of material to be carried.

Perhaps an additional criteria in the definition of type II deposits stems from the fact that they generally have a close physical relationship with the littoral, though this cannot always be assumed to be the case, as suggested for the Bronze Age site in Culbin sands (Coles and Taylor 1970). Settlements with shell deposits related to them (type III) tend to be situated some distance from the coast; even if they are considered coastal they are generally removed from the littoral. The presence of so many apparently substantial settlements on the immediate shore in places such as the Outer Hebrides and Orkney is largely due to the erosion of that coastline by the sea over time. As will be outlined below and in later parts of this work, this proximity of some sites to the sea, and the specific nature of tasks carried out on them, would bring people into intimate contact with a dynamic environment very different to that further inland, a factor which may imbue what we can perhaps most suitably term 'shell middens', and the activities carried out on and around them, with a special role in the formation of world views and cosmologies.

The presence of terrestrial fauna indicates that other procurement strategies also had a part to play. However, it has been suggested that the red deer bones on Oronsay may represent raw material for the production of artefacts (Grigson and Mellars 1987). The transformation of terrestrial raw materials into artefacts, perhaps for use in marine procurement, further emphasises the role of the shell midden as a mediator between land and sea. The use and location of shell middens is symbolic of the transformation from one environment to the other.

In the light of these suggestions it is not unreasonable to associate at least some type II deposits with a particular set of activities and it is to these sites that the term 'shell midden' is best suited. However, it is also important to note that at least some type I deposits, those situated in caves, may have served similar functions and so can be considered in the same light. It is for this reason that the term 'shell midden' should perhaps be reserved for these sites only. However, the use of language is unavoidably difficult and distinctions are far from clear cut. It has already been noted that the Risga midden contained far more lithics than the other Obanian sites. In the past this difference has simply been put down to the availability of flint in Morvern and its absence in these other areas (Lacialle 1954, 235; Morrison, 1980, 161). The present work has certainly established that one reason for the presence of lithics may be the ready availability of quartz on the island, and it is this material and not flint which dominates the assemblage. However, a more profound reason for this difference may be the close proximity of settlement to the shell midden, which may not have the case in Oban, where space on the shore was restricted by cliffs, or on Oronsay, where Mellars has suggested that settlements may be located toward the centre of the island (1987, 3). The Risga midden may therefore not only have served as a marine extraction and processing station but also as a domestic midden, where waste material produced within the settlement, including lithics, was dumped, a process which also carries it into the type III(b) category.

vi. Coastal environments and coastal culture

Though environmental determinism is now rightly frowned upon it cannot be denied that the environment within which people live does influence the way they perceive the world and their role within it. This factor is surely nowhere more apparent than in the case of people living on the fringe of two wholly contrasting environments: land and sea. This section will now attempt to consider the implications of a number of factors relating to the nature of the marine environment for our understanding of the archaeological evidence related to its exploitation.

Approaches to shellfish exploitation in Scotland have generally been limited in scope, a factor partially due to the gearing of specialist reports to the assessment of limited assemblages for the purposes of publication in reports on the excavation of specific sites. Analysis and interpretation is generally centred upon species identification and the ranking of the importance of shellfish alongside other sources of nutrition, which may involve the calculation of calorific content (eg Evans 1983). Rarely has any attempt been made to seriously consider the nature and implications of procurement beyond identifying the nature of the coastline from which various species had been collected (eg Evans and Vaughan 1983). The consideration of the dynamic processes which underlie the static data represented by deposited marine shells is vital if we are to achieve an understanding of marine exploitation which transcends the less than profound realisation that limpets live on rocks near the sea.

It has elsewhere been noted that the role of women in shellfish gathering has been largely overlooked in archaeological approaches to the subject, despite the acknowledgement of their consistent and central role in anthropological works (Claassen 1991). To do so in the present work would be to deny a female role in the formation of a major and important element of the Scottish archaeological record. However, to limit women to this role is to perpetuate stereotypical images of the female role as gatherer and it may be more appropriate to envisage an active role in many aspects of marine based economy, which would include the manufacture and maintenance of procurement equipment (making nets etc), control of fish traps, preparation of bait, primary processing and butchery etc. One important consequence of the presence of women on the foreshore and littoral is their accompaniment by young children. Though Sauer's paper on the role of the seashore as "the primitive home of man" (1962) has been rightly criticised for its extreme stance (Palsson 1991), there may be something to his statement that "The sea, in particular the tidal shore, presented the best opportunity to eat, settle, increase, and *learn*" (1962, 309 - emphasis mine). The likelihood that children in coastal communities spent much of their time, in their formative years, on or near the shore, would certainly suggest that its influence in moulding their world views and its function as an environment within which knowledge was gained would have been an important one.

Most of the evidence for the early prehistoric exploitation of marine resources was at one time situated in very close proximity to their source: the sea and its littoral. This is despite the fact that many of these sites now inhabit locations some distance removed from the shoreline. These sites relate to the main post-glacial shoreline, brought about by sea-levels rising up to 15m above those of the present. In some cases the retreat of these high seas left some sites, formerly on the shore-line, several kilometres inland. Whether they existed as open sites (type II) or were confined to caves (type I) these sites were very often physically touched by the sea, either at high tide or during storms. At the MacArthur Cave in Oban the lowest cultural deposits were overlain by a stratum of water rolled beach pebbles. It is probable that this material was washed into the cave by storm waves (Anderson 1895), though it is possible that the earliest human use of the cave pre-dated the maximum transgression. Whatever the case it is likely that the cave was situated on the immediate shoreline.

The location of shell middens in immediate proximity to the shore, at least at some point in their history, perhaps being situated on the fringe of the high water mark or the storm beach, immediately suggests that these sites were generally exposed and open to the elements and perhaps most importantly two times a day almost became part of the sea. They exist on the edge of the littoral zone, on the boundary of that area which is neither land nor sea, but at given times is one or the other. It is likely that at times of especially high tides, either equinoctial or storm driven, the sea took with it elements of these sites, washing deposits down onto the beach and from there returning them to sea from which these residues had come. A modern analogy for this process can be seen in the marine erosion of sites in places such as Orkney and the Outer Hebrides. An irony here is that many of the sites which today inhabit the immediate shoreline were at the time of their use and deposition situated some distance away from the sea.

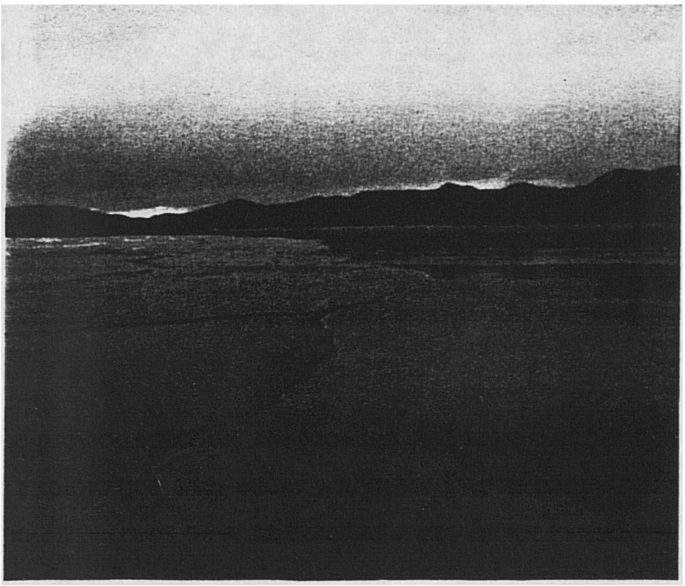


plate 3. "...neither land nor sea."

As suggested in the previous section, the location of a large number of early prehistoric marine exploitation sites either within the littoral zone itself or on its immediate edge should perhaps be considered as a key factor in understanding the importance of these sites. It is a liminal environment, representing the interface between land and sea, within which a complex series of relationships exist between the environment and the people and animals which inhabit it. The seal may taken as an example of this complexity, perhaps more than any other creature embodying this meeting between land and sea, belonging to both but restricted to neither. It is for this reason that so many cultures have incorporated these creatures into their myths and folklore. In Scotland stories of *Selchies* are common to many areas, with seals variously having the ability to change into people or representing the souls of the dead or the cursed (Thomson 1965). Though it is obviously not possible to say that these stories have an early prehistoric origin it is reasonable to suggest that these creatures may have represented more to those who shared their habitat than a simple source of food.

Whales are another marine mammal which in many societies are regarded as a special creature, often becoming the object of taboos and myths. In the contemporary west the image of the whale as an intelligent graceful creature has dominated the conservation movement and turned the whale into a 'green' icon (Kalland 1993). Despite the anthropological evidence for the special status of these animals there is little evidence for their presence in overtly ritual contexts, there apparent absence in chambered tombs being noted (Clutton-Brock, 1979, 149). This absence may reflect their deliberate exclusion from ritual contexts which include human remains. This exclusion may reflect an aspect of taboo related to the place of marine mammals in people's perception of the world. However, it also possible that this absence may be a result of the failure to report the presence of such material, or of differential preservation - though the bones of whales are more apt to survive than fish bones which have been recorded. Certainly the identification of a piece of whalebone from the Isbister tomb (Colley in Hedges 1983) establishes that the absence is not general.

As noted in chapter 7 there has been some debate as to whether cetacean bones on archaeological sites represent beached whales and dolphins or the result of hunting activities. It was pointed out there that even beached whales may have a social significance, representing as they do substantial supplies of food for little or no cost. Beachings may therefore have represented important events which may have had a feasting or ceremonial aspect, as demonstrated by Australian aborigines on such occasions (Proulx 1986). The whale remains periodically discovered in the Carse of Stirling certainly take on a new dimension if considered in this light, each perhaps representing an event which brought people together and temporarily focussed communal activity on the boundary between land and sea.

Events centred upon a beached whale carcase may have provided a temporary focus, though its remains may have been returned to periodically to remove bones for use as a raw material. Shell middens however can represent much more protracted periods of activity, with a period of up to 700 years established for the Oronsay mounds (Mellars 1987). This longevity in itself may infer a role for these sites in the creation of world views or cosmologies which were heavily influenced by the character of the littoral and marine environment.

The importance of tidal action has already been touched upon (chapter 4). This becomes further apparent when one considers its direct influence on exploitation practice and scheduling. An obvious dichotomy can be drawn between those resources confined to the littoral zone, such as limpets, mussels, seaweed etc, and those found only further out to sea, with deep sea fish such as cod being an obvious example. It is here worth noting that the seal is not the only multi-zonal species to be incorporated within superstition and folklore. The salmon, which moves from salt water to fresh water to spawn, is in various parts of Scotland regarded as a symbol of bad luck, and some fishermen, up until very recently, would never consider fishing for seafish in clothes or with gear which had been used in the catching of salmon (Blair 1987).

vii. Cycles and scheduling

The exploitation of shellfish is only practical at times of low tide, when the rocks which accommodate mussels and limpets, or the sands within which cockles and razor shells are buried, are exposed by the temporarily withdrawn sea. The same low tide may reveal seaweeds which can also be collected, while rock pools may trap small fish. Artificial fish traps also do their job, with the recession of the tide not only making them accessible but also providing the mechanism by which fish are drawn into the trap. Low tide occurs every day, twice a day and is these temporary windows which provide the cue for the intensification of activity on the shore, with people perhaps abandoning other tasks and moving from areas removed from the shore in order to take part in shellfish collection.

Though resources situated within the immediate littoral are most obviously influenced by the turning of the tide, it is also important to realise that access to resources situated in deeper water, beyond the littoral, may also be dependent on the state of the tide. Depending on the nature of the shoreline terrain it may be more convenient to launch boats at high tide, in order to avoid rocks, or at low tide when boats can be dragged down the beach. Perhaps more importantly the nature of the tide can also dictate the movements of fish, which can to an extent be predicted. This is especially true with the use of lines from boats or rocks, and it has been noted in the Northern Isles that most kinds of fish were more likely to be caught when the tide was moving most strongly, on the turn, and least well in the slack between tides (Fenton 1978).

Though the window provided by shifting tides is predictable it is also a moving window, with times of low tide moving forward an hour every day, on a regular cycle. This differs somewhat to the time cycles which dictate non-marine based activities, such as agriculture, where work is dictated by the less obviously shifting hours of daylight and the nature of work by the season. Time for the agriculturalist or hunter-gatherer is marked by the movement of the sun while for the fisher it is marked by the effect of the moon (and the sun) on the movement of the sea. When agriculturalists are also fishers then the two systems mesh, with marine time acting as a rolling counter-point to land time.

It is not suggested that the earlier prehistoric inhabitants of the coast were aware that the mutual gravitational pull of heavenly bodies was responsible for the movement of tides; that was not realised until 1687, when Newton developed his laws of gravitation. However, it is not unlikely that people were aware of the relationship between the phases of the moon and tidal action. The new moon and the full moon equate with the highest (spring tide), while the first and last quarters of the moon equate with the lowest (neap) tide (Carson 1951).

The extremes of tide obviously have implications for access to beach resources, with spring tides effectively denying access to much of the beach at high tide. Neap tide will have the opposite effect, exposing areas of the lower beach for prolonged periods of time, perhaps permitting increased access to sub-littoral resources such as kelp, crabs and shellfish such as scallops. Even more important here is the influences of the tide on currents and fish movements. A knowledge of local tidal conditions is vital to groups regularly using the sea as a means of transport or source of food, this fact being evidenced today by the importance of tide tables to any one using a boat at sea. In present day Scotland areas such as the west coast are renowned for their fast currents and rip-tides, with the narrow gaps in the mouths of sea lochs and between islands requiring considerable skill to negotiate safely. Today the crossing from Oronsay to the mainland is particularly hazardous, necessitating movement through several such areas, of which the Correyvrecken is the most notorious. However, the extrapolation of present conditions to the prehistoric past is difficult, and it should be noted that a rise in sea level, as during the main Holocene transgression, would have made conditions very different to those of today, with land area reduced and the sea's surface extended. This not to say that this different environment was not accompanied by its own dangers and local hazards.

Into his complex framework must also be placed the various cycles of spawning, migration and shoaling behaviour which affect the availability of fish. Most fish spawn in spring or early summer, at which time fish such as cod will move in shore in large numbers and so lend themselves to exploitation (Wilkinson 1981). However, as the analysis of saithe otoliths from Oronsay have established fishing need not be limited to a single part of the year (Mellars and Wilkinson 1980). In the shorter term the depth of water at which fish such as the saithe swim may alter on a daily cycle, as they are closest to the surface in the evening.

The remains of a multitude of fish species on early prehistoric sites suggests a high degree of knowledge regarding the behaviour and movements of fish. Perhaps more than any other form of mobile resource exploitation, effective fishing strategies suggest an intimate relationship between people and their environment. Deer and other terrestrial prey species can be observed and their behaviour patterns studied; fish, on the other hand, are effectively invisible. It is here that past experience and the passing down of knowledge will have played a vital role. It has been suggested that one reason for the veneration of ancestors by agricultural groups is the debt owed to antecedents for their role in the preparation of the ground and provision of seed (Meillassoux 1972). Such debts may also have been recognised in hunter-gatherer-fisher economies where rewards are generally thought to have been quickly achieved and free of obligation. This is a factor which should perhaps be considered in relation to the insertion of human remains into shell middens which was discussed earlier.

The scheduling of marine exploitation with agricultural activities and terrestrial hunting and gathering would have required flexibility which would permit elements of the workforce to have broken off and participated in other tasks. The role of women in shellfish collection may have represent only one means of accommodating these various tasks within the work schedule. It is possible that some members of the community devoted much of their time to marine based work while others may have devoted most of their time to land-based tasks. It is not uncommon in peasant economies for fishers to form a separate segment of society (Smith 1977, 8), a demarcation which is not often considered in the study of prehistoric marine exploitation. However, though specialisation cannot be universally ruled out, it is difficult to reconcile such rigid demarcation with the diverse nature of many of the deposits which have provided evidence for marine procurement. From an anthropological perspective it is also interesting to note that some groups who mix fishing with other activities, such as farming, may be viewed by those outside, who do not fish, as fishing rather than farming communities (Schoembucher 1988, 214).

Shell middens suggest a focus for activity on or close to the shore, with people moving from areas further inland to take part in processing and consumption. On sites such as

Risga and Oronsay the period over which this activity took place may have been so prolonged that settlements were established in very close proximity to the shore, while in other places, such as Oban, settlement may have been a little more removed. It is more appropriate to view the adoption of agriculture as representing a broadening of the subsistence base rather than as a move to increasing specialisation. This is not to say that agriculture did not heavily influence the nature of economy and settlement, in some places more than others, and in doing so may have encouraged different attitudes to the sea and its littoral to those discussed above. The direct association of residues relating to both agriculture and farming is generally limited to settlement sites, though some shell middens have been found to contain the bones of apparently domesticated animals (e.g. Nether Kinneil). The best preserved and most thoroughly investigated Neolithic settlements are to be found on Orkney and it is to there we must turn in order to examine some of the implications of a shift in focus from the shore to the land.

viii. Away from shell middens

The movement of marine resources to permanently occupied settlement sites, where they were processed and consumed, has a number of implications on the character of marine exploitation. Most obviously, the resource is removed from the place of its procurement. Marine shells collected at low tide were carried from the littoral to the rear of the beach. This movement would necessitate traversing an area of land which at high tide would be covered by the sea. It has already been suggested that this area and its liminal status may have played an important role in moulding the relationship between humans and the environment through which they moved and which they exploited. In the case of shell middens, movement may have ceased once the rear of the beach and the shell midden had been reached. However, in the case of type III deposits movement extends beyond the bounds of the beach and the littoral. To move from the beach to the land beyond is to move from one type of environment to another. Indeed, in many cases the boundary between the two is marked physically, either by sand dunes and ridges, as in the case of machair environments, or by cliffs, as along many rocky coasts.

Cliffs will very often restrict access to littoral areas, a factor which may increase markedly the distance which people needed to travel in order to return to their settlements. This factor should not be forgotten when considering the Oban deposits, some of which would have been situated on narrow shelves bounded by the sea on one side and cliffs on the other. Here topography would effectively have channelled movement along the beach, restricting inland penetration to a limited number of locales, perhaps marked by river or stream outlets. Such observations may seem rather obvious and simplistic, but they do have very real implications for the ways that people related not only to their surroundings but also to each other. In Oban this restriction of movement along the shore front, unless circumvented through the use of boats, would have necessitated that people pass in close proximity to extraction sites used by others. People would become very aware of their own places on the beach, associating themselves with 'territories' which may have been defined through reference to the location of their neighbours'.

Permanent settlements are not situated on the beach, which is a mobile environment, exposed to the elements and the daily transgressions of the sea. Evidence for Neolithic settlement is limited, with the few settlement sites which are known generally surviving only because they were constructed from stone. Notable here is Skara Brae, where both stone construction and the site's burial beneath wind-blown sands facilitated impressive levels of survival. Both here and at other sites on Orkney, such as Links of Noltland and Knap of Howar, marine resource residues, including shellfish, were deposited both inside and outside the structures. All of these sites were found to have been constructed on midden deposits, which included marine shells, relating to earlier phases of activity. This material was later integrated within the construction of the buildings, being heaped against the outer walls as well as integrated within wall cores, possibly to serve as a form of insulation (Clarke 1976). The nature of the activity responsible for the build up of this early midden is difficult to assess, though it is likely that it does relate to structures which the later village replaced. A similar picture can be seen at Howar, where evidence for earlier structures was detected within the basal midden deposits (Ritchie 1983).

The structures at Skara Brae bear witness to a highly mixed economy, with a variety of resources being brought to the site, where they were processed and consumed. Animal remains include bones of cattle and sheep, along with red deer and wild boar. Cereal production is attested by the recovery of charred cereal grains and quern stones. Marine resources include shells, dominated by limpets and whale bones. Childe's excavations failed to recover fish bones and led him to believe that fishing did not play an important role, with cattle and sheep providing the staple foods. However, fish bones were recovered by Clarke's later excavations, through the use of a sieving programme, and it was he who suggested that the limpets were essentially used as bait (Clarke 1976). Again, gauging the relative importance of these various resources is an almost impossible task, with factors such as limited excavation, differential preservation and depositional patterns all ensuring that a full picture is unobtainable.

Though evidence for Mesolithic activity on Orkney is suggested by the recovery of lithics (Wickham-Jones 1992), there is no irrefutable evidence for Mesolithic marine exploitation there. It is possible to suggest that much evidence will have been removed through the continuing encroachment of the sea. Sites such as Skara Brae and Knap of Howar were once some distance removed from the sea but now they are situated on the immediate shoreline and it is likely that much evidence for Mesolithic marine exploitation will have fallen victim to marine erosion. However, the location of Mesolithic shell middens at the rear of raised beaches, a situation which elsewhere has removed them from their original location on the sea shore, may have saved some sites, yet to be discovered, from destruction by the sea. Indeed it may be that evidence for Mesolithic activity is contained within the basal midden deposits at Skara Brae and Knap of Howar. A microlith was recovered from Howar, but as previously noted it is becoming more apparent that these forms continued to be used well into the Neolithic, with single pieces providing very little reliable insight into chronology.

On Orkney, with the absence of much of the Neolithic and earlier shoreline it is difficult to say what activities took place there. We shall never know whether shell middens were a common occurrence on the beaches of Neolithic Orkney. However, the presence of large quantities of marine residues on the settlements does suggest that shell middens did not build up on the beaches - with the presence of shells on the settlement suggesting that they weren't processed or eaten on the shore. However, it seems a little unlikely that the shells on these sites represent bait as suggested by Clarke (1976), an interpretation that would imply bringing shellfish from the beach only to remove the flesh from the shells prior to returning with them to the beach.

This process appears to differ to that implied by shell middens, where large quantities of marine shells were processed and deposited on the shore. Though it has been established that settlement may be found within the immediate proximity of these sites, as at Risga, these appear to be largely of a temporary nature with their location oriented specifically to the exploitation of marine resources. The shell midden served as an intermediate focus for activity centred on the transformation between land and sea, with resources and artefacts moving between the two domains.

It would appear in the case of Skara Brae and Knap of Howar that factors other than access to marine resources played a dominant role in the location of settlement, with proximity to arable and grazing land perhaps being paramount. Evidence for agricultural activity at Knap of Howar took various forms, including cereal grains and domestic animal bones, including cattle and sheep, as well as quern stones.

The difference between deposits on these permanent settlements and those in shell middens are also manifest in the variety of deposition displayed by marine shells on settlement sites. Where in shell middens the shells appear to be deposited within a limited area in heavy concentrations, those on settlements are to be found in various contexts, both inside and outside structures (types IIIa and IIIb). However, this should not be taken to suggest that shell middens represent a single, homogeneous pattern of deposition, as more recent excavations demonstrate internal complexity and variation between deposits. This variation may include: areas of trampled shell, burnt shell, layers of wind-blown sand, firespots, animal bones, deposits of burnt stone, charcoal spreads, cuts into deposits of shell (which in the case of Polmonthill included a large pit cut through the shell deposits), layers with a marked earth matrix and those which consist almost exclusively of shell.

Perhaps the main difference on settlement sites is that marine shells are rarely the dominant form of deposit, though they may still be present in considerable numbers. It is not uncommon to find layers through which shells are mixed, though these may include high proportions of ash, stone, pottery, sand, charcoal, bone etc. These may variously be described as occupation layers, floors, or even middens (see next chapter). At Skara Brae Childe reported that: "In all the deposits the usual broken bones, including long bones and horns of oxen and limpet shells were encountered as in the usual midden" (Childe 1930, 166). Generally the term midden is given to deposits outside buildings, as they are considered to be areas where waste was deliberately dumped, perhaps after being removed from the floors of buildings. Despite the apparent cleaning of floors most buildings do contain these highly mixed deposits which include various types of detritus; sometimes these are later covered by paved floors or deposits of stamped clay, which in turn become covered with deposited material.

Marine shells were not limited to the internal deposits in the structures, nor to the middens outside. Prior to the first excavation at Knap of Howar a heavy stone revealed a large pit, some four feet deep which was full of limpets (Traill and Kirkness 1937). Other faunal remains were also found deposited in pits on the settlement. Excavation revealed at least two pits cut into the floor of one of the structures. These were found to contain the bones of a young ox and an immature sheep, along with a hammer stone. These deposits may compare to those found within the Iron Age wheelhouse at Sollas, on North Uist, which have been interpreted as ritual deposits (Campbell 1991). If the deposition of animal bones and marine shells in pits at Knap of Howar is considered in the same light, then it can be suggested that marine shells, which may be taken to represent the joining of land to sea, have become integrated within a social and economic system which is largely terrestrial, with the settlement itself and the dominant forms of subsistence foods, such as agricultural produce, being land based (if not earth based, as in the case of cereals). This picture contrasts somewhat with that presented by shell middens, where the land, in the form of deer bones, and in some cases of cattle, is actually brought to the sea. Both depositional patterns may therefore reflect a form of dialogue which expresses the complex nature of the shifting relationship between land and sea and the relative importance placed on each ecosystem, while neither is considered in exclusion of the other.

It is tempting to view the evidence for marine exploitation identified on Neolithic Orkney as representative of a shift from the wild open environment of the shore to the cultured, closed environment of the settlement. The contrast between the cultured and wild environments has recently been expressed in terms of the *domus* and *agrios* (Hodder 1990), with the house and activities centred within it taken to be symbolic of this segregation. However, it is suggested here that the picture is somewhat more complex, with the external world divided not only between cultured (agriculture) and wild (gathering and hunting) but also between marine and terrestrial.

Due to differing conditions of preservation there is little structural evidence for Neolithic settlement outside Orkney, with the result that Neolithic type III deposits are also generally absent. Here, the over-riding impression of Neolithic marine exploitation is one of continuity, with relatively little change detectable in the contexts of deposition and types of deposit from those of the preceding Mesolithic. There is some evidence for structural remains related to the Forth shell midden site at Mumrills (region E) but the nature of this structure is poorly understood and their presence at the moment only serves to cast the apparent type II status into doubt.

ix. Conclusion

This chapter has considered the various implications of marine resource residues and their archaeological context for the role and character of marine exploitation in early prehistoric Scotland. Consideration of the environment within which these activities took place has also played an important role in further understanding the complex nature of marine exploitation and its integration with terrestrial activities. If nothing else, this chapter has challenged at least some of our assumptions about the changing role of resource exploitation over time. The later use of the Oban shell middens negates the assertion by Zvelibil and Rowley-Conwy that foraging loses economic, organisational and ideological significance with the consolidation of agriculture (1986), though it can equally be claimed that agriculture was never really consolidated during the period under discussion. The approach adopted here has been more concerned with process rather than content, with the implications of a series of relationships between land and sea, people and environment, foraging and agriculture being considered of greater importance than the 'facts' which can be obtained through the detailed analysis of the contents of shell middens, though this is not to negate the valuable contribution made by such detailed analyses. The present approach has allowed the examination of some of our preconceived assumptions about the differences between so-called hunter gatherer and agricultural economies. It is apparent that many of the characteristics of so-called agricultural communities may have been already in place during the hunter-gather period, with the use of the Oronsay middens suggesting a concern for genealogy not usually considered important until the adoption of agriculture (cf. Bradley 1993, 6).

The next chapter will now carry this discussion into the later period, to consider the nature of marine exploitation in the Bronze and Iron Ages.

Chapter 9

Down through the ages II: marine exploitation in later prehistoric Scotland

i. Introduction

As in the case of the previous chapter it is impossible to discuss in detail every aspect of marine exploitation in later prehistoric Scotland. This chapter will instead focus more closely on a number of issues which, it is felt are central to a fuller understanding of the nature and role of marine exploitation in this period.

The majority of later sites known to include marine resource residues are characterised by the partially upstanding remains of structures related to settlement and domestic activity. With the exception of several Neolithic sites, including Skara Brae and Knap of Howar, the vast majority of earlier settlement sites have not survived in an upstanding condition and hence approaches to them have differed markedly. It will be one of the aims of this chapter to examine whether apparent differences may in fact mark real changes in the role and character of marine exploitation evidenced in the two periods.

Though there has been a marked tendency to disregard the role played by marine resources in later subsistence practice, this may be symptomatic of a more general unwillingness to seriously consider the nature of economy in later prehistoric studies. The study of the Bronze Age is largely devoted to the consideration of funerary practice and the production and circulation of artefacts. Iron Age studies tend to be dominated by terms such as power and prestige, much of the discussion being devoted to the origin and status of architectural features such as brochs and duns. This situation is all the more striking when one considers the richness of the evidence for economic practice for the period. However, this is undoubtedly more the case for the Iron Age than the Bronze Age, where the excavation of numerous sites has resulted in the recovery of well preserved deposits of faunal residues and elements of material culture related to the procurement, production and processing of food.

Despite providing a quantity and quality of subsistence evidence rarely equalled in the earlier period, it is the nature of the archaeological record has been largely responsible for the neglect of economic studies in the later period. Though more Bronze Age settlement sites are now being located and excavated, eg. Lintshie Gutter in Crawford (Terry 1991), the field has for a long time been dominated by the excavation of funerary cairns and cists. This bias has been the part result of archaeological visibility, with settlement sites from the period still virtually unknown in places such as Orkney and the Outer Hebrides. This pattern stands in direct contrast to that of the Iron Age, where settlement structures, sometimes representing some of the best preserved prehistoric monuments in Scotland, have long been the subject of archaeological enquiry. It is the physical prominence and visibility of these structures, some of which appear to represent high status sites, which has tended to promote the study of architectural origins and building typologies to the neglect of the economic evidence which these structures contain (cf. Armit 1988). Though the situation has much improved since the nineteenth century when brochs were simply "emptied" of the debris and rubbish which hindered their exploration, there is a need for more research into the nature of the subsistence practice and its role within later prehistoric society.

Reference to marine exploitation, or any other recourse to wild resources, in the later period tends to be linked to the discussion of marginal areas in western and northern Scotland. The need for a further understanding of the role of marine exploitation in the Iron Age of northern Scotland has recently been voiced by Hingley (1992), and its potential role was briefly commented upon by Whittle, in his report on the excavation of the Neolithic and Bronze Age settlement of Scord of Brouster, in Shetland (1986, 142). A rare attempt to view brochs within their wider landscape was made by Fojut in his study of Iron Age Shetland, in which he too noted the role of marine resources (1982), even going as far as to suggest that topography and broch location may in some cases indicate that access to marine resources was a locational factor. This call for a greater understanding, which has up until the present work been largely ignored.

ii. The context of marine resource residues in later prehistoric settlements

This work has suggested that there are several categories of evidence for marine exploitation, which in its most obvious manifestation is represented by deposits which include marine shells. The majority of early period evidence appears to fall within either the type I or II categories, where type I denotes deposits found within caves and type II the accumulation of marine shells in open contexts apparently devoid of structural elements, though as the previous chapter has made clear this is not to say that structural elements may not be found close by. In contrast, most of the evidence which has been established, usually through excavation, to relate to later period activity can be classified as type III deposits. In the majority of cases these deposits have been identified as a result of the excavation of settlement sites, many of which are represented by partially upstanding structural remains, though as Skara Brae and Knap of Howar have demonstrated this is not a characteristic unique to the later period.

The variety of settlement and building types from the later period is extremely wide, with roundhouses, brochs, duns, souterrains, cellular structures, wheelhouses and forts all providing evidence for various types of domestic activity (see chapter 6). It should therefore come as no surprise to find that marine resource residues are known to have been deposited in a wide variety of contexts within these settlements, with some considerable variation apparent within what have here been classified simply as type III deposits, though some distinction between internal and external deposits has been made (type IIIa and IIIb). If a further understanding of these deposits and their relevance to prehistoric economic practice is to be achieved, it will be necessary to more closely examine the nature of these deposits and their relationship to other forms of evidence.

ii.i. Context and interpretation

During the excavation of the broch of Ayre, on Orkney, the excavator noted a layer consisting of: "yellow and brown clay mixed with peat ash, limpet and periwinkle shells. The shells so largely predominated in places as to entirely displace the clay. A few splintered bones in this layer..." (Graeme 1914, 50). What Graeme has noted here is variety in the nature of a deposit which includes shellfish - an enlightened observation at a time when it was unusual for the character of such deposits to be deemed important enough to be recorded (see fig 26). In some places within the deposit (D in section) the shells appear to represent one component within a mixed deposit which also included ash, clay and splintered bones. In another part of this same layer shells are present in such quantities as to "entirely displace the clay". In the lowest deposit (H in section) it was found that: "bones of ox, sheep, and pig were numerous, many of the larger being splintered, evidently to obtain the marrow. Small fragments of crabs' claws and shells were found" (Graeme ibid). From this second observation it can be concluded that not only is there variation within the same deposit but also between deposits. The upper horizon appears to have heavy concentrations of marine shells with only a few splintered bones, while the lower horizon is dominated by animal bones large enough to identify by species. Although marine shells are still present they appear in lesser quantities than in the upper deposit.

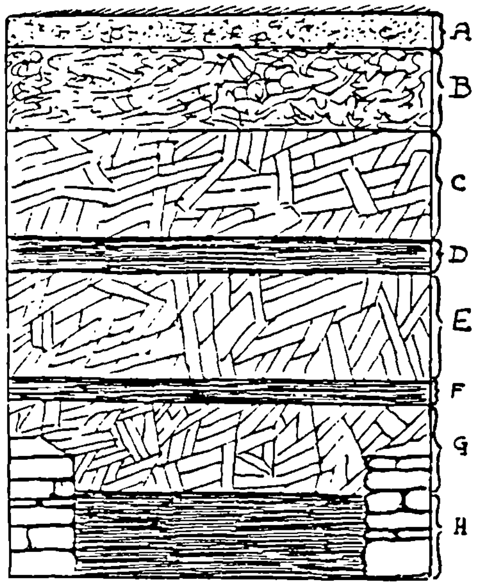


fig 24. Section through passage, broch of Ayre, Orkney (from Graeme 1914).

It is one thing to detect a difference between deposits; it is entirely another to assign them valid meaning. What can be suggested from these observations, which were based on more thorough excavation than the section illustration may at first suggest, is that there is both a temporal and spatial difference in the way that subsistance residues were being deposited. One way of interpreting this difference is to suggest that in the earlier history of the site shellfish were being utilised only to a limited extent, with a greater importance placed on the role of domestic animals such as cattle, sheep and pig. This situation changed over time, with the intervening period marked by the appearance of tumbled stone and rubble (represented by G in the section). Such a horizon would appear to mark the at least partial collapse of the structure within which the resource residues have been deposited. In the upper deposit animal bones are less evident but marine shells appear in dense accumulations - the intervening deposit (F) is described as being similar. This would appear to imply that agricultural resources such as livestock were utilised less and shellfish more than in the case of the earliest deposit.

An interpretation based on these observations and the assumptions drawn from them may read something like this: During the period of the broch's initial occupation the staple subsistence foods were the products of agriculture, chiefly cattle, sheep and pigs (stratum H). However, some marine exploitation did take place, with shells and crabs collected from rocks on the shore. After a time the agricultural system began to break down and could no longer support the broch and its residents. The site was abandoned and the structure suffered partial collapse due to a lack of maintenance (stratum G), with some stone possibly robbed to build structures close by. However, the site was re-occupied (stratum F), and smaller, temporary structures were built inside the shell provided by the partially upstanding wall of the broch. The new occupants had access to some livestock but may also have hunted deer. The resources of the sea played an important role in supplementing shortages caused by the lack of an efficient system of agriculture. The site was once again deserted (stratum E) and then reoccupied before being abandoned for good (strata C,B and A).

The stratigraphical information therefore can be used to tell an interesting story, but there is more. According to the appendix report on animal bones, not only were the species Graeme describes present within these deposits, but also whale and seal - represented by "sundry large bones", red deer, gannet, horse, cormorant, great northern diver, gull, wild swan, shag, shearwater and great auk. It is unfortunate that the context(s) from which these bones were recovered are not recorded, a problem common to many nineteenth and early twentieth century excavation reports. However, the presence of these other bones need not drastically detract from the picture previously presented, though the bones of sea mammals and sea birds suggest a more intensive exploitation of marine resources than that implied by the presence of crabs, limpets and periwinkles. It may be that these remains were recovered from contexts other than those described by Graeme in his section, a possibility which adds a further dimension to the differential depositional patterns suggested by the described deposits.

The animal bone report written by a Dr Norman Ticehurst, probably a surgeon or vet, is fairly typical of the time: a haphazard collection of material was sent to a non-archaeological specialist, with no reference to context or relationships. The result is a list which provides very little clue as to how these residues relate to one another and the nature of economy in general. More recently the problems of drawing interpretations from samples collected in an inconsistent fashion have been recognised (Evans 1983). However, it must be noted that Graeme does not attempt interpretation in his report, being satisfied with merely reporting the facts. This may reflect a tendency at the time to regard archaeology as the collecting of data, and history as giving that data meaning: two different disciplines. Even the section drawing and the descriptions of the deposits illustrated were confined to an appendix in the report, coming after the "list of relics found during excavation" and the "human and animal remains from the broch".

More recent excavation reports have not been so modest in their aims. In his report on the excavations at the broch known as Dun Mor Vaul, on Tiree, MacKie proposed that the dominance of domestic animal bones over wild animal bones in the main broch phase indicated that agriculture was most important, and that hunting, while practiced, was less important. From his excavation of the broch known as Dun an Ruigh Ruaidh (C/79) MacKie detects "the *usual* picture of an iron age community practising mixed farming and *indulging* in deer hunting" (Mackie 1980, 73 - emphases mine). Thus the importance of wild resources is reduced to an indulgence, which sounds very much like the modern western perception of hunting as a leisure pursuit or luxury, while agriculture provides the real mainstay. In the later phase of the Dun Mor Vaul sequence, MacKie saw an apparent reduction in the ratio between domestic and wild animals as evidence for social disintegration and the decreasing efficiency of agriculture (1974, 88-91).

As already demonstrated an almost identical interpretation can be offered for the stratigraphy in the passage at the broch of Ayre. However, it has since been noted (Bradley 1978, 87) that MacKie's interpretation is based on the misuse of data and that a truer picture places more emphasis on the role of hunting throughout the site's use as a broch. In the later phases, if the minimum number of individuals rather than number of bones is used as representative, then the evidence again stands in opposition to MacKie's interpretation, with domestic animals outnumbering game animals to a greater degree than during the broch phase. It can be suggested that MacKie was using the deposits at Dun Mor Vaul as a *fact mine* to back up preconceived ideas about the role of brochs and the mode of subsistence they imply - an interesting inversion of the misuse of data by Laing in his attempt to suggest a stone age date for the broch at Keiss (discussed in chapter 2).

MacKie is not alone in associating the social organisation related to the construction of brochs with an increasing efficiency in agriculture and the decreasing importance of wild resources. At Jarslhof in Shetland Hamilton proposes that during the Bronze Age phase: "A few domestic animals were kept, including sheep and oxen, but a staple element in the diet of those early dune dwellers was shellfish, including cockles, limpets and mussels collected in large quantities along the beach and in the shallow Voe" (1956,3); later on, "Once the broch had been constructed the inhabitants kept cattle, sheep, pigs, an occasional dog and pony; fished in the tideway off the headland, hunted seal and caught a variety of wild fowl for the cooking pot" (ibid, 5). By the time the wheelhouses had been constructed in the later Iron Age, the field system had been reorganised and the rotary quern introduced, thus increasing the viability and efficiency of agricultural production and processing (ibid). This view of economic practice changing over time, with a gradual reduction in the importance of wild resources and increasing reliance on agriculture, encouraged by improvements in technology and organisation, differs from MacKie's only in that he relates economy to a site which appears to go from simple to complex, rather than complex to simple, as in the case of Dun Mor Vaul.

As previously noted, much of the research involving brochs has revolved around their origins and status as symbols of power. However, for the purposes of this work the brochs represent a focus for past human activity which in many cases resulted in the deposition of residues related to the exploitation of the marine resource base. They represent not only substantial structures but also environments of deposition within and outwith which activities related to subsistence and the processing and consumption of food were centred. Studies of the use of space within brochs have so far sought to identify architecture's role in controlling and maintaining social relations through the medium of movement and visibility (eg. Foster 1989), rarely considered are the contextual relationships of material deposited in these structures, which may in turn tell us something about the spatial organisation of various activities and their role within the wider spectrum of site use.

iii.ii. Terrestrial and marine

The earliest levels at Jarlshof bear some resemblance to the Bronze Age phases at Ardnave, on Islay, where a series of structures and features evidenced occupation from at least the Bronze Age to the Iron Age. The earliest evidence for a dwelling on the latter site took the form of a somewhat irregular structure with stone foundations to the external wall and a series of postholes within. The shape and proportions of this structure are comparable to the less well preserved remains at Jarlshof (fig. 25). The Ardnave structure appears to have contracted over time, with the excavators suggesting that this may have been due to problems in roofing such a structure (Ritchie and Welfare 1983, 305). The site has a complex stratigraphy which is further complicated by the active role of wind-erosion, which both deposited sand and removed material.

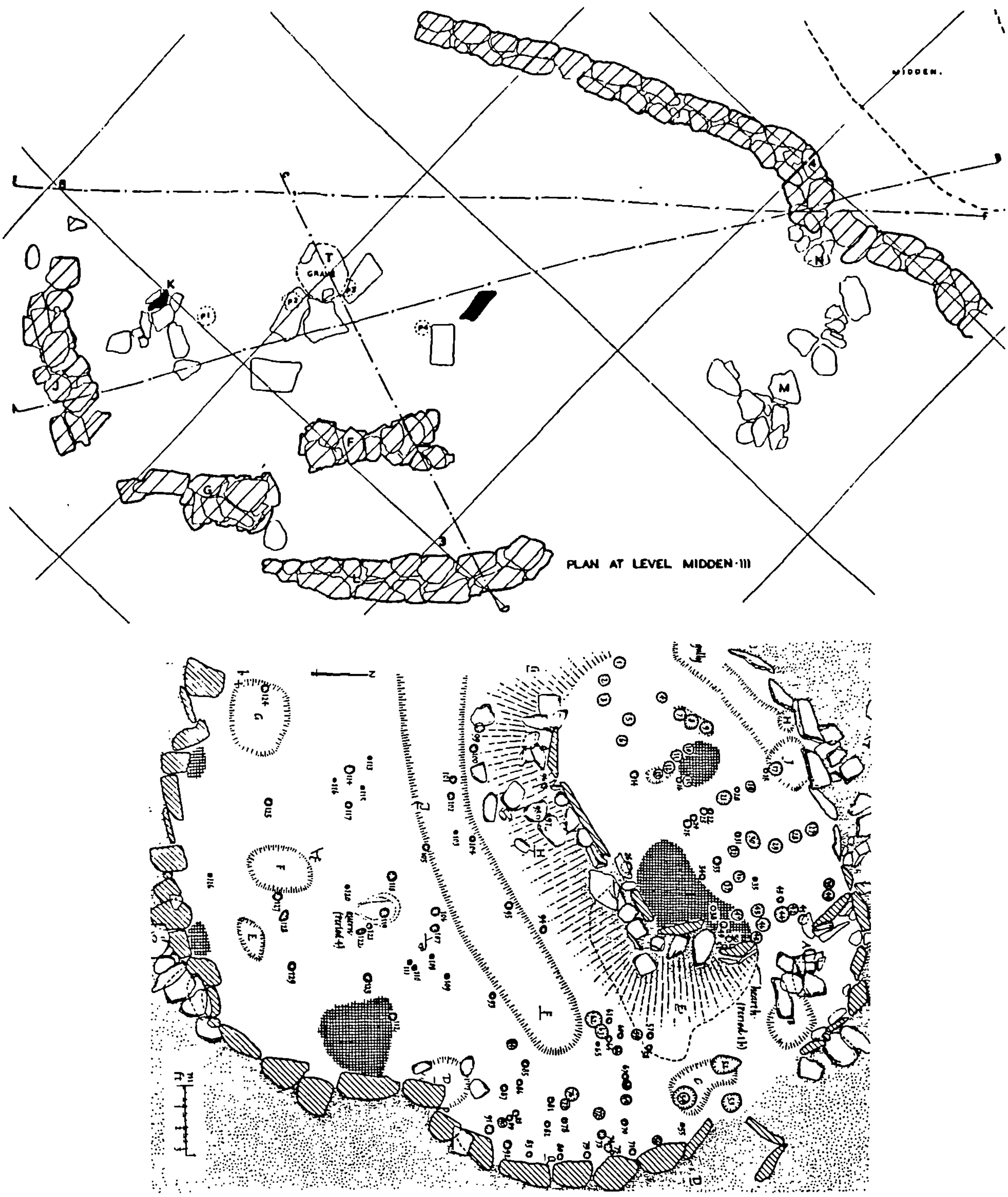


fig 25. Earliest Bronze Age phase at Jarlshof (top) and structures at Ardnave, Islay (from Hamilton 1956 and Ritchie 1983). Both drawings at same scale.

The Ardnave site was occupied over a considerable period of time. The earliest deposits are related to Food Vessel pottery and radiocarbon dates suggest that occupation was underway by 2,000 BC (Ritchie and Welfare 1983, 317). The latest phase of occupation appears to be related to metalwork and a radiocarbon date from a hearth suggests activity up until the first two centuries AD. However, occupation was not continuous, as substantial deposits of blown sand separate the Bronze and Iron Age levels. A break in occupation was also obvious at Jarlshof, where again deposits of blown sand separated the various layers.

Economic evidence at Ardnave took the form of animal bones, including domestic species such as cattle, sheep and pigs, along with wild species such as red deer. Marine shells and crab fragments were also present in a number of contexts. Deposits of marine shells were present in both the upper and lower levels, with the lower underlying the bank which represents the southern wall of the contracted structure. Though marine shells and crab fragments were recovered from floor deposits this secondary structure did not contain limpets in enough quantity to merit the use of the term 'shell midden', which has been applied to the material below the bank (ibid, 307). It was not until this structure had been abandoned and inundated with blown sand that another shell-rich deposit accumulated. This deposit consisted almost entirely of limpets with small amounts of charcoal, and it appeared to have accumulated fairly rapidly prior to being buried beneath sand (ibid 310). Though the limpet deposit itself was relatively free of other residues it had accumulated in close association with a deposit of charcoal which included grains of six-row barley and which along with a quern provides direct evidence for the processing of arable products. A broken barbed and tanged arrowhead suggests that hunting was also practised at this time. The bones of cattle, sheep and pigs were also associated with this phase of occupation.

As in the Broch of Ayre section there is evidence at Ardnave for differential deposition in terms of both time and space (fig.26). What the report describes as "shell midden deposits" are restricted to the lower and the upper Bronze Age levels. Although they are not absent from the intervening deposits they do not appear in such substantial accumulations.

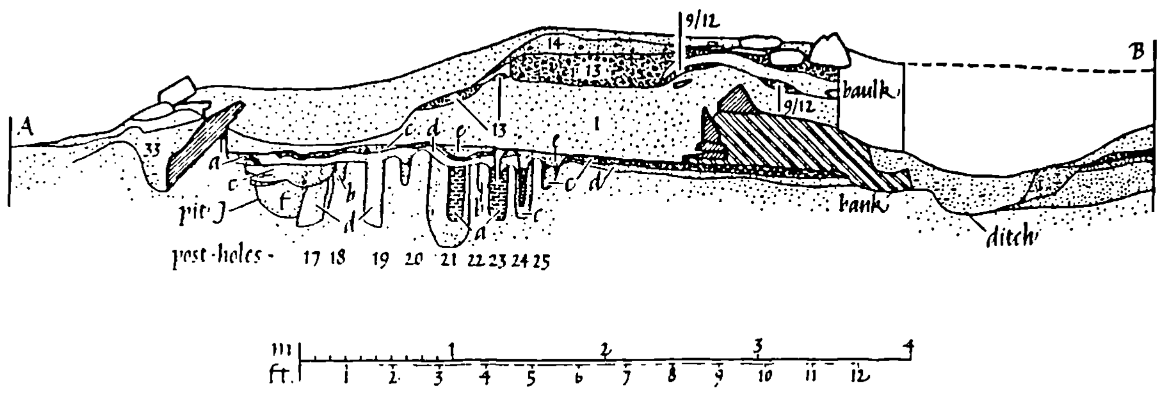


fig 26. Section through deposits at Ardnave - shows upper and lower shell midden deposits (upper marked as 13, lower beneath bank) from Ritchie 1983.

That marine shells were consumed at the same time as harvested crops were being processed is evidenced by the presence of six-row barley in the upper layers, while domestic animal bones and those of deer appear throughout. However, the upper shell midden at least appears to be relatively free of these other residues. The rapid accumulation of the upper shell midden (Ritchie and Welfare ibid) indicates that for a short period limpets were used in larger quantities than usual, with normal consumption represented by smaller numbers of limpet shells mixed in floor deposits.

Though the shell midden deposit at Ardnave appeared to be located within the confines of the earliest structure it lies outwith the confines of the later structure. There is plenty of evidence to suggest that middens often built up outside structures. Perhaps the most striking examples of external middens on a Bronze Age site are to be found at Jarlshof, where at least some of the cellular structures in the later Bronze Age village appear to have their own designated midden (fig.27). In places these deposits appear to have been defined and contained by stones arranged around their perimeter, but as Hamilton points out not all of them were clearly defined (1956, 25). There may be some parallel for the containment of the Jarslhof midden deposits in the stone-lined pits used for just the same purpose to the rear of the houses in the nineteenth century village on St Kilda (Stell and Harman 1988). One of the Jarlshof midden deposits is reported to be some two to three feet deep and when excavated was found to contain large quantities of limpet shells, along with a few cockles, lying on blackened soil along with some animal bones, the majority of which were oxen. Fish bones were reported to be rare, with only one recovered from midden A. At the bottom of this deposit were found two broken querns.

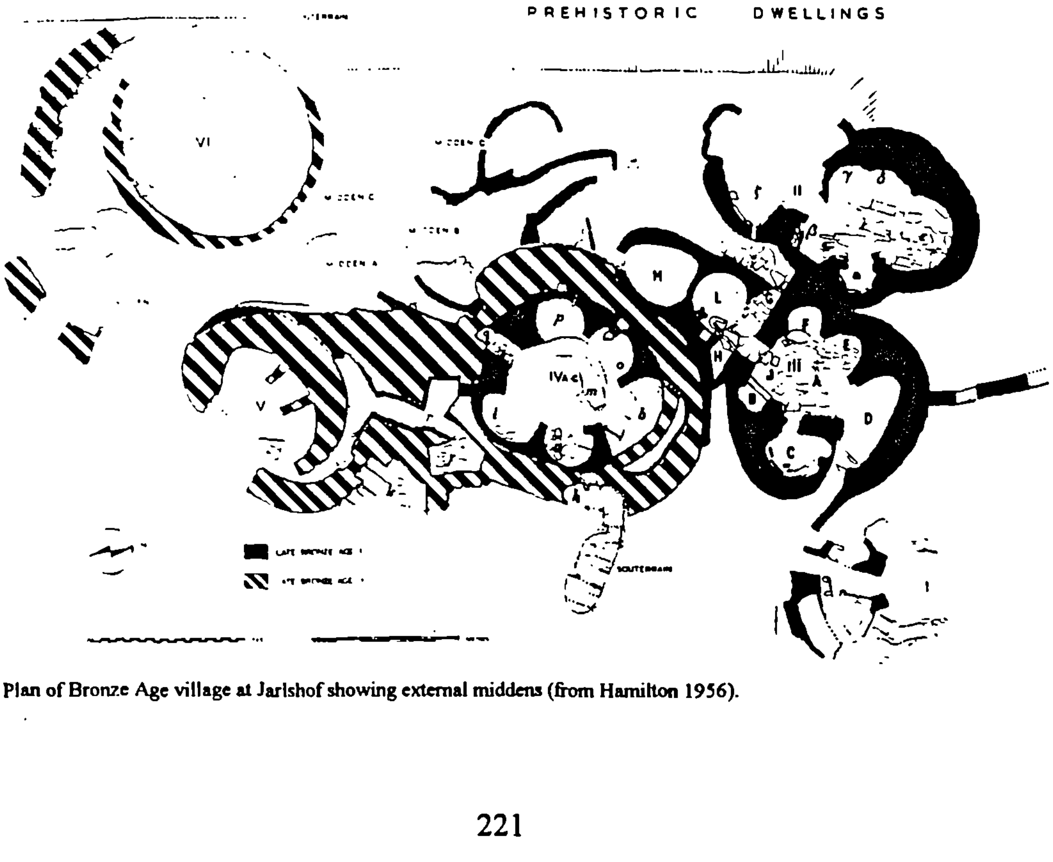


fig 27. Plan of Bronze Age village at Jarlshof showing external middens (from Hamilton 1956).

The midden deposit clearly includes evidence for a variety of subsistence activities, including the consumption of shellfish, the rearing of cattle and the transformation of cereal crops into food. What is less obvious is how these various activities related to one another spatially on the site. The midden represents the context of deposition, not the context of use. Gould has noted that in areas of major habitation, where a wide range of tasks were carried out, it is likely that the by-products of those activities will be deposited in areas removed from the place at which the activity took place (1980,197).

A fundamental difference exists here between domestic middens and what have, in this work, been called *shell middens* - which, as already established, do not represent areas of major habitation. A shell midden represents a focus for primary processing and consumption. The external middens at Jarlshof represent designated areas where material from various parts of the site was dumped. Similar processes of secondary deposition could have taken place at sites like Risga, where the settlement is known to have been located in close proximity to the shell midden - a proximity which may have been responsible for the large quantity of lithics recovered from the midden. What this means on settlement sites is that the instruments of marine exploitation are rarely, if ever, found in direct association with the residues of that exploitation. This contrasts with shell middens where fish hooks, harpoons and limpet hammers have been found in shell deposits, which may also include fish and marine mammal bones.

As already suggested in the case of Knap of Howar, it is not known whether this difference means that the occupants of Jarlshof or Knap of Howar did not create shell middens, as defined in the previous chapter. It is probable that shell middens were used during the Bronze Age, but as in the case of Oban these may be the product of local economic and environmental conditions. If shell middens are not present, and in many cases this cannot be proved one way or the other as the prehistoric coastline has long since disappeared, this absence could suggest a fundamental difference in the way marine exploitation operated. The focus on the shore, so evident in the early period, may have shifted to the settlement, a result perhaps of the need to integrate the products of marine exploitation with the process of agricultural production - with seaweed used for fodder and fertilizer, with material dumped on domestic middens also being removed to the fields (discussed later). Again, this cannot be proposed as a general model but may be specific to time and place. At the islet site at Clickhimin iron age midden material was dumped over the enclosing wall of the settlement, thereby returning at least some of it to the sea (Hamilton 1968, 31).

On some settlement sites there is evidence that protracted occupation brought about the deposition of midden material over large areas, with sites such as Skara Brae and Knap of Howar actually built on pre-existing settlement middens; a similar pattern appears at Dun Mor Vaul in the later period, where previou settlement is represented by a hut and related midden (MacKie 1974). At Clickhimin, the various deposits found within the general midden spread, enclosed within the boundary wall, included: "occasional small shell middens" (Hamilton ibid, 22 - fig.28). These deposits of limited size appear to represent rapid periods of deposition, hence their concentrated and discrete nature. It is often unclear whether such deposits include other forms of food refuse within their matrix, but some of them do appear to be free of other elements. This certainly appeared to be the case at Dun Flodigarry on Skye, where a deposit consisting almost exclusively of limpet shells was found to immediately overlie a deposit of animal bones, including cattle and deer (Martlew 1985). This material was found deposited in the passage of the structure and in this respect bears some similarity to that previously discussed at the broch of Ayre. However, the broch at Dun Floddigarry appears to have been abandoned before its construction was completed and the activity in the passage may post-date this event by quite some time (Martlew 1985).

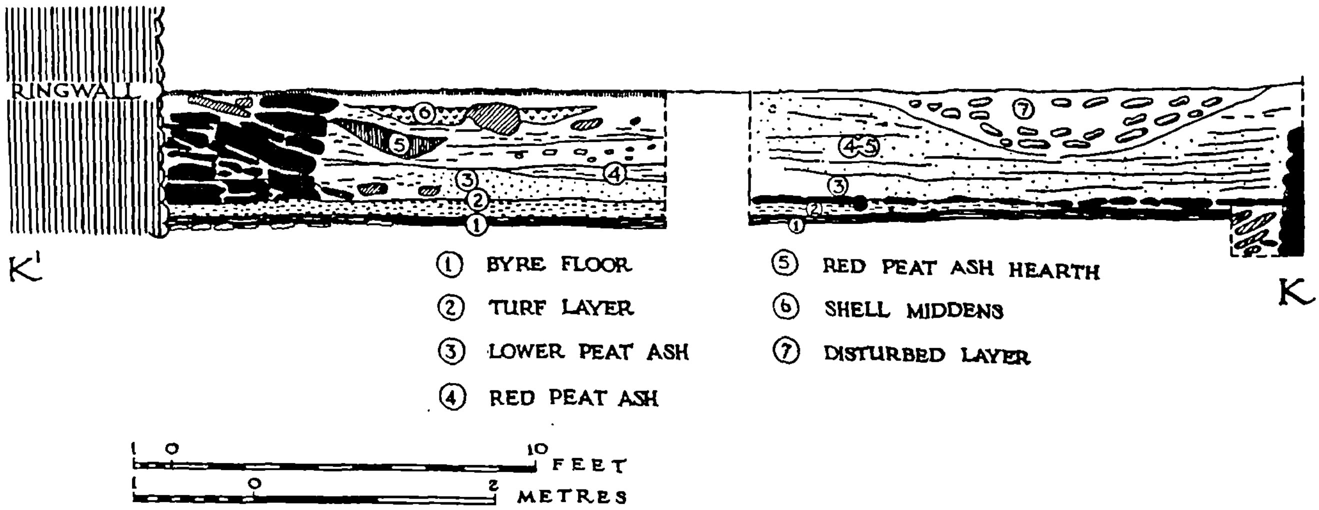


fig 28. Section through deposits at Clickhimin, Shetland, showing "shell middens" (from Hamilton 1956).

It is probable that the food represented by these residues was prepared and eaten elsewhere within the partially built structure, with a stone blocking the entrance suggesting that the passage was no longer used for entry. The deposition of shells on top of bones suggests a temporal as well as spatial dimension to the depositional pattern. The meat which included deer, pig, sheep or goat and seal may therefore have been eaten at a time previous to the exclusive consumption of shellfish. Other than highlighting some of the issues related to deposition patterns on settlements, the remains at Dun Floddigarry tell us little about subsistence practice on the site, the excavator concluding that they may represent nothing more than the most temporary of occupations (Martlew ibid). Excavation on the site was largely limited to internal deposits, some of which appeared to have been removed; it is therefore impossible to make firm statements about overall patterns of deposition and the potential for external deposits.

Though a great variety of faunal remains has been recovered from later sites it is difficult to assess how these different forms related to one another within people's diet. The examination of human faeces recovered from the broch well at Warbeth consisted almost entirely of meat residues, with even a deer hair identified. However, as the report makes clear it would be unwise to read anything more from this than the fact that the meal represented had a high meat content, which is very different to concluding that meat was always eaten to the exclusion of all other food-stuffs (Bell and Dickson 1989). A more balanced impression of what may well have been a balanced diet could be represented by the other materials recovered from the well, which included: cereal grains, wild plant seeds, marine shellfish and fish bones.

There has been some suggestion that shell deposits apparently lacking other residues represent their consumption to the exclusion of all other foods. In his description of a shell midden in the Moray Firth Lubbock noted: "The absence or rarity of bones, may perhaps be attributable to the insular position of this shell-mound, and at any rate we may certainly infer, that meat was a luxury seldom enjoyed by these 'mound builders'" (1863, 420). It is possible that the impression of a shellfish-only diet, if not the result of differential preservation, could well be the result of differential deposition. Oyster meat may have been extracted from shells on the shore, in order to reduce their weight, before carrying it to a settlement located elsewhere, where it may have been consumed as part of a more balanced diet. If this were the case then excavation of the settlement may well reveal a depositional pattern suggesting the exact opposite of Lubbock's inference, with the presence of animal bones and the absence of shells perhaps suggesting the consumption of meat to the exclusion of shellfish!

There has been far too little concern with understanding the nature of deposits present on later settlements, such as brochs, and even less concern for the processes of deposition responsible for their build-up. Terms like 'midden', 'refuse', 'floor', 'occupation layer' and the like are used with little consideration of their meanings. At Dun Mor Vaul these contexts include: the earth floor, secondary rubble capping of the rampart, the rubble core of the rampart, and early broch floor deposits (MacKie 1974). At Crosskirk, in Caithness, the contexts from which marine residues were recovered include: middens, ash layers, floor deposits and ash and silt layers (Colley in Fairhurst 1984).

Although marine shells appear in a wide variety of contexts on later settlement sites, they can generally be characterised in one of two ways. The first of these is the appearance of marine shells as only one component within mixed deposits, which may also include other residues, such as domestic and wild animal bones, pot sherds, charcoal, burnt stones and other forms of refuse related to day to day existence. The relatively diffuse nature of these deposits contrasts with high concentrations of marine shells in other deposits. The context of deposition may vary, with either being present in inter-mural chambers, in stone tanks, heaped against walls, in pits or in ditches.

Mixed deposits, which have variously been described as 'occupation deposits' or 'middens', not only suggest that a variety of foodstuffs were consumed but also that they were consumed together, in the same place and at the same time, probably after being processed together in an area designated for food preparation. This integration, at the processing and consumption stage, of foodstuffs procured from contrasting environments, marine and terrestrial, and by a variety of means, may suggest that the settlement served not only as a place to eat, but also as a place where the various components of the environment were brought together, thus fixing their place in the cultural world of hearth, home and food. At a more pragmatic level it also suggests that people had a balanced diet, with shellfish consumption maintaining a steady 'background' level.

Somewhat different are deposits which appear to consist almost exclusively of marine shells. In most reports, like the already quoted example of Ardnave, these deposits are usually called 'shell middens' and are a feature of a number of coastal settlement sites, from both the Bronze and Iron Ages. In contrast with the mixed deposits these heavy accumulations of shells do not suggest integration and balance, but separation or polarisation. Such deposits may suggest that, at times, these resources were treated differently to other food-stuffs, perhaps being processed in areas removed from other food related activities, though it is important to remember that we are looking at the context of deposition rather than the context of use. Such separation may be the result of task allocation, with some members of the community specialising in the procurement, processing and preparation of shellfish and other marine resources. Anthropological case studies from various parts of the world have noted that it is not unusual to find such specialisation, with some studies suggesting that these groups were generally isolated from the rest of the community and even looked down upon (Schoembucher 1988, 214). However, this sort of segregation seems highly unlikely especially when it is considered that these deposits, though perhaps suggesting differential deposition, do appear on the same site or even within the same structure.

Another explanation is that the shellfish represented by these deposits were consumed to the exclusion of other forms of food - an exclusivity which would preclude the mixing of food residues. The limited size of many of these deposits and the apparent lack of a matrix strongly suggest that such exclusivity was short-lived. This picture contrasts with much of the evidence from early period shell middens, where large quantities of shellfish were utilised, though perhaps periodically, over long periods of time.

Differentiation in the deposition of marine shells is also apparent in many of the eroding coastal sections in Orkney and the Outer Hebrides which appear to represent settlements and their related deposits. These sections may include a number of elements, including walling, stone floors and other types of masonry, charcoal deposits, humic layers, burnt stone, and deposits which contain shell and bone. The shells sometimes appear to be quite a minor component, sitting in a dark humic matrix perhaps with bones and other detritus. However, in other places within the sections shells may appear in greater concentrations, and though these deposits may include bones within their matrix it is the shells which draw the eye (see photo).

plate 4. Eroding coastal section on Stronsay, Orkney. Shows concentration of marine shells in foreground left and various dark humic layers and stone structural elements.

Without excavation, understanding these deposits is difficult and at times the lack of apparent structural elements has led to those without obvious structural elements being termed 'midden sites' (eg Armit 1992, 4). Excavation at Cnip, in Harris, revealed a complex and well preserved stone-built structure to the rear of a section which prior to excavation had been dominated by 'midden' deposits (Armit and Dunwell 1992). It is for this reason that the type II category, though it includes shell middens proper, should be applied as a descriptive label only and not imply interpretation. On Orkney a number of these features are found in close proximity to large mounds and may represent external elements and midden deposits related to brochs (eg. Knowe of Saverough, Knowe of Skogar, Queena Howe, Sandquoy and Swona).

Identifying the impetus for temporary and perhaps sporadically increased shellfish consumption, evidenced by its limited deposition in high concentrations, is problematical. It has been suggested elsewhere in this work that a short-fall in the availability of other foodstuffs, perhaps due to crop failure or disease, may have served as a strong impetus. While the presence of a shell-rich deposit in close association with grains of six-row barley at Ardnave argues against this, half a dozen grains do not a harvest make. Rather than envisaging wholesale famine with a total absence of an agricultural product, it is perhaps more reasonable to envisage less dramatic short-falls in expected yields or problems with stored foods. There are a multitude of ways in which these problems may have manifested themselves, many of them subtle and all of them impossible to detect archaeologically. The spoiling of a single grain storage pit, through damp or vermin, may have provided impetus enough for the use of shellfish to have increased. This increase may have lasted for only a few days, until the deficit was off-set. There may even be a seasonal aspect to this increase, with shellfish complementing stored foods and non-agrarian foods during the winter. An increase in the consumption of shellfish may have been prompted by factors which have little to do with the availability of food, and Deith quotes the case of Aborigines who eat very little but shellfish during some of their protracted rituals, simply because they haven't time to procure and prepare other types of food (1989b, 75).

At Sollas in North Uist the excavation of an Iron Age wheelhouse, already noted in reference to the bone-filled pits found cut into its floor, revealed an external deposit which included quantities of marine shells throughout. Atkinson used the phrase *little meals* to describe these small concentrations of marine shells, regarding them as the result of individual repasts (Campbell 1991). This statement brings to mind the proposition that discrete pockets of shells identified in the deposits in MacArthur Cave may suggest the result of individual collections (Anderson 1895, 216); a similar conclusion may be drawn from the observation that mussels and other shells were found in "separate nests" within the deposits at Polmonthill, Falkirk (Stevenson 1947). Thus, what initially, in the case of the larger middens at least, may appear as an undifferentiated deposit was in fact the result of individual actions and separate events taking place over a long period of time but centred on the same place. Atkinson draws particular attention to consumption, and in doing so acknowledges an interim stage between collection and deposition, and one which may be separated in both space and time from the final deposition of the shells on a midden outside the house. It is important to remember that these materials went through a series of transformations prior to their final deposition, all of which would have involved the actions of people, both as individuals and as a community, in the collection, transport, preparation and consumption of food (see next chapter for a discussion of the full implications of this).

Before leaving the issue of marine shells on later settlement sites it is vital to consider one more explanation for their presence, and one which perhaps illustrates the problems inherent in the interpretation of the archaeological record. There is a possibility that these shells accumulated as something of a by-product of other shore-based exploitation practices and do not themselves represent the main reason for that presence on the beach. As previously noted seaweed has been described as the most important of the beach resources (Thomson 1983), serving both as a form of animal fodder and as a fertilizer. This importance has been no more clearly demonstrated than in the so-called 'kelp riot' which took place on Stronsay in 1762, when local farmers in opposition to the burgeoning kelp industry destroyed kelp kilns on the shore. Those held responsible for these actions later testified that; "the burning of tang (seaweed) in this county has not only been the cause of bad crops these three years, but also that the same has been prejudicial to their persons and their cattle when in a sickly condition." (Willis 1983, 26). In places such as Sanday it is still possible to trace the long used tracks which were used to cart seaweed up from the shore to the farmsteads (Willis ibid).

It can be suggested that when seaweed was collected the opportunity was also taken to collect shellfish. Obviously, when seaweed was spread on the fields (off-site) or eaten by livestock it left no material residues within settlements. Thus, these concentrations of marine shells may be more indicative of times when seaweed was collected rather than reflecting a period when the importance of shellfish as a dietary component increased.

iii.iii. Fishing

Reality is always a lot more complex and subtle than archaeological deposits may lead us to believe. We must temper any interpretation with the realisation that interpretation is limited by factors such as differential decay, off-site deposition, partial excavation and subjective recording. The preceding discussion was dominated by the consideration of marine shells and their context on settlement sites. However, as earlier parts of this work have made clear, shellfish were not the only marine resource exploited in prehistoric Scotland.

When Childe excavated Skara Brae he used the apparent absence of fish bones to argue that fishing did not play an important role in the economy of the site, though shellfish were exploited. As Clarke's later excavations established, the absence of fish bone was a false impression brought about by inadequacies in retrieval techniques. The implementation of a sieving programme resulted in the recovery of large quantities of fish bone, thus establishing that fishing did play an important role. A large number of later prehistoric sites, which have demonstrated the exploitation of marine resources, have produced little or no direct evidence for fishing. In many cases the reasons for this lack of evidence are similar to those cited for Skara Brae.

Various other reasons have been cited for the apparent absence of fish bones on later sites, including their removal for use as fertilizer, though other processes, such as decay, burning and even consumption by cats have been suggested (Macartney 1984). Sampling strategies are central to this problem, as the majority of major excavations took place prior to the introduction of adequate sampling and sieving programmes. The few remains which have been recovered suggest that a wide range of fish were caught, probably using several techniques, including fishing from boats.

Finds of material culture related to fishing are also rare but this again may be due to the failure of material to survive and the possibility of its deposition outwith areas excavated. The use of the gorge has been evidenced on a number of sites, including, A Creadach Mhor and Jarlshof with bronze examples recovered from Clickhimin. A good many late sites in northern Scotland have also provided evidence for the use of nets, but as already noted these may have had other uses.

The way in which fishing was organised and executed is little understood, though Colley has suggested that the fish represented at Bu may suggest fishing was carried out on a low level, family scale. Uncertainty about the nature and role of fishing in the later period will only be overcome through excavations which aim to recover material such as fish bones. Issues such as boat ownership and access to the mode of production may be important in the later period. Control of fishing technology and territories may have been one way in which power and social relations were maintained in the later period, a factor which may be indicated by the positioning of brochs on Shetland so as to facilitate access to marine resources (Fojut 1982).

iii.iv. Whales

Finds of whalebone, usually modified into artefacts, are also regularly reported from both brochs, on Orkney and Caithness, and wheelhouses in the Outer Hebrides. Artefacts described as scoops, mattocks, plates, spatulas, handles, whorls or simply worked fragments have been commonly reported. The uses to which many of these were put is difficult to ascertain, though Clarke suggested that the mattocks were used to remove blubber from marine mammals. It is likely that these implements had a variety of uses, as did the antler mattocks from the Forth, which were themselves associated with whale remains (Smith 1989). It has been further suggested that some of the bone handles, which include whalebone examples, from the broch at Clickhimin may have been used to haft iron blades which could have been used to work skins or dismember whale carcases (Hamilton 1968, 113). Another whalebone implement which might have played a role in marine exploitation is the netting needle from Dun Cuier, Barra (Young 1956). Other artefacts of whalebone have also been recovered from these sites and include combs, possibly for weaving, from Midhowe (Callander and Grant 1934), though it has since been recognised that some of these are antler rather than cetacean bone (Foxon 1991).

The debris from working whalebone was present within one of the external middens at Sollas, North Uist, but this tells us very little about where this activity took place; it could have been inside or outside. The midden itself may have provided a source of raw material, as a revealing passage from an Irish Dark Age text, the Bretah Nemed tiosech, may indicate: "three things confer status on the comb-maker: racing a dog in contending for a bone, straightening the horn of a ram by his breath without fire, chanting on a dunghill so he summons on top what there is below of antlers bones and horns" (Kelly, 1988, 63). Whalebone is ideal for the manufacture of various artefacts, as it is easily worked, durable and comes in shapes which lend themselves to modification. Whale ribs and limb bones are relatively straight and flat, making them ideal for the production of scoops, shovels, mattocks etc. Whale vertebrae which, depending on the species, can be of substantial size provide a suitable template for cups and other vessels. Whalebone cups have been found on a number of sites, including the brochs at Clickhimin, Midhowe, Burray and the broch of Ayre.

Little or no pattern appears in the deposition of whalebone artefacts and their associations with other types of artefact or material, though the paucity of recording on many sites does not aid this recognition. They appear to be quite commonly found in association with terrestrial animal bones, pottery and even querns, as in the case of material recovered from the "occupation layer", consisting of sand, crushed shells and peat ash, in chamber II of the aisled round-house at Jarlshof (Hamilton 1956, 50). However, at Clickhimin, a whalebone cup was found sealed beneath a floor slab in the broch. Hamilton suggests that the cup was hidden (1968, 110), an action which implies value; Hamilton discusses the broch very much in terms of defence against raiders, so presumably these are the people from whom he sees the cup being hidden. There are two important issues here: *value* and *hiding*. The former may well have little to do with intrinsic value but be centred upon the context within which the cup was used. The nature of the raw material may have been important and could imply a protracted and even dangerous process of procurement - if the whale was hunted - though the social role of beached whales has also been noted. The cup, though modified and transformed from its natural state may have maintained a degree of its 'whaleness', with the people using it remaining very much aware of its origins and the meanings associated with those origins. The context of use may have related directly to the origins of the piece. Rituals are commonly associated with whaling practice and may include various celebrations and festivities in which food and drink are shared. One Inuit ritual involves offering the dead whale a drink of fresh water from a specially made pot, in the belief that the whale would be thirsty after spending so much time in salt water (Bodenhorn, 1993, 192). It has been suggested that whale bone cups would not hold liquids and therefore would have been used only as dry measures (Foxon 1991, 203). However, this is more likely to be true only of bone which has desiccated over time and so become permeable.

The *hiding* or deposition of the cup beneath the floor of the broch may in itself have been imbued with a ritual connotation, perhaps having some parallel with the deposition of animal bones in the pits cut into the floors of houses at Knap of Howar, Ardnave and Sollas, thus integrating elements of the external food providing world with the living place.

Though portable whalebone artefacts represent the most obvious use of whales as a resource, it is also apparent that they were used in other ways, aside from the consumption of their flesh. The recovery of stone lamps from a number of Iron Age sites, particularly from the northern brochs (Hedges 1987) strongly suggests that whales provided a source for fuel oil. The association of these animals with the provision of light may have further influenced people's attitudes to them, perhaps conferring upon them a further layer of meaning, again above and beyond their role as an exploitable resource.

The association of cetaceans with light and heat is further suggested by the use of whale vertebrae as sockets for cooking armatures. The arrangement of these bones on either side of the hearths in the broch at Dun Mor Vaul (MacKie 1974) and in the wheelhouse at A Cheardach Mhor, the latter identified as Rorqual and Sibald's Rorqual (Young 1960), strongly suggests their use in supporting roasting spits or other cooking equipment. Not only does this function have a close association with light and heat but also a direct role in the transformation of other resources into food. Childe suggested that whale ribs may have been used to roof the houses at Skara Brae (1931c, 12), with timber being scarce on the island. This architectural use again implies an association with heat and the home.

iv. Agriculture, change and continuity

So far the discussion of later prehistoric marine exploitation has generally been limited to sites on islands. MacCormick, in his analysis of faunal assemblages from Medieval Iona has suggested: "that the intensive exploitation of marine resources and other wild animals in late prehistoric and early Scotland is a phenomenon confined to island settlements due to the limited supply of land available for domesticated animals. Many more assemblages of faunal remains from mainland as well as island sites will have to be examined before this can be ascertained" (1981, 318).

What MacCormick is defining here is one idea of marginality, where the availability of agricultural land is limited. It has already been argued, in the case of the later use of marine resources in Oban, that marine exploitation continued to be important, particularly because of the need to diversify in an area where agricultural activity may have been limited by the nature of the environment. However, the north-west coast is somewhat more extreme than other parts of Scotland, and it is perhaps to these areas that we should turn in an effort to detect whether MacCormick's hypothesis has any foundation.

The limited picture provided by the site at Ardnave is of a highly mixed economy, with livestock - including cattle, sheep and pigs being utilised along with the fruits of arable agriculture. Evidence for hunting took the form of red deer antler, while the presence of crab fragments, limpets and seal bones clearly demonstrates exploitation of marine resources. The excavator compares this with a number of sites, including the nearby site of Killelan Farm, the settlement at Northern on Harris and the midden site excavated by Coles and Taylor in the Culbin sands, Moray (1970). All of these sites suggest recourse to both agricultural and wild resources in areas which were extremely unstable, but none the less attractive to settlement.

While the consumption of marine resources such as shellfish could conceivably suggest a set of activities wholly divorced from the practice of agriculture, there is evidence at Ardnave to suggest that the two were intimately linked. The final phase of occupation is represented by a hearth contemporary with evidence for agriculture in the form of preserved spade cuts. Arable agriculture in machair regions is largely dependent on the addition of fertilizers. It has already been noted that seaweed is ideal for this purpose. There is both direct and indirect evidence for the presence of seaweed on the site, the former taking the form of a fragment of Lamour (Dickson in Ritchie and Welfare 1983), and the latter marine shells which may have been brought to the site on seaweed (Evans in Ritchie and Welfare 1983). In considering both the spade cuts and the evidence for seaweed together one must turn to Martin Martin, who on a visit to South Uist noted: "...in this island, as elsewhere, that the ground is dug up with spades, and the turfs turned upside down, and covered with sea-ware, it yields a better product than when it is ploughed" (1716, 42-3). It is this commitment to the land and the necessity to add outside agents to the soil which, along with the unstable nature of sandy soils, qualifies machair regions for the term marginal. They may also qualify in the sense that they represent a limited resource. The distribution map showing sites on the Outer Hebrides (region C) displays a strong bias toward the west coast, which just happens to be the location of machair land. Though it could be argued that this western focus is the result of bias created by accentuated preservation levels, this pattern is mirrored by historical and modern settlement.

Evidence for arable agriculture within machair zones has been identified in a variety of locations. Ard marks at Rosinish appear related to beaker midden deposits (Simpson 1976), and it is possible that the two are linked in the same way as seaweed and spade cuts at Ardnave, if the midden material was used as a form of fertilizer. It has already been noted that shell middens have been utilised by modern farmers as a source of fertilizer. Indeed, it was the barrowing away of a shell midden in the Moray Firth, for this very purpose, which brought about the discovery of a bronze pin (Lubbock 1863) which finds a close parallel to the disc headed pin found in the sands at Ardnave point (Ritchie and Welfare 1983).

The use of seaweed as fertilizer in machair regions suggests a direct relationship between the products of the sea and those of the land, with the former transforming the latter. One way in which an awareness of these transformations is expressed was described by Martin following his visit to Lewis: "...every family furnished a peck of malt, and this was brewed into ale: one of their number was picked to wade into the sea up to his middle, and carried a cup of ale in his hand, standing still in this posture, cried out with a loud voice, saying 'Shony, I give you this cup of ale, hoping that you'll be so kind as to send us plenty of sea-ware, for inriching (sic) our ground the ensuing year': and so threw the cup of ale into the sea" (1716, 28). This ritual embodies the entire transformational cycle, from seaweed to land, from land to crop, from crop to ale, with the ale being returned to the sea in order to ensure the provision of more seaweed.

When midden material which included marine shells was used for fertilizer further levels of complexity are involved, as the marine resources were transformed into food prior to their residues themselves transforming the land and facilitating the production of more food. A similar bonding between land and sea via consumption can also be suggested for the case of livestock fed on seaweed prior to the use of their manure on the fields. The archaeological identification of fertilizers and their sources is difficult, though crushed shell mixed with soils is more recognisable than seaweed. Despite these difficulties, recent work on Sanday, in Orkney, utilising stable carbon isotope analysis, has succeeded in identifying the use of seaweed as a fertilizer in Neolithic and Bronze Age soils (Dockrill et al 1994).

The collection of seaweed for use both on the fields and as fodder may have been integrated with other forms of beach exploitation, including the collection of shellfish. Indeed, at times the prime aim of such foraging trips may have been to obtain the seaweed, with shellfish collected merely as a bonus. It has already been suggested that shellfish collection at the Mesolithic site at Morton, in Fife, may have been integrated with the collection of raw material for stone tool manufacture (Deith 1986).

The evidence at Ardnave suggests a shifting settlement pattern largely dictated by the movement of sand, rather than by the dictates of a seasonal regime. The later structural phases appear to have been especially adapted to this kind of environment, and Ritchie notes a similarity in the use of stone slabs to hold back sand at both Ardnave and Northton, where the structures were comparable in size (1983, 318). It is possible that a similar pattern of shifting settlement may be represented by many of what were usually called kitchen middens. These features are common to the east coast of Scotland, in dune systems at Ythan, Newburgh, Culbin, Gullane, Tentsmuir, and in the west in the Outer Hebrides, as already noted, and at places such as Sanna Bay in Ardnamurchan. In the far north middens have been found in sand dunes at Durness. The southwest is notable for its absence of midden deposits in its many dune systems. The discovery of ceramics and cremations in the Luce sands (Davidson 1952) along with metalwork and a large number of barbed and tanged arrowheads from the Stevenson sands, Ayrshire, clearly indicate Bronze Age activity - but it should be noted that this may have been of a different character, with the arrowheads suggesting the use of machair as a place for hunting.

At Ardnave the upper midden deposit was totally removed by wind erosion over a period of just three years (Ritchie and Welfare 1983). The extreme fragility of these deposits may well be responsible for the apparent lack of midden deposits and structural evidence at Luce, while the same processes of erosion are probably responsible for the categorisation of many of these sites as kitchen or shell middens rather than settlements.

Though arable agriculture may only have been practical at certain times and in certain places, it is also apparent from Ardnave that shifting sand need not wholly prohibit its practice. Analysis of the Ardnave spade cuts suggests that a deposit of sand some 5-10cm thick may already have overlain the ground surface prior to having been dug with the spade (Halliday 1983, 316).

Livestock herding may have added an extra element of mobility to the settlement pattern, with grazings perhaps situated some distance from the places of settlement; transhumance is documented well into the modern period. It is unlikely that the fragile dune environment would have accommodated large herds, with over-grazing by livestock being one possible cause of environmental destabilisation (Angus and Elliot 1992). It may be more realistic to envisage a pattern of arable and low level pastoral farming on a scale similar to a small holding or croft.

There does appear to be some consistency in the nature of Bronze Age coastal activity in areas occupied by machair, with both arable and pastoral agriculture practiced in conjunction with hunting and marine exploitation. However, this observation does little to explain the relationship between these various elements of the economy. It would be impossible to reconstruct a full picture of economic practice with all the various elements quantified and their roles clearly defined, the nature of excavation, attrition and depositional practice will not permit such a complete picture. However, a closer look at the physical relationship between various resource residues may tell us something about the way they were utilised in the prehistoric past.

The structures and patterns of activity evident at Ardnave and suggested for various other dune environments are not wholly dissimilar to the primary activity levels at Jarlshof identified by Childe (1938). This activity was evidenced by the remnants of a curving wall which overlay deposits of midden material consisting of animal bones and marine shells. There was also evidence for a possible cist burial and the deposition of cows feet in a small pit, which may have some parallel with the pit containing sheep bones at Ardnave. To the north of what has been suggested as a dwelling was found an enclosure wall, with the space between the two wall elements occupied by an accumulated deposit of shells. This horizon was then buried beneath wind-blown sand which was later sealed beneath a stamped clay surface related to a hearth. This site does differ from those discussed above in that it eventually gave rise to the settlement of Jarlshof, which included substantial late Bronze Age cellular houses and, in its later phases, a broch and wheelhouses. Why is it that the earliest settlement at Jarlshof, which resembles very much the shifting pattern of settlement suggested elsewhere in coastal Scotland during the early Bronze Age, should later develop into a permanent, substantial community rather than remain occupied by a collection of small scale huts half-buried in the sand?

What does seem apparent is that the majority of brochs occupied points in the landscape which had previously been inhabited. Excavations at sites such as Dun Mor Vaul, Tiree, Clickhimin, Shetland, Carn Liath, Caithness, and Bu, Orkney have all provided evidence of pre-broch phases. This contrasts with the wheelhouses on the machair of the Outer Hebrides, which do not appear to have early non-wheelhouse phases, though they themselves went through protracted periods of occupation with various stages of remodelling. It has been suggested that areas of earlier machair occupation will have been lost to marine erosion (Crawford 1979, 53) and so the Iron Age structures may exist on previously unoccupied areas or stretches of newly formed machair.

It is therefore obvious that a general pattern is hard to detect, and is perhaps not what we should be looking for anyway. It has been suggested that the margins of agriculture may have fluctuated throughout prehistory, and contractions and abandonment in one area may contrast in another with expansion and settlement growth (Fleming 1978, 112). It has also been suggested that the marine resource base may have been one means by which expansion could take place (Whittle 1986, 24).

Evidence for a mixed agricultural economy at this time is provided by faunal remains from a number of sites, including Ardnave. These remains commonly consist of cattle, sheep/goat and pigs. Field boundaries detected beneath the peat moss at Achnacree, just north of Oban, have been interpreted as a means of controlling livestock (Barrett et al 1976). The fact that these features were concealed beneath substantial deposits of peat again suggests that much of the evidence for this period still awaits discovery. It is thought that much of the peat now seen in Scotland began to form around 5,000 BC with a deterioration in the climate, consisting of a general rise in rainfall and a decrease in temperature. However, the human impact on the landscape, with widespread forest clearance and increased levels of agriculture, may also have played a role in the increased levels of podsolisation which can precede peat formation (Price 1983). This deterioration is widely regarded to have been accompanied by the abandonment of many upland areas, where arable agriculture, now evidenced by clearance cairns and field systems, became an unviable proposition under this new environmental regime.

A knock-on effect of this population shift may have been an intensification of coastal settlement, where tillable soils and access to the marine resource base would have presented an attractive combination. Such a shift in settlement has been proposed to explain the initiation of settlement at Clickhimin, Shetland, during the later Bronze Age, where the hill grazings were abandoned in favour of the coast (Hamilton 1968). Further evidence for climatic deterioration and the abandonment of upland settlement was identified at the Scourd of Brouster, also on Shetland, though it was also noted that other factors such as internal social process were also partly responsible (Whittle 1986, 149). Though this is an inviting proposition we should also be aware that pressure upon agricultural land may have varied on a region to region, with some evidence suggesting that the general pattern of peat growth was extremely variable and in some areas may have taken place much later than the Late Bronze Age (Tipping 1994). It is also apparent that coastal areas themselves were sometimes affected by this process of climatic deterioration. It was noted in the previous chapter that increasing wetness encouraged podsolisation and the peat growth which was eventually to totally submerge the Bronze Age field boundaries at Achnacree, Argyll (Ritchie et al 1974). On the coast at North Ballachulish the build up of peat, in places over two metres deep, at the rear of the raised beach, also submerged evidence for prehistoric settlement (Pollard 1993).

Though it is almost impossible to demonstrate a general pattern for the severity and effect of climatic deterioration in the first millenium, the use of coastal areas appears to have increased. This may have increased pressure on both agricultural and marine resources, and people may have a more urgent need to legitimate access to resources, as has been suggested for Oban. This process may be reflected in the practice of redepositing midden material within the wall cores of structures such as brochs and duns - discussed further in next chapter.

v. The later use of caves

It has been suggested that there is an absence of a tradition of cave archaeology in Scotland (Armit and Finlayson 1992, 662). This is not true. As chapter 2 has made clear caves have provided a focus for archaeological investigation for well over a century now. What is probably more true is that cave excavations have lacked methodology, and in many cases have failed to provide results from which conclusions about the nature of stratigraphy, chronology and function can be drawn. A number of caves around the coast of Scotland have produced evidence for activity in the later prehistoric period. A consistent feature of these sites has been the presence of marine shells within the deposits, though marine resources such as fish and bird bones have also been identified. Some caves appear to have had structures within them, including Borness Cave, Kirkudbright (Corrie et al 1874, Clark 1878), Sculptor's Cave, Moray (Benton 1931) and Smoo Cave, Sutherland (Pollard 1992). The true nature of these structures is rarely fully understood, though their presence would seem to suggest that at least some of the activity within the caves represented occupation over a prolonged period.

In regions A and E, which have the least evidence for later marine exploitation, caves represent a major source of evidence for marine exploitation. This may suggest one of two things. The caves may represent the activities of people denied access to other forms of subsistence. On the other hand, this picture may be the result of archaeological survival and visibility, with material deposited outwith caves having been destroyed, which is more likely than in the north where structures were often built from stone rather than timber.

One possible function may be suggested by the common correlation of these sites with debris related to metalworking, in the form of slag and equipment such as crucibles. The use of caves by itinerant smiths in has been recorded in various parts of Scotland as recently as the mid twentieth century (Leitch and Smith 1993). Though it is not unknown to find evidence for metalworking on settlement sites (Hingley 1992), caves may have been regularly used by smiths as workshops and places of at least temporary residence. They may also have served as fishing stations in a way similar to that proposed to some of the early period sites. The location of the cave at Dunagoil, on Bute, in close proximity to the fort may suggest that the two sites are related. There has been a tendency to isolate caves from other components of the cultural landscape and this has done little to aid their interpretation and integration.

vi. Conclusion

People living on those sites in the most geographically marginal areas of Scotland, certainly do appear to have utilised marine resources throughout their history. The sites give a general impression of marine resources having been highly integrated within the economic system, with little evidence to suggest their specialised treatment on site, as residues were usually deposited in the same contexts as the residues of other activities. There is limited evidence for increased exploitation at certain times, in the presence of greater concentrations of marine residues, usually represented by marine shells. Though a large number of sites in the Outer Hebrides and on Orkney have provided evidence for marine exploitation, this has generally been restricted to sites which would not have been situated on or near the immediate coast or littoral. The appearance of these sites on the present immediate coast is due to the erosion of coastal areas and rises in sea level. The vast majority of eroding sites appear to have quite substantial structural elements, and as Cnip has demonstrated, the impression that some deposits are isolated from structures may prove to be a false one.

This pattern suggests that marine shells in substantial structures such as brochs may represent more than the straightforward removal of resources from the sea. They also represent the removal of people from the domain of the sea. Though these settlements may be located relatively close to the sea they are, in all other aspects, removed from it. Walls protected people from sea winds and salt spray, while shellfish and other marine foods were processed, consumed and perhaps even deposited out of sight of the sea. Those deposits which appear to have been deposited in the open air, much like some shell middens, are just as likely to represent the secondary deposition of material removed from inside structures. This picture contrasts with the earlier period, where marine resources appear to have been collected and consumed very close to the point of their extraction. However, it has already been demonstrated that a scenario similar to that of the later period is in evidence at the Neolithic settlements of Skara Brae and Knap of Howar. The problems of preservation and visibility are common to both periods in the Outer Hebrides and the Orkneys, with evidence for the contemporary shoreline being lost to the sea. It is therefore difficult to establish what type of evidence might have existed on the immediate shore.

It should perhaps come as no surprise that the majority of evidence for marine exploitation has been identified in the north and west of the study region (regions A,B,C), with much of this evidence relating to island sites. However, there are a number of factors which must be taken into account in any consideration of this pattern, including research bias, preservation conditions etc. Once these factors are considered it becomes more apparent that marine exploitation was practiced to some considerable degree on the mainland of regions B, C and D. Outwith machair regions evidence for late marine exploitation is generally limited to caves, which remain poorly understood.

The present evidence does suggest that marine exploitation played a less important role in regions A and E. Today these correspond to some of the best agricultural land in the country, and so may point to the role of environmental conditions playing a role in determining the nature of subsistence practice. However, it is not suggested that environmental determinism was the sole factor involved. Indeed there is plenty of evidence in the more northerly areas to indicate that agriculture was widely practiced and even that marine exploitation may have aided it. It is here that the key difference may occur. In the northern areas people were bound very strongly to the sea, not just because they lived on islands or because there was lots of sea about, but because the sea supported terrestrial activity and in some places may even have made it possible. The application of marine residues on agricultural land made this relationship direct and obvious.

Though the bond between land and sea may not have been as strong in areas with greater agricultural potential, marine exploitation still took place. Though it is not possible to confidently assess the role of marine exploitation in these more southerly areas, MacCormick's proposition, that marine exploitation was isolated to islands in the later period has certainly been negated.

Chapter 10

Food for thought: marine shell deposits in ritual contexts

i. Introduction

This work has presented a comprehensive survey of the evidence for marine exploitation in prehistoric Scotland. Central to this overview has been an attempt to examine and consider the nature of the deposits from which this material has been recovered and identified. This contextual approach has suggested that the archaeology of marine exploitation must look beyond purely pragmatic economic considerations if a fuller appreciation of its character and meaning is to be achieved. It is strongly believed that these further issues, which include the utilisation of marine resources and their residues within social and ritual activities, may cast fresh light on the ordering of settlement and society in prehistoric Scotland.

While undertaking the research presented in the foregoing chapters it became apparent that the material in question represents much more than the dumped refuse of prehistoric activity related to the procurement, processing and consumption of marine resources. The widespread adoption of blanket terms such as 'shell midden' and 'kitchen-midden' has served to obscure the varied and complex nature of much of the material under consideration.

As is now obvious, deposits which include marine shells have been recovered from a wide variety of contexts, only some of which are here regarded as shell middens. These contexts include broch sites, hut circles, caves and chambered tombs. In the past archaeologists have tended to view the first three examples as unproblematic deposits which can immediately be interpreted as straightforward domestic refuse. Only the last of these contexts, chambered tombs, has caused archaeologists to consider more complex issues such as the role of marine resources within funerary rituals. Even then discussion has not been elevated above the rather simplistic idea of food for the dead or funerary feast (eg Corcoran 1966, Connock 1985 Henshall 1963, Renfrew 1979, 168). However, as will be discussed here it is the writer's belief that not only deposits recovered from such overtly non-domestic sites such as chambered tombs may represent more than straightforward waste disposal. Factors which suggest this more complex dimension include the construction of chambered tombs over shell middens, the insertion of human remains into shell middens, the redeposition of shell bearing material in specific contexts and the use of this material in juxtaposition with terrestrial resources. Again by dealing primarily with issues related to context this chapter will suggest that marine exploitation played more than a simple economic role in different parts of Scotland at various times within the prehistoric past.

ii. Beyond contingency

It has previously been suggested that the presence of human remains in Mesolithic and later shell middens may indicate the importance of the resources represented by the those residues. It was proposed in chapter 8 (shell game I) that the use of shell middens as places of burial may be explained through the need to symbolically legitimize and reinforce group access to the marine resource base through the incorporation of human remains within the deposits. It is believed that this model goes some way to explaining the motives behind the deposition of human remains on these sites and as such moves beyond the rather simplistic, and sometimes unspoken, notion that these remains can be explained away as rubbish or refuse, as has been done with the deposits from which they have been recovered. These outmoded assumptions are the legacy of early investigations which rarely distinguished between the food refuse represented by the shell middens and the human remains within them, thus it was not unusual for human bones to be interpreted as the remains of cannibal repasts (eg. Laing and Huxley 1866, Smith 1892).

The hypothesis that human remains in shell middens represent the use of the ancestors to legitimize access to marine resources has been adopted in order to explain the continued use of the Oban sites into the post-Mesolithic period. Neolithic and Bronze Age use of these sites appears to have been accompanied by the deposition of human remains. It has been suggested elsewhere that these human remains post-date the use of these sites as shell middens, with caves merely representing natural alternatives to the construction of chambered tombs (Armit and Finlayson 1992). There is certainly some evidence to suggest that human remains were placed in the caves after they had ceased to be used as locales related to marine exploitation. The skulls and long bones recorded during the investigation of the MacArthur Cave were found to lie upon a deposit of dark earth which sealed the shell midden deposit (Anderson 1895a). It is therefore doubtful that these human remains are related to the use of the site as a shell midden. However, it is one thing to recognise they do not appear to be related to the shell midden and quite another thing to suggest that their position within the cave is due merely to its function as an ersatz chambered tomb.

It cannot be doubted that human remains have been recovered from shell midden deposits and it may be that their presence does to a degree relate to the importance of those sites and the need to legitimize access to that site. However, as the corpus demonstrates, the presence of human remains is much more widespread than the initial study of the Oban sites may have suggested, and indeed would reward a comprehensive survey and study in their own right. It could therefore be that the presence of these remains cannot be entirely explained through the general application of a model which has at its core the assumption that marine resources increased in importance at certain times, usually when other resources were in short supply or under pressure.

It is not suggested here that the model presented in chapter 8 as a means of explaining the presence of human remains in shell middens is applicable for all those sites in Scotland which have been found to contain marine resource residues and human remains. This work has attempted to demonstrate that there is a good degree of variety in the types of deposits so far identified in Scotland, itself an area of diverse and contrasting coastal environments. This chapter will now go on to discuss the role of marine resources within the wider context of Scotland, and in doing so will consider sites varying from the Mesolithic to the Iron Age in date. As well as expanding the discussion to other parts of Scotland this chapter will also demonstrate that the integration of marine and other residues into what can be broadly described as 'ritual processes' was influenced by a series of complex motives which cannot always be readily reduced to issues relating purely to contingency and the availability of resources, as presented for the Oban sites.

iii. Deposits within chambered tombs

The most obvious manifestation of marine and other faunal residues within ritual contexts (classified as type IV in the corpus) are those identified in Neolithic chambered tombs. Though animal remains are known from only a limited number of chambered tombs their serious consideration is now long overdue.

Before the issue of ritual deposition in chambered tombs can be discussed, it is important to note that materials such as marine shells and animal bones recovered from chambered tombs need not necessarily relate to the ritual use of that structure, and indeed may not have been deposited as a result of human agency. The most detailed discussion of this problem relates to the excavation of the tomb at Point of Cott on Westray, Orkney (Barber 1988). Among other things Barber suggests that it was probable that all of the faunal remains identified in the tomb - including fish and bird bones - were deposited by non-human means, incorporated in animal faeces and bird pellets. This discussion has made a valid contribution to any contextual consideration of archaeological deposits.

However, it cannot be stated, simply because Barber has recognised that depositional and post-depositional processes may provide a somewhat confusing picture, that all materials within chambered tombs are the result of processes other than purposeful deposition by those who constructed and used these tombs. Indeed, there is nothing new here and similar observations were made by earlier excavators. Bryce, in his excavation of chambered tombs on Arran recognised that the bones of fox and otter in the chambered tomb at Torlin (A/1) may well have represented the use of the chamber by these animals as a den or holt. In turn this may suggest that the bones of fish, birds and other creatures could indicate that these animals were hunted and introduced by these resident predators (Bryce 1902). Distortions caused by otter activity are not confined to chambered tombs; they have been suggested as a possible cause of bias at Bu broch (Colley 1987, 133) and as an alternative to Clarke's suggestion that deposition at the settlement site at Links of Notland had a ritual dimension (Barlow pers comm).

In his report on the excavation of the chambered tomb of Quoyness, Sanday in Orkney, Childe suggested that small concentrations of limpet shells identified within the cairn matrix were the result of rats carrying the shells to a nest, with some suggestion that nests were also located (Childe 1952). Though there is convincing evidence to suggest that marine shells were purposefully incorporated into the matrix of cairns during their construction, particularly in Ireland, Childe's suggestion should not be discounted. There is little direct scientific evidence to suggest that rats feed on shellfish, but they are known to exploit littoral environments. Until very recently the island of Ailsa Craig in the Clyde estuary was heavily infested with rats. These animals have been observed to regularly forage en masse on the beach, quickly stripping any seal or bird carcasses which happened to be washed ashore (Vaughan pers comm.). Rats are also a serious problem on the island of Rhum where they represent the only terrestrial predator. It should also be remembered that many sea birds, including the majority of gulls, will also feed on shellfish and will quite often deposit marine shells some distance from the shore, at times in places of present or past human habitation.

Another natural form of deposition which may be confused with deposits of human origin results from the tendency of shellfish populations to undergo mass mortality at times of environmental adversity, such as during heavy storms or shortages in the food supply. These events may result in the accumulation of many thousands of marine shells toward the rear of the beach. Even without such dramatic events the gradual build up of marine shells over time could easily be mistaken, by the untrained eye, for shell midden deposits as they become visible in section at the base of sand cliffs or in beach erosion sections.

In contrast to the potential causes of confusion outlined above, a clear case of the purposeful deposition of marine shells within a chambered tomb is demonstrated at Crarae, Argyll, which was found to include deposits of marine shells both inside and outside the structure. A layer beneath the floor of the chamber was found to contain a deposit of some 2,500 marine shells, dominated by periwinkles (Scott 1961a). Shells were also found in the fill of the chamber, above the level of the septal slabs, with other insertions including a broken lozenge shaped arrowhead, potsherds, hazel nuts and burnt and unburnt human bones and teeth. In the forecourt was a pit in which a quantity of shells roughly equivalent to that inside, but represented by fifteen species, had been deposited.

This material represents a complex series of depositional events, possibly taking place over a protracted period of time. Shells within the chamber below the level of the floor appear to predate the construction of the chamber, and have been suggested to represented earlier activity on the site (Scott ibid). The presence of marine shells in both the chamber fill and in a pit cut into the forecourt strongly suggests that the motive behind their deposition is related to the ritual function of the tomb. As will be discussed below it has often been recognised that faunal deposits may have a ritual connotation but little effort has been expended on attempting to explain the role and character of these ritual activities.

The lesson to be learnt here is obviously that once again a consideration of context is paramount - there can be little doubting that human agency is behind the deposition of marine shells at Crarae, but identifying the nature of this agency may be more difficult in other cases. An example of such difficulty is offered by the presence of fish bones in the chambered tomb at Embo, Sutherland. This site is situated on a raised beach and prior to excavation appeared as a low sandy mound with boulders. Excavation revealed an Orkney Cromarty type tomb with two chambers, one in each end of the mound (Henshall 1963). The site had been heavily disturbed both in antiquity and relatively modern times. As well as Neolithic insertions within the chambers there were also later Bronze Age cists inserted into the mound and one of the chambers, along with a number of cremation deposits.

Animal bones were found in various contexts and quite often in association with human bones. It is suggested by Henshall that a deposit of animal bones and shells had built up over chamber one. These were later displaced and disturbed with the removal of the chamber roof and the insertion of the cist. Henshall reports that the animal bones identified at Embo are unusual in that a wide variety of species are present but each is represented by a very small number of bones.

Despite the fact that there does seem to be a good case for the insertion of some animal bones, including those of fish, as well as marine shells, it is apparent that the degree of disturbance must increase the suspicion with which some of these deposits should be viewed. It is likely that at least some of the bird, amphibian and fish bones were introduced by predators such as owls, foxes etc. Henshall makes mention of three compacted balls of fish bone recovered from the sand surrounding the cist in chamber one. No conclusions were drawn from these deposits but it does seem possible that they may represent pellets regurgitated by predatory birds such as owls or large sea birds. Despite this cautionary note it does, on the evidence recovered from other sites, seem likely that the insertion of animal bones and marine shells may have played a part in the ritual function of this monument.

Corcoran's excavations of three chambered cairns at the head of the body of fresh water known as Loch Calder, Caithness, also recovered faunal remains (1966). The insertion of marine resources, including marine shells and fish bone, into the chamber deposits of Tullach an T-sionnaich is especially interesting when one considers the site's distance from the sea. The nearest stretch of coast is situated some 6 miles to the north of the site. Given the security of their context and the distance from the coast it cannot be doubted that these materials were inserted into the tomb through human agency. Their presence has important implications for our perceptions of the way people lived and subsisted during the Neolithic. The movement of material from a location at least six miles away from the site implies that resources were exploited over a considerable distance and is certainly at odds with the image of the local population tending fields and living a pastoral idyll in the shadow of the chambered tomb. The six mile distance involved here points to a site catchment area of which any Mesolithic hunter/gatherer group would be proud!

However, the identification of this material within the chamber is one thing; recognising the reasons for this deposition is another matter. Corcoran discusses this material in terms of funerary feasts or offerings for the dead (1966). Limpet shells were found in various contexts. The first to be located were those situated on the top of the chamber fill and mixed with animal bones, including red deer and cattle, and charcoal. These deposits were covered by the collapsed roof of the chamber and passage. Corcoran also noted a concentrated deposit of burnt animal bone, charcoal and burnt earth. The presence of fire-reddened stone beneath this deposit suggested to the excavator that either the material above had been deposited while still hot, or alternatively that the contents of a hearth had been placed in the chamber. The fill of the chamber beneath these deposits was itself made up of animal bone, marine shells, and layers of thin, flat stones. Human bones were also present within this deposit, including skull fragments. The bulk of the human remains, which appear to belong to two individuals, were sandwiched between these deposits and it is suggested that their fragmentary condition was due to their having been previously interred in an ossuary prior to being deposited in the chamber. At least one dog appears to have undergone the same process.

The bones of cattle and red deer were also recovered from the nearby cairn of Tullach of Assery B. In this case no marine fauna were identified, only the bones of red deer, cattle, and possibly sheep and pig with some bird bone. The process of deposition appears to have been somewhat different to that discussed above. Deep deposits were lacking and most of the animal bone was situated along with the human bone, which again appeared to be disarticulated, on top of a layer of paving. The presence of fox bones may represent an intrusion, and if so may cast doubt on some of the other bones (the Gaelic name for the other tomb, Tulach an t-Sionaich, translates as 'the mound of the foxes). A quantity of burnt and fragmented bone was found beneath the paving in the chamber, mixed with charcoal which also contained pottery sherds. This deposit appears to represent activity taking place on the site immediately prior to the construction of the chamber and cairn, the unabraded condition of the pottery suggesting to Corcoran that not much time had elapsed between the two events. Similar burnt deposits are known to have existed at basal levels in the chambers of several Caithness tombs, including Camster round (Corcoran 1966).

Corcoran suggests that the absence of animal remains in the passage of Tullach of Assery A may represent a difference in the type of ritual practised. He does not go on to suggest that the presence of marine resources in Tulach an t-Sionnaich represents either a different form of ritual or reflects differences in the type of economy practised by the users of the monument. Indeed, Corcoran makes no mention of the marine resources and the distance of the site from the sea in his discussion of the economy practiced by the users of these tombs. He rightly states that any such discussion based wholly on ritual deposits must be treated with caution, though as this chapter will argue it is likely that certain deposits could reflect economic evidence a little more directly than at first may be supposed. The pattern of economic practice he does propose is herding supplemented by hunting with indirect evidence, from wear on teeth, of some crop production.

Despite the results of excavation relatively little is known about the sequence of activity at Loch Calder. With an absence of radiocarbon dates it is even impossible to say whether all the sites were utilised simultaneously or at different times, a shortfall in our knowledge which has some parallel in the Oban cave sites. However, the distinct differences in the morphological details of the sites with their evidence for remodelling and long history of use, clearly highlights the fact that every site is different and can make generalisation difficult. Tullach t-Sionnaich in its earliest guise was a passage grave set in a heel-shaped cairn, a type which had previously only been identified in the Shetlands. A later modification involved the construction of an extension which transformed the structure into a long cairn. Tullach of Assery A was a double-chambered passage grave with passages opening onto short-horned forecourts situated on either side of the cairn. Tullach of Assery B was different again, with a large circular cairn which accommodated a long passage and chamber of the Camster type. Again, a parallel may be seen in shell middens where the blanket term promotes an idea of homogeneity and uniformity, whereas in reality nothing could be further from the truth.

At Lower Dounreay, also in Caithness, the finding of the majority of animal bones in close proximity to the most complete of the human skeletons within the chamber has led to the suggestion that they were deposited as offerings to the dead. Bones higher up in the fill of the chamber are suggested to represent the remains of a feast taking place during the closing of the tomb (Henshall 1963, 96). These animal bones, which were extremely fragmentary, were dominated by ox, but species as diverse as red deer, water vole and otter were also identified. Again, the presence of the otter may cast some doubt on the interpretation of these remains as funerary deposits. Marine resources were limited to a few gannet bones and two fragments of oyster shells, but again the provenance of these finds cannot be relied upon.

The limpet shells at Tulloch An t-Sionnaich represent the furthest inland occurrence of marine material in Neolithic Scotland. The evidence as it stands at present strongly suggests that the prehistoric use of marine resources was generally limited to the coast and its immediate hinterland. It is not until the Medieval and post-Medieval periods that marine resources commonly appear in contexts some considerable distance from the sea. At this time many prestige sites, such as castles and tower houses, regularly include oyster shells, which as they do today may have represented something of a luxury or status food. This is in marked contrast to the perception of shellfish as representative of a rather impoverished economy in the prehistoric period. However, in stating that marine resources are limited to coastal contexts in the prehistoric period, one must always consider factors such as differential survival, with coastal alkaline contexts being far more conducive to the survival of material than the acid soils which are generally found inland. It has already been suggested that fish may have been preserved during the Mesolithic period, by either smoking or drying, and may have permitted the transport of these resources over considerable distances without risk of decay. However, the only other recorded case of marine resources in a truly inland context is the find of periwinkle shells in the Bronze Age cemetery at Kirkburn near Lockerbie, which will be discussed presently.

A large percentage of the tombs so far excavated on Orkney have provided evidence for faunal remains. The most common occurrences are cattle, red deer, sheep and pig in decreasing order of magnitude. It is not surprising that those sites from which the widest range of animal species have been reported are the tombs excavated most recently, namely Isbister and Quanterness. This broader spectrum includes dog, fox, otter, rabbit, horse and a variety of birds including the white tailed sea eagle - which Fraser has suggested may provide evidence of totemism (Fraser 1983).

Fraser further suggested that "The paucity of chambered cairns with such shells may be a reflection of poor recovery - molluscs not being deemed worthy of collection by archaeologists - but it may equally be a sign that the rationale behind the deposition of bones of large land mammals and birds, inside chamber tombs did not extend to lowly sea creatures"(Fraser 1983, 179).

Fraser is right to indicate that there may be a recording and collection bias on the part of archaeologists but then demonstrates that he holds certain perceptions in common with those who may not have considered molluscs as worthy of report by writing them off as "lowly sea creatures" (Fraser ibid) - this, however, may be a little unfair, as his true intention was perhaps to suggest that these perceptions were held by earlier archaeologists. The apparently rare appearance of marine shells in chambered tombs stands in contrast to the fact that "Every prehistoric midden that has been sampled in the last decade in Orkney has contained large quantities of sea molluscs, notably limpets, razorshells, mussels and oysters" (Fraser ibid 179).

Henshall has suggested that faunal remains deposited along with human remains may be interpreted as food offerings for the dead, while bones in the filling of chambers may represent the residue of ceremonial feasts taking place during the final closing of the tombs (1962, 36). This hypothesis is important because it represents the first attempt to differentiate between the motives which may have lain behind the deposition of faunal material in chambered tombs. It is also noteworthy in that it is based on contextual considerations. However, despite this consideration of context little thought is given to the nature of the material itself.

The excavation of the tomb of Isbister, though largely carried out without professional supervision has produced some interesting results. A large quantity of faunal remains was identified within and outwith the tomb. This material not only included terrestrial mammal bones but also fish bones and marine shells. Examination of the animal bones has determined that immature specimens were generally selected for inclusion, including cattle, sheep, pig and red deer. It was further observed that the bones were not so fragmentary as those found on Neolithic settlement sites (Hedges 1983). An absence of butchery marks was taken as evidence that the flesh was still on the bone when these joints or limbs were placed in the tomb. The presence of flesh on the bones would place these deposits within the realm of funerary offerings rather than funerary feasts - food for the dead rather than for the living.

Hedges (1983) expands upon the simple feast/offering dichotomy by considering the deeper implications of statements which can be made rather glibly without much thought about these wider issues. The slaughter of young animals and the expenditure of their meat in purposeful deposition serves to deprive the group responsible not only of quantities of food but also of potential future breeding stock. It has elsewhere been suggested that throughout much of prehistory young animals were regularly slaughtered in autumn in order to avoid having to fodder them over winter (Noddle in MacKie 1974, 189). if this were their case then it is perhaps worthwhile considering the further implications of this proposed culling, with particular regard to the utilisation of culled meat in feasts and ritual activities which may have served to strengthen social bonds prior to the onset of the most difficult time of the year. Hedges has pointed out the cost to the community of the removal of important components of the food resource base but unfortunately fails to postulate how the mechanism of deposition may have worked.

The taphonomy of bone deposition at Isbister appears to contrast somewhat with that evidenced at other chambered tombs, both on Orkney and the mainland. In most cases the bones from these sites are reported to be highly fragmented and in many cases burnt - it was noted in the Isbister report that this fragmentary state is a common feature of bones identified on settlement sites. Such a basic difference would suggest a fundamental difference in the types of depositional process involved.

There are cases of piles or heaps of shells having been deposited in chambers, as occurred at Midhowe. Fish may have been cooked and their bones inserted or placed whole, though there is little evidence for the presence of articulated fish. Molluscs may have been placed in the chamber either intact, in their shells, or they may have been consumed previously and the shells alone deposited; shells are the physical residue of shellfish just as bones are the physical residue of cattle or deer.

The idea that faunal remains deposited in chambered tombs represent food to be consumed by the dead can perhaps be traced back to the excavation of tombs in Egypt during the first half of the twentieth century. In those tombs the dead were found to have been preserved through mummification and accompanied by artefacts which symbolised the world of the living. These grave goods included food, complete with serving vessels, furniture, boats and servants, represented by terracotta figurines or even the executed corpses of those who had served in life. This practice of preserving the dead and depositing with them the accoutrements of daily life reflects an ideology centred upon the belief in life after death, with narrative paintings and inscriptions documenting the journey of the dead into the afterworld.

It is to these images that phrases such as 'food for the dead' unintentionally invite us to turn. However, the remains of the deceased inhabitants of Neolithic Orkney and the material deposited with them stand in dramatic contrast to the Egyptian picture. Unlike the case of mummies, where great care has been taken to preserve the image of the living in death, the remains of the Neolithic dead were often deposited in a dismembered, abstract form. The disarticulated bones of the dead were moved around, grouped and regrouped, scattered and collected, with the human form reduced to its component and, in life, concealed parts. Despite this contrast the material deposited with these remains, in many cases equally abstract and disarticulated, with pots broken and bones burnt and scattered, is commonly interpreted as representing the food of the dead. Again, however, we have a problem of definition here as archaeologists writing on the subject tend not to specify how they view the relationship between the faunal remains and the remains of the dead; offerings to the dead may function ideologically in ways other than can be encompassed within the phrase 'food for the dead'. Despite this concern with the dead, rituals function for the benefit of the living and in the case of funerary activity perhaps the most readily understandable form is that of the funerary feast. The expenditure of food resources, its communal or selective consumption and the purposeful deposition of the waste produced may all have assisted in the renegotiation of social relations weakened through the death of members of the community. These social gatherings may also have permitted the expression of grief and loss which are an important component of bereavement, as would have been the creation of memories and biographies through story-telling and eulogising, which may also have taken place on these occasions.

Alternatives to the feast/offering dichotomy, both of which are concerned with food, have been proposed. These ideas include the suggestion that certain species may represent totemic badges or symbols which are identified with specific groups, marking one group from its neighbours. Such an interpretation has been offered by Fraser to explain the presence of a large number of sea eagle bones and talons in chambered tombs such as Isbister and Quanterness. Under the same scheme the presence of a number of dog skulls in the tomb at Cuween and at Burray may indicate a different totem and hence a different group (Fraser 1983). Piggott had earlier suggested that the presence of dog bones may be related to hunting ceremonies (1954, 247), though the use of the dog in herding should also be considered (Bradley 1978).

One assumption behind these suggestions is that the species in question are not today regarded as food animals, and so alternative means were required to explain their inclusion. There has been little attempt to explain the inclusion of marine residues which does not involve their use as food resources, though as this work has made obvious these deposits have tended to be totally disregarded by archaeologists anyway. Hedges did question the inclusion of small rock-pool fish at Isbister, doubting their usefulness as a food resource. Perhaps the only attempt to offer an alternative motive for the inclusion of marine shells was made by Lindsey Scott in his report on the excavation of the chambered tomb at Rudh 'an Dunain on Skye (which did not contain marine shells), where he states: "The most probable view seems to be that pieces of pumice, like quartz pebbles and shells, served as receptacles for souls and therefore at a later stage of development, and charms" (1932, 210). However, it interesting that Scott then goes on to cite the example of a modern Serbian funerary ritual in which the soul of the departed is attracted by food, again reaffirming the common association of food in rituals related to the dead. The suggestion that shells were used as charms may find some affirmation in their use as a form of body adornment, as outlined in chapter 7.

The association of chambered tombs and marine shells is not limited to Scotland. A number of Irish chambered tombs have also included deposits of marine shells, which also appear as shell middens at various locations on the north-west coast of the island. A large concentration of 80 tombs at Carrowmore includes at least one example within which marine shells were identified. At tomb 19 marine shells were found within all three recesses of the central chamber, along with cremated human bone (Herity 1974). Similarly, at Loughcrew cairn H quantities of limpets, cockle, periwinkle, pecten and mussel were deposited in the burial chamber. Like many of those deposits of faunal remains in Scottish funerary contexts, these shells have been identified with funerary feasting. At Knocklea a considerable deposit of periwinkles, mussels and limpets was present within the make-up of the mound. This deposit has been interpreted as the remains of shellfish eaten by the builders of the tomb during its construction (Herity 1974, 173).

iv. Process, memory and narrative

It is intended here to present a further alternative explanation for the deposition of marine residues, and indeed other faunal remains in chambered tombs. Again, this hypothesis is not intended as a general model which can be applied in all cases but it does go some way to furthering our understanding of the relationship between ritual, procurement practice and people's perceptions of the world in which they lived. This proposal is based upon an appreciation of the processes of procurement, processing and deposition which were discussed in the previous two chapters. Though these processes are here discussed in relation to deposition within chambered tombs, it will later be made apparent that similar motives may lie behind the deposition of material within later structures, such as brochs and duns.

As outlined above, discussions of the processes which were responsible for the deposition of faunal material within chambered tombs are usually centred upon the idea of offerings or funerary feasts. Little attempt has been made to further define these processes or to relate deposited materials and their context to the physical nature of ritual activity. Activities which preceded deposition are rarely considered, beyond the suggestion that a feast or ritual took place. The assumption generally appears to be that this activity took place in the immediate vicinity of the monument.

The forecourt has been widely assumed to have been a focus for ritual activities related to the function of chambered tombs, and features such as pits cut into the area defined by forecourts do appear reinforce this suggestion. In some cases these have been found to contain marine shells, as at Crarae, Argyll, where some 2,500 marine shells of fifteen varieties were found to fill a pit in the forecourt (Scott 1961a). Marine shells were also incorporated into the blocking of the entrance of the tomb at Cairnholy and were interpreted by the excavator as seafood which had been utilised in a ceremony marking the process of blocking (Piggott 1949). The shells at Crarae were thought to have been deposited once the meat had been removed, thus having related to feasting. How Scott came to the conclusion that the meat had been removed is uncertain; if it were possible to make such a differentiation then it may go some way to interpreting a number of similar deposits. Scott may have assumed that decaying shellfish would leave an organic residue, which is fairly improbable, though that is not to say that scientific techniques capable of carrying out such analysis could not be developed. However, Scott did detect a "black unctuous deposit" (ibid, 16) related to another 2,500 shells which underlay the chamber, which he could have interpreted as the decayed meat of these shells. Instead, and perhaps more sensibly, he sees this material as a possible midden deposit which may relate to a phase of occupation preceding the construction of the cairn (the construction of tombs over earlier shell middens will be discussed more fully in the section which follows).

The character of this evidence for ritual deposition and the activities suggests that materials inserted into the tombs and indeed into the forecourts underwent processes of transformation and saw other contexts of use before this, the last in a series of depositions and redepositions. The majority of deposited items in chambered tombs have been recovered from what might be described as mixed fills, with various components, including human remains, pottery sherds, animal bones, stone tools and marine shells being included within the matrix of these fills, some of which include stone, burnt stone (as at Tulloch an S'tionnach), unctuous organic material (as at Cairnholy), earth, ash and charcoal. All of these components in contexts outwith chambered tombs, and particularly on domestic sites, would usually be described as "midden material". The presence of midden material in chambered tombs has been noted by Ritchie who admits uncertainty as to whether this is truly domestic refuse or related to feasting and ritual activities (Ritchie, 1983, 58). The present writer believes the former of these suggestions to be the most likely.

It has been noted that a limited range of artefactual material was deposited within the Orcadian tombs, with pot sherds, pins and simply worked flints being the norm (Hedges 1983, 250). The same writer further suggests that the large quantity of pottery may indicate that they represent the central or most important artefactual component selected for inclusion and the other types may have been included unintentionally (Hedges imaginatively suggests that shell and bone beads found within the chamber fill were deposited when the necklace worn by an individual filling the tomb from the roof snapped). It can equally be suggested that much of the material was included unintentionally as it was not the various artefactual components themselves which were of concern but their meaning as a mass within a matrix, and even more importantly their original context and the processes of deposition which placed them within that primary context.

It is also noteworthy that it is not unusual for pottery sherds recovered from chambered tomb contexts to be abraded and usually small (eg Scott 1961a, 14; Yarrington 1986), thus suggesting that they have been moved around after primary deposition. Though not usually stated explicitly, the assumption generally appears to be that this movement took place inside the tomb as new insertions and fills were added. There is, however, no reason why this abrasion could not have taken place prior to deposition within the tomb, perhaps upon breakage and deposition on a settlement site. Though it is likely that some of the pottery, sometimes of fine quality and highly decorated, was deliberately selected for deposition, much of it would not have been out of place on a domestic midden site or house floor. It is also interesting that the generally poor quality of the flint work, noted by Hedges, mirrors the case of several of the Obanian shell middens, which the present writer and others has put down to the concentration of lithic manufacture away from these features.

The preceding chapters outlined the processes by which marine shells and other marine resources were removed from their natural environment to undergo a series of transformations via processing and consumption. In some cases this process appears to have been single stage, with shellfish being removed from the shore and eaten in close proximity to the place of procurement prior to deposition (this pattern is suggested for the majority of early period shell middens). In other cases a more complex pattern may be at work with shellfish being processed and the meat removed to be consumed elsewhere, or indeed to be utilised in a secondary capacity as bait to catch fish; in this case a whole new strand of processes will have followed, with fish caught, processed and consumed. It is suggested here that these transformations played an important role in the way that people not only ordered their lives and the activities which constituted those lives, but also in the way they perceived their place in the world and their relationship to their environment.

The deposition of marine residues on sites such as shell middens or within or outwith domestic structures marks the final transformation from the natural world of animals and plants to the cultural world of food. This material, having been transformed, could be taken to represent not only domestic waste, as it usually is, but also a symbolic reminder of all those investments of time, labour, movement, contact and communication which preceded deposition and followed procurement, in activities which may have included transport, processing, storage, exchange, consumption etc. The symbolic role of these deposits may have been enhanced or indeed activated by their redeposition at chambered tomb sites in a ritually controlled manner. As touched upon previously, these rituals may have included the creation of biographies through oratory, a narrative which may have been symbolised through the handling of material which itself included components of that life. Certainly deposition and redeposition appear to have played an important role in the way that the remains of the dead were treated, with disarticulated remains being interred and moved around within chambered tombs and perhaps at times being removed from tombs to places such as caves, as was suggested may have happened in Oban.

When looked at in this light it becomes very apparent that ritual process was highly embedded within what we might be tempted to call economic activities. It can also be suggested that though chambered tombs represented an important focus within the cultural landscape they in fact mark the terminus for long and involved ritual practices. In the past it has been normal to see these practices taking place in the immediate vicinity of the tomb, with areas such as the forecourt representing arenas within which ceremonies relating to the disposal of the dead were centred. What is now apparent is that the landscape itself played a vital role in these activities, with material moved from one place and carried to another. This process of redeposition involved movement through the landscape, perhaps along routes used in a variety of exploitation practices, including those which resulted in the procurement of resources now carried as residues. It is therefore not only the place from which material was removed which was regarded as important but also all the other places passed through on the journey to the tomb.

Though not wholly removing the sphere of ritual from food and the need to eat, the suggestion that the residues of food were sometimes incorporated as "midden material" permits new layers of meaning attributed to ritual processes, incorporating as it does all the stages of procurement, processing and consumption, and as such including many of the activities which would constitute a life. Such secondary or even tertiary deposition within chambered tombs may therefore represent the explicit bonding of past practice with the physical remains of those related to that practice. It has already been noted that chambered tombs and various other funerary monuments share features in common with domestic structures - houses for the dead and the living. The redeposition of material related to houses of the living may represent a further embodiment of the connection between the realm of the living and the dead. It is also important to note that this process would bring about the transformation of deposits from one type to another, with perhaps type I, II and III deposits becoming type IV deposits.

v. Chambered tombs and shell middens

It was noted in the preceding section that the deposit of marine shells found beneath the floor of the chamber of the Crarae tomb may represent a midden deposit relating to the earlier occupation of the site (Scott 1961). Though by no means a common occurrence, the construction of chambered tombs over shell middens is certainly not unprecedented in Scotland (Chapter 7) and indicates a somewhat different physical relationship between marine resources and ritual monuments than that presented by marine shells being deposited within chambered tombs.

This juxtaposition is most obviously indicative of change, with the shell midden no longer providing a functional focus for marine exploitation once the chambered tomb had been built over it. Aside from the possible case at Crarae the only verified case occurs on the island of Bute at the tomb of Glecknabae, situated at the rear of the raised beach in the north-west corner of the island.

At Glecknabae excavation of the tomb resulted in the identification of a substantial shell midden deposit immediately beneath the chamber (fig.29). Extension of the trench revealed an uneven deposit of shells of considerable extent and over a foot in thickness in places. Fragments of ox bone were found to be sparsely distributed through the deposit (Bryce 1904) and may suggest a Neolithic date for at least some of the activity evidenced by the midden, though it is possible that the bones represent wild ox. The more recent discovery of a flint blade core eroding from a rabbit burrow in the tomb mound may indicate a Mesolithic element (Cormack 1985).

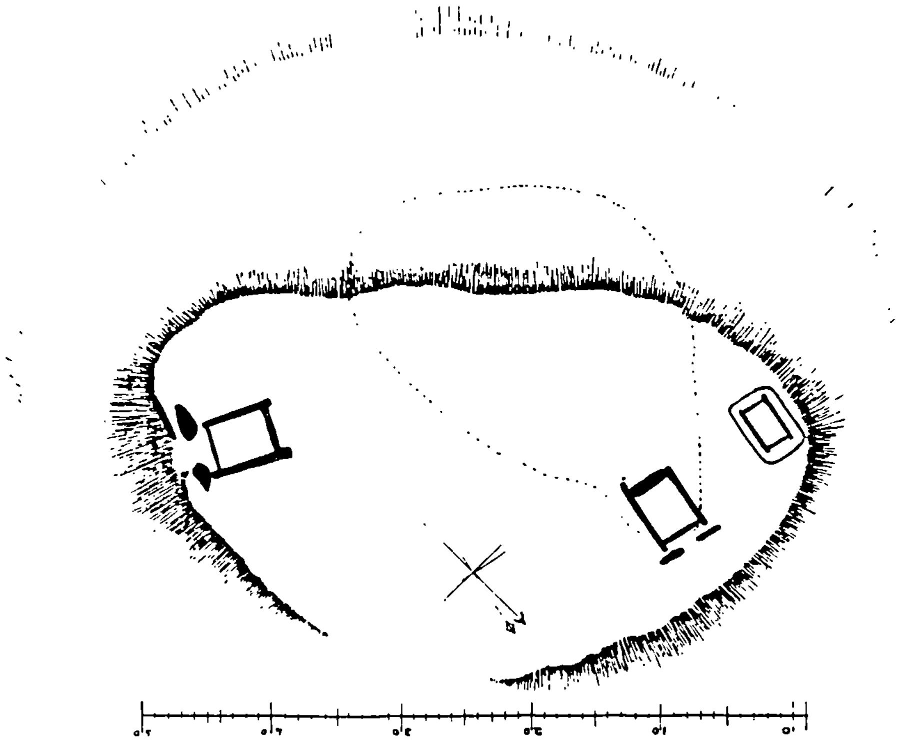


fig 29. Plan of Glecknabae tomb showing location of shell midden beneath (dotted line) from Bryce 1904.

It has been suggested that the building of chambered tombs over shell middens may emphasise the importance of past practices in regions of poor agriculture, though in a separate context of use (Hughes 1988). Though the present work has much sympathy with this idea it is felt that other issues may also lie behind this continuity. It has already been suggested, in the case of the Obanian sites, that shell middens may have represented important foci of activity which served, among other things, as territorial markers. This function may have something in common with that suggested for chambered tombs (Renfrew 1974, Chapman 1981, 1989) and as such may represent a form of continuity in this capacity at least. However, this does not explain why a site which was regarded as a focus for marine exploitation should later have been marked by a chambered tomb which denied access to the midden itself.

Though the coastal environment has played a vital role in providing access to an important resource base - the marine ecosystem - it has also provided other important opportunities not on offer further inland. In many parts of northern Scotland, particularly in the west, present agricultural land is situated on raised beaches. In the majority of cases these features, which often occupy rock platforms, are surrounded by areas of rocky hillslope or mountain-side. These surrounding areas provide only limited potential for agriculture, though even fairly steep slopes can bear evidence of pre-improvement rig and furrow agriculture. At the time of the maximum post-glacial transgression the areas which now display the best agricultural potential would have been under the sea. It is at the foot of the surrounding cliffs and hill slopes, which then represented the interface between land and sea, that we come across so much evidence of early prehistoric marine exploitation, in the form of shell middens. However, as the sites in Oban and elsewhere have demonstrated, the fact that a shell midden occupies this Mesolithic shore line does not necessarily mean that it is Mesolithic.

It was only once these raised beaches were formed, once sea-levels fell at the end of the post-glacial maximum, that these areas opened themselves to agriculture. This point is of great import in any discussion of the so-called Mesolithic-Neolithic transition in this area, where sand and gravel terraces, some 50-500m wide, provided the freely draining foundation for the formation of readily tillable soils (Price 1983, 182). Childe may well have been right to assume that the light soils which fringed the sea were the first to be colonised by early farmers (1935, 26); where he went wrong was to envisage these farmers coming in from the south in boats. It is more likely that they colonised these areas from the land, having been in the area for some considerable time before then. These farmers had been exploiting the fringes of these areas for thousands of years as hunters and gatherers and as fishers. It was only when the option was opened to them, as much by a fall in sea level as the availability of farming technology, that agriculture became a viable option, which they may or may not have taken up.

As already noted it was Childe (1935, 26) who first suggested that in the south-west of Scotland these raised beaches were the first to be colonised by Neolithic farmers travelling by sea from the south and west. Childe's theory of a Clyde-Carlingford culture, with chambered tombs marking the passage from coast into the hinterland, was later refuted by Scott (1969), who saw apparently simpler tombs in the higher, more inland regions as earlier than those on the coast. However, Scott was later to concur with Childe when he recognised that chambered tombs on Arran appeared to tie in more closely with his earlier hypothesis. He did not, however, agree with the idea that the main post-glacial raised beach would have provided an important source of agricultural land, regarding much of it having been still underwater during the early Neolithic, and going as far as to say that, during the whole of the Neolithic period what is now visible as the 25 foot raised beach can be discounted (1970, 117).

Scott's later proposition fails to hold water, literally, as there are several instances of chambered tombs being built directly onto raised beaches in western Scotland, with the sites of Clahd Aindreis, in northern Ardnamurchan, and Camas nan Gael, southern Ardnamurchan (see photo), both sitting on or near the 10m contour, which in these places can be equated with the 25 or 30 foot raised beach. It can be said, then, that in some parts of Scotland at least, chambered tombs were being built on raised beaches, which today represent valuable agricultural land.

plate 5. Raised beach in southern Ardnamurchan. The chambered tomb known as Camas nan Gael was constructed in the middle of the beach - in trees middle distance.
Note steeply rising hills around beach. Land mass on horizon is Mull.

It is difficult to estimate the period of time over which the regression to current sea-levels took place, with the effects of bending and warping in the earth's crust causing variation from one area to another. However, it is thought that sea levels in the Oban area were falling around 4,500BC (Gray 1972), while the present washing limit at Lealt Bay, on Jura, was reached some time between 3,200BC and 2,800BC (Mercer 1971). Sissons has suggested that land recovery following the post-glacial maximum may have been in the region of six inches per century, compared to three feet per century following the immediate post-glacial (1962). Mercer has suggested a rather more rapid rate of recovery of around one foot per 25-35 years in northern Jura (Mercer, ibid). Though in human terms the rate of recovery was very slow, relative changes in altitude between land and sea must take into account the relief of the recovering land. The relative flatness of these areas means that even a drop of a few feet would have been enough to reveal entire terraces, perhaps over a period as brief as several human generations. Though not observable by individuals it is not unreasonable to suggest that people were aware of this dramatic change, possibly through stories being passed down from one generation to the next. The giving up of new lands by the sea, and perhaps the creation myths inspired by this process, would have played an important role in moulding the way that people related to their environment.

The limited extent of agricultural land provided by raised beaches would have placed a heavy premium on them as a resource base. It is not therefore unreasonable to suggest that the building of chambered tombs on raised beaches, where a large proportion of those on the north-west coast are to be found, was a result of the need to physically and symbolically legitimize access to that resource, just as it has been suggested that the insertion of human remains into shell middens secured access to marine resources. It has already been noted that the cycle of tidal change played a central role in the scheduling of marine exploitation practice, with the littoral representing a liminal zone between land and sea. Marine regression may have been viewed as a part of this cycle, with receding sea levels representing a turn of the tide on a grand scale. Land that had once been beneath the sea was now permanently raised above the waves, and where shellfish were once collected crops were now grown. The construction of chambered tombs over shell middens may therefore be related to this transformation with the former littoral continuing to play a role in the creation of a cosmology which drew heavily upon the relationship between land and sea and the resources provided by both. It has already been noted that shell middens may have served to symbolise the transition between land and sea, with raw materials from both zones undergoing transformation into both artefacts and food.

It should be noted that the construction of ritual monuments over sites of earlier activity is not unique to shell middens on the west coast of Scotland. At Hazelton North in Gloucestershire the excavation of a chambered tomb revealed evidence for Mesolithic activity sealed beneath the impressive, stone-built cairn; this evidence took the form of midden deposits and stone tools (Saville 1990). This again may represent a continuing importance being given to a particular place, though the motives involved here were probably different to those involved in the siting of coastal tombs in western Scotland.

Aside from the Glecknabae site, and the previously cited Crarae tomb, the only other chambered tomb thought to have a shell midden beneath it is at Clach Aindreis, in northern Ardnamurchan (region B), where marine shells were found eroding from rabbit scrapes (Henshall 1972). Despite the poorness of this sample it is noteworthy that they are all situated on the west coast of Scotland, where agricultural land is at a premium and in most cases located on raised beaches. This small number is no doubt in part a reflection of the pattern of past investigations into these monuments, where excavation, if carried out at all, has been centred upon the chamber, with very little work carried out on the mound or its environs. More recent excavations have generally focused on areas such as Orkney where the draw of substantially upstanding monuments continues to prove irresistible to modern archaeologists, just as it did to their nineteenth century antecedents.

The construction of ritual monuments over shell middens does appear to have continued into the Bronze Age, though only one example is known. At the Fairy Knowe (fig.29), which is situated very close to the chambered tomb at Crarae, a probable Bronze Age barrow was found directly located over a shell midden. Bronze Age cists were found above the Stannergate shell midden, on the shores of the Firth of Tay, but these were separated from the from the earlier deposit by several feet of earth, the shell midden therefore was no longer visible when the cists were inserted. However, it cannot be stated outright that the placement of the cists was totally unrelated to the site's earlier function, or at least to the memory of that earlier function.

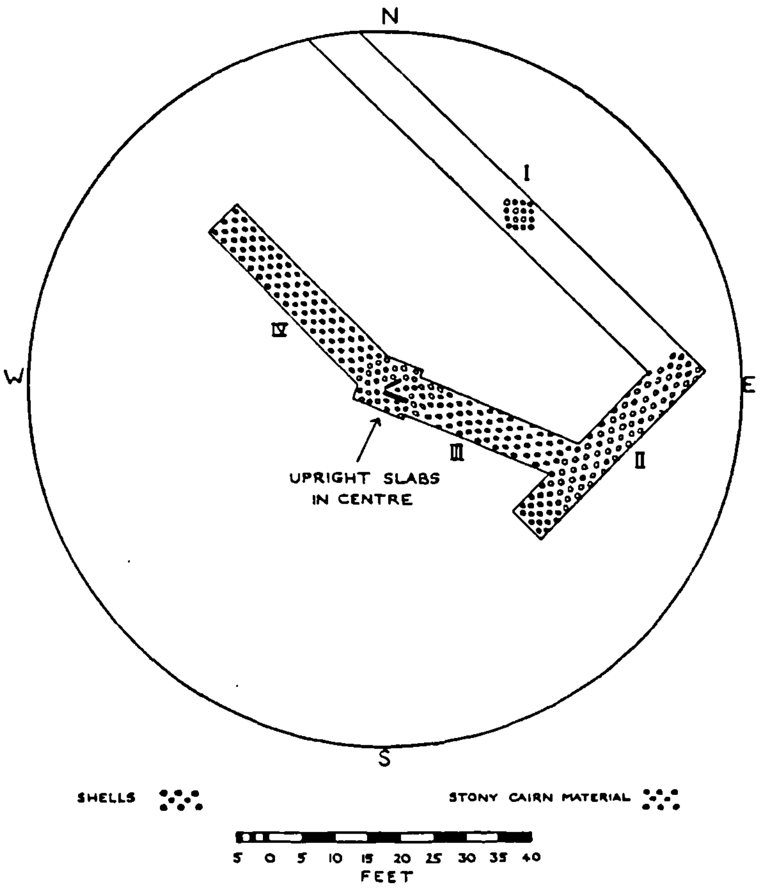


fig 30. Plan of bronze age cairn at Crarae, built over shell midden (from Scott 1961).

The suggested status of the shore as a liminal zone may have provided further impetus for the construction of chambered tombs on raised beaches and shell middens, beyond the need to reinforce claims to agricultural or marine resources. Chambered tombs represent receptacles for the remains of the dead and as such represent a means by which the transition between life and death was negotiated, with the majority of recorded funerary practices reflecting a recognition of a liminal phase between the two states (Huntington and Metcalf 1991). Indeed the beach was an environment within which death would often be apparent, with dead animals being washed up from the sea. The sea itself was a dangerous and alien environment, and as such stood in stark contrast to the more familiar land upon which people lived most of their lives. When they did venture onto the sea they did so at some risk to their lives and, as discussed in chapter 7, it would not have been unknown for people to lose their lives at sea.

It has already been established that shell middens not only existed within this liminal zone but were themselves places upon which processes of transformation, animal to food, residue to artefact, sea to land etc., were centred. It can be further suggested that the residues of these activities maintained this symbolism when moved to chambered tombs as discussed earlier. It should be emphasised that these less obvious motives may have provided an equally important motivation for choosing these places as a focus for activities relating to the disposal of the dead.

vi. Insertions in Bronze Age funerary monuments

Though insertions of marine residues in chambered tombs generally appear to be mixed and en-masse, and not definable by terms such as 'grave goods', there is a case to be made for the opposite occurring in relation to Bronze Age funerary activity. In region C there are several occurrences of marine shells within Bronze Age funerary contexts. In two instances at least, marine shells appear only as single valves. The valve of a mussel, along with cremated bone and several flints, was found in a cist in a cairn at Inverlael, Wester Ross (Cree 1914). Similarly, at Sithean an Altair, Lewis, an oyster valve was deposited in a cist (Beveridge 1911). In a cist within a small cemetery at Clachbreck a number of cockle shells were found to accompany a food vessel inhumation: these were interpreted by the excavator as a shell necklace, though there is no mention of perforations in the shells (Campbell 1963, 8).

These single insertions contrast with other Bronze Age funerary sites where, as in the Neolithic, marine shells were deposited in greater quantities, usually within or beneath the cairn rather than in the cist. At Sheildaig, Wester Ross, a number of marine shells, including oyster, mussel, winkle and limpet, were recovered. Though the unpublished interim report (Hedges 1978) makes the relationships far from clear, these shells, associated with a small quantity of burnt bone, appears to have been deposited upon or within a layer of redeposited beach material, upon which the kerb cairn was constructed and within which shallow grave pits were scooped. A similar type of deposit appears to have been identified within a cairn at Nev Hill, South Ronaldsay, Orkney (Orkney SMR).

There is a fundamental difference between these two types of deposit: one representing single or limited insertions into cists with human remains, while the other represents more substantial deposits not necessarily associated with human remains but related to the construction of the funerary monument. Material deposited with burials is usually termed 'grave goods', with relatively little thought being given to the motives for their deposition. Artefacts of apparently intrinsic value, such as carefully crafted arrowheads, metalwork etc, are more readily explained through their association with rank and status. However, the motives behind more mundane inclusions, such as coarse stone tools, flint flakes and even marine shells are a little more difficult to interpret. A number of possible explanations may be applied to this material, ranging from their association with the deceased in life, perhaps even representing visual puns on names or physical characteristics (Samson 1992, Pollard in press). Single shells may also have served as a reference to the environment from which they had been removed, and as such symbolised liminality and transformation as previously discussed.

The potential of seaweed as a source of fuel should not be overlooked, and recently it has been positively identified as a component of cramp recovered from hearths in the settlement site of Barnhouse (Stapleton and Bowman 1993). Another use for seaweed has direct implications for the discussion of Bronze Age funerary activity. Examination of cramp recovered from the pyre material which covered burnt bone in the Mousland cairn cist (Downes forthcoming) has established that seaweed had been used as a fuel in the cremation of the corpse (it is noteworthy that this deposit was topped by a layer of burnt stone, thus establishing a direct 'ritual' context for what elsewhere might be described as burnt mound material). What this use of seaweed, collected from the littoral, establishes is a direct association between what has been suggested to represent a liminal zone and the transformation of human remains.

vi. Settlement sites

It was proposed in the foregoing sections that material which was deposited on settlement sites was later reworked into monuments which are generally seen as relating to 'ritual' activities, and has thus been characterised as type IV deposits in this work. Much of this ritual activity has been associated with the dead and their disposal. However, as has been suggested in the case of the Obanian shell middens and chambered tombs, ritual activity, even when it includes the use of human remains, need not relate just to funerary activity (the disposal of the dead) but may be more concerned with maintaining relationships between the living, while also reinforcing their place within the environment and access to its resources.

That depositional practices may have operated within more subtle agendas, which may have included an element of what can be described as ritual, can also be suggested for categories of deposit which would not readily be defined as class IV. These include certain deposits related to settlement sites (class III) which in the past have generally been ignored or written off as straightforward 'midden' or 'refuse' deposits.

The present writer is not the first to suggest that deposits which include domestic refuse may have had some sort of ritual or symbolic connotation. It has previously been suggested that the midden deposits, which served an almost architectural function at Skara Brae, may have held "a symbolic meaning for the people. It may have seemed to them a physical sign of the strong sense of identity within their community, binding them together, fixing their boundaries: in here we live - out there is the rest of the world" (Clarke 1989, 14).

Settlement sites which manifest themselves as substantial structures were usually occupied over protracted periods of time. An obvious result of this long-term activity was the build-up of considerable deposits of midden material, which in many cases included the residues of marine resources. It should then come as no surprise that this material became integrated within the make-up of these settlements. Clarke has suggested that this integration may have been carried out with the intention of creating symbolic demarcation between the cultural environment and the natural world within which it exists, a suggestion which fits well with Hodder's idea of the domus and agrios (1990)

Though the present author does not intend to deny that there is some validity in the proposed natural/cultural model it is thought that it represents only one aspect of any ritually oriented or symbolically based role which may be ascribed to the redeposition of midden material. It has already been proposed that at least some of the deposits identified in Neolithic chambered tombs may themselves represent the redeposition of midden material. Though some of the residues which made up these deposits represented resources which had been exploited from the natural environment, it was also suggested that experiences related to memory, continuity and time were also embedded within this ritual practice. These aspects may also have motivated depositional practices related to midden material in the later period.

A consistent feature of broch sites appears to be the use of midden material, in the form of animal bones, marine shells and other materials, as a means of filling the wall cores created through the use of dry-stone building techniques. In the past this material has been somewhat overlooked by archaeologists, who have been more concerned with the height and thickness of the walls than the old rubbish which appears to have been integrated within them. More recent excavations have noted the presence of this material. At Crosskirk Fairhurst noted that the core of the broch wall was "filled with anything available - boulder clay, rubble, slabs domestic refuse and even rounded boulders" (1984, 41). It was also realised that bones of domestic animals and marine shells related to collapsed wall slabs had fallen from the wall core into the interior of the broch. At Bu Hedges noted that the spaces within the outer broch wall was filled with material such as burnt stones and ashes (1987). Similarly at Dun Mor Vaul the outer boundary wall was found to include a core of redeposited midden material (MacKie 1974).

The supervised clearance of rubble from the interior of the Dunbeath broch in Caithness, revealed that the wall contained a variety of animal bones, including cattle, deer, horse birds and fish, as well as marine shells (Banks 1990). Not too far from this site it was noticed by Curle that marine shells had been incorporated into the rear wall of the wag of Forse (1948), with similar deposits also underlying the wall.

There is also evidence for this incorporation of midden material within structures located away from region D. In region A the small dun at Mochrum was found to contain marine shells within the core of the wall and the section drawing also shows a deposit of ash (fig.31). It was also noted marine shells underlay the paving within the structure while also extending underneath the wall (Fiddes, 1952, 151). A similar pattern of redeposition seems to have occurred at the fort at Little Dunagoil on Bute. Here marine shells were found to be incorporated within the rampart of the fort (Marshall 1964).

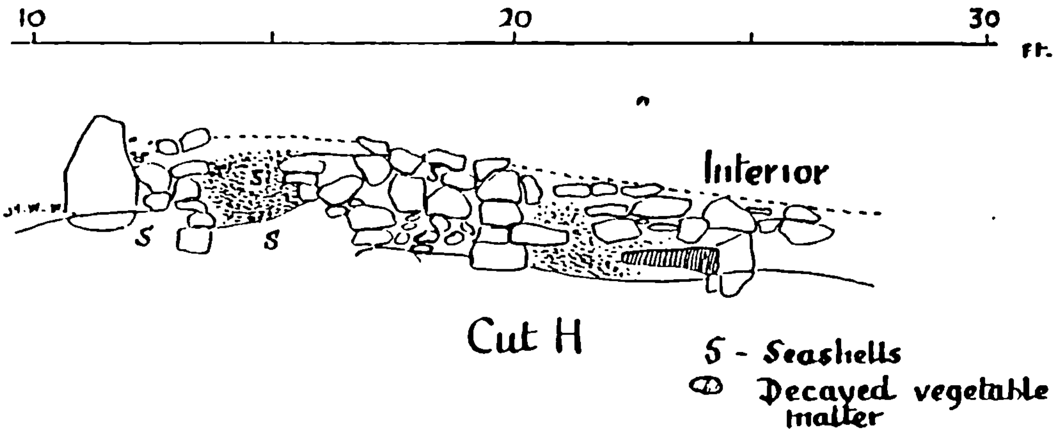


fig 31. Section through wall at Mochrum showing deposit of marine shells in core (from Fiddes 1952).

There has been little attempt to explain the presence of this material, beyond the pragmatic need to provide a filling for hollow walls. This perception is perhaps best summed up by Fairhurst's statement that the broch builders used "anything available" (1984, 41). The presence of similar components within the walls of the Knap of Howar structures prompted the excavator to suggest that this may have been a phenomenon peculiar to Orkney (Ritchie 1983, 58). Whether or not this is true for Neolithic Orkney is impossible to say, considering the lack of upstanding Neolithic structures outside Orkney. However, the evidence clearly demonstrates that in the later period at least the practice is by no means limited to Orkney.

What can be suggested is that though this context of deposition was maintained into the later period the motives behind this activity may have changed somewhat. One of the themes which does appear to have been maintained is that of continuity and memory, with material related to past practice being re-used to reinforce people's sense of place and belonging. However, it can also be suggested that the construction of settlements as substantial as brochs may represent a distinct shift, between the Neolithic and the Iron Age, in the way that social relations were established and maintained. Though the settlement at Skara Brae represents a considerable input of labour and time it is constituted from a series of individual structures bonded in nuclear form. It would not be beyond the capabilities of an extended family group to construct one of these houses with only limited help from those outside the group. It is likely that assistance was available from others within the settlement, with the physical bonding of houses suggesting a close-knit community; the integration of midden deposits created by their ancestors or themselves in the past perhaps strengthened this sense of community and its place in the world. However, brochs stand in some contrast to this, representing, in some cases at least, isolated structures of impressive proportions, the construction of which would be well beyond the capabilites of a single family group, even with limited assistance from neighbours. It can be argued that even when these structures are accompanied by external settlements their size and architectural form, the latter of which restrict and control access, still serve to isolate them (Foster 1989). The following discussion will further expand upon the nature of social orginisation and the role played by midden material redeposited in brochs and other Iron Age structures.

People living on sites which had been occupied for a long period of time could not have helped but be aware of the activities of those who had gone before them. Any modification to the cultural environment within which they lived, be it the sinking of a stone-lined trough into the floor of the broch, or the burial of the dead outside the broch, would have revealed deposits laid down by their forebears. Sites such as Crosskirk broch, Caithness, Bu broch, Orkney and Dun Mor Vaul, Tiree have all demonstrated that earlier deposits were cut or disturbed by later modification. Though it is not suggested that this material was regarded in the same way as we view archaeology, it is likely that a sense of continuity and time, if not history, may have been apparent to those coming across these deposits.

It was noted in the previous chapter that some sites appear to develop into long-term substantial settlements while others may remain a focus for activity but do not develop into brochs, duns or wheelhouses. Explaining why some sites do and some sites don't develop is very difficult. However, one feature common to many of these substantial settlements appears to be this integration of the residues of past practices within the structures which provide a focus for present activity. If any attempt is to made to understand the motives behind this integration it is essential that we fully consider the context of deposition.

The presence of midden material within wall cores strongly suggests that it was placed there during the construction of the building. The construction of substantial settlements such as brochs would require the ability to mobilise a considerable labour force. Barrett has suggested that this ability is indicative of the dominance of one group over another, with the provision of labour perhaps representing a form of tribute (1981, 215). The redeposition of midden material during the construction of the broch may have played an active role in the negotiation of social relations between these two groups: the dominant group responsible for the mobilization of this labour and those carrying out the work.

It is suggested here that this redeposition of midden material, which was previously deposited on the site of broch construction, engendered it with a dual symbolism. In the first instance the midden material can be taken as symbolic of continuity and tradition, having built up over time through repeated acts of deposition. However, on the other hand, it is also the result of processes of change and transformation, with raw materials, plants and animals being transformed into artefacts and food prior to the deposition of their residues as midden material. The juxtaposition of these two metaphors, continuity and change, would serve to legitimate the dominance of one group over another. This social order would require constant reinforcement, a function which the broch itself would serve as a structuring agent on its completion (Barrett ibid). During construction the movement of midden material, laid down over time on the site by the dominant group, and its integration within the wall core would serve to make their presence on the site appear as part of the natural order of things. However, the construction of the broch did mark a dramatic change in the nature of the settlement on the site, perhaps being preceded by timber houses, such as suggested at Dun Mor Vaul and Clickhimin. It is here that the metaphor of transformation came into play, reflecting this change but also binding this with tradition, thus permitting this change to be negotiated without conflict or question.

As noted above identifying the reasons for the changes which brought about the construction of brochs or other changes in the nature of settlement structures are difficult to identify. In the past archaeologists looked to population movements to explain these changes, with incomers from southern England being responsible for the brochs (e.g. MacKie 1974, 6). Though these ideas have now been abandoned population movement may have had some part to play albiet on a more local level, with climatic deterioration, evidenced by the abandonment of upland settlements such as Scourd of Brouster, placing increased pressure on coastal locations (cf. Hamilton 1968). It is here that the movement of midden material from previous sites of occupation may have served to establish a sense of place in a new location. However, it is unlikely that climatic deterioration alone was responsible for these changes and Barrett has suggested that this "increasingly infilled landscape of settlement", brought about through dynamic social processes such as competition, kinship, inheritance and social debt (Barrett 1981, 214).

Though general patterns are again difficult to identify it is notable that these substantial complexes do appear to be confined to areas in the north of Scotland where securing access to limited parcels of arable land would be an important concern. In places where this pressure is not so apparent, as in eastern and southern Scotland there is less evidence for this process of residue incorporation and a general absence of the substantial structures within which it was incorporated. However, it is again important to stress that the settlement record in the north is peculiar in that so much has been preserved. In places where timber, rather than stone, was more likely to be used in building construction the evidence for settlement is not so apparent.

As the reincorporation of midden material suggests sites often remain a focus for activity for some considerable time. However, this activity may be discontinuous and not always related to their original function as settlements. It is not unknown for Viking burials to be found in the top of previously abandoned settlements, like those represented by the mounds created by denuded buildings at Buckouy, Orkney, and broch mounds such as Gurness, Orkney. More relevant to the present study is the insertion of two Iron Age long cists onto midden deposits at Galson, Lewis (region C). Here, the cists had been cut through a deposit of blown sand, with a former occupation surface containing shells and pot sherds being utilised as the cist floor (Ponting 1989). It is intriguing to postulate whether those responsible for these insertions were aware of the presence of these features, and if so, how? Were they observable in section or were they remembered? One of the cists contained not only a human skeleton, but also a deliberate deposit of marine shells, pot sherds, burnt and unburnt bone, cramp and pebbles. The broken nature of the pottery and the shells again points away from the idea of food or offerings and bears some similarity in form, and perhaps motive, to those deposits discussed in the earlier part of this chapter

It also pertinent to remember that the position of the site by the sea, if indeed it was in close proximity during the Iron Age, may have provided an added incentive for the placement of burials. The liminal status of coastlines has already been discussed and if perceived as such beach locations may have regarded as an ideal spot for the disposal of the dead. This is certainly a pattern which is followed elsewhere in Scotland with sites such as Rosinish, South Uist (region C); Hermisgarth, in Orkney (region D); Gullane, North Berwick and West Links, Archerfield (region E), all bearing witness to either Bronze Age or Iron Age funerary activity in close proximity to the shore. Though liminality may have figured in the placement of human remains in the Obanian shell middens it is not necessary to see this as detracting from the other depositional motives suggested in chapter 8.

Overtly ritual monuments dating from the Iron Age are conspicuous by their absence in Scotland. This apparent absence of ritual activity may be due to the fact that much of it was centred around the domestic sites of the period. The purposeful deposition of animal bones in pits cut into the floor of the wheel house at Sollas, North Uist, apparently prior to the occupation of the house, has already been noted. Although the ritual nature of midden material redeposited in contexts such as wall cores may not have been overt, it is likely that it played an almost subliminal role in a series of embedded processes which included the use of architecture and ordering of space and served to structure and maintain social relations between people using these structures (Barrett 1982).

viii. Conclusion

It has been established that the unconsidered use of terms such as 'refuse' and 'midden' may serve only to straight-jacket the discussion of marine exploitation and its role in early prehistoric society in Scotland. The recognition of this factor has hopefully permitted a fresh insight into the material and its ramifications which transcends simple statements about the nature of resources exploited and the means used to achieve that exploitation.

It has been suggested that the material residues of marine exploitation may have played an important part in ordering and maintaining human-environment relations. The use of marine resources in ritual activity clearly indicates that this material was considered in terms which transcend its primary function as a dietary component within a broader subsistence strategy, though it cannot be denied that these more pragmatic considerations served as the impetus for a variety of complex secondary processes of which ritual activity is only one element. The deposition of these residues on ritual sites such as chambered tombs and the placement of human remains within marine deposits represents only the most obvious of these processes.

The process of history is dynamic, inevitably involving both cultural and environmental change. Marine resources have served as a means of both negotiating a series of transformations which included the adaptation to, rather than the adoption of, agricultural practice and the broadening of the subsistence spectrum to include the exploitation of new resources within new environments. Marine resources and their material residues were utilised as an analogy for this process of change and were the vehicle through which human-environment relationships were re-negotiated and alternative modes of subsistence established. This process includes the use of marine residues in agricultural practice such as fertilisation, and the use of these same resources in the manufacture of material culture, such as the use of marine shells as temper in pottery.

As noted in the previous chapter the over-riding impression is of a general shift away from the immediate shore with less time spent within or near the littoral. Processing and consumption on shell middens is replaced by movement of resources to the settlements proper, where they become integrated with the fruits of land-based labours such as agriculture. However, it is difficult to identify change on a chronological or geographical scale, with this shift apparent as early as the Neolithic in Orkney but elsewhere not apparent until the Bronze Age.

What is apparent is that the littoral represents a zone of transition and transformation and shell middens, which exist in or near this zone, can be seen as a metaphor for those processes of transition and transformation which accompanied culture change in prehistoric Scotland.

Chapter 11

All at sea: a conclusion

This work has utilised an essentially contextual approach to consider the implications of marine residues deposited on archaeological sites for our understanding of various aspects of economy and society in prehistoric Scotland. Though consideration of the contexts of depostion from which material has been recovered has played a central role here, it has also been emphasised that the contexts within which the processes of procurement and transformation which preceeded this deposition took place cannot be disregarded if we are to attempt any understanding of this material. This thesis has covered a wide geographical area and spanned a broad chronological scale, a factor which has precluded detailed discussion of all the sites mentioned. However, it is felt that the need for a general overview of this generally ignored but none-the-less important component of the archaeological record in Scotland outweighed the problems inherent in any work of broad scope.

Central to the approach adopted here has been the introduction of a simple system of classification which has served to highlight some of the basic differences apparent in deposits which included marine shells. Once these differences had been identified it was possible to consider some of the reasons for those differences, which in some cases were found to be more apparent than real.

The term 'shell midden' has been widely used to describe archaeological deposits within which marine shells constitute the most obvious component. The term has become something of a catch-all which may suggest not only a specific set of activities but also a particular type of economy, one within which agriculture is either not practiced or is limited by environmental constraints. Closer consideration of the body of material available for Scotland, much of which has been described in the literature as 'shell midden material', has suggested that these assumptions are in fact far too over-simplistic and in the past have achieved little other than to mask a number of complex issues which may have an important role to play in furthering our understanding of settlement and economy in prehistoric Scotland.

General patterns in the material are not easy to identify, a factor which strongly suggests that local conditions, both social and environmental, played an important role in moulding the type and extent of marine exploitation practiced in a given location. Certainly, there is a greater wealth of evidence for marine exploitation in the north of Scotland. However, this may to an extent be due to the higher visibility of sites in this area, many of which are represented by upstanding structures or have been revealed through the active processes of coastal erosion. Despite the strong possibility of bias it does seem fair to suggest that marine exploitation was not carried out to the same degree in places such as the south-east, where access to large tracts of fertile hinterland perhaps reduced the need to exploit the sea. This is not to say that marine exploitation practice did not take place in this area. Indeed, the evidence from the east coast suggests that the major Firths provided an important focus for shellfish exploitation during the early prehistoric period, with the Cromarty Firth, the Firth of Tay and the Firth of Forth all well populated by shell middens, with more constantly being discovered. Reference to the maps in the corpus will highlight this apparent concentration around these areas.

It is also apparent that the sites related to this exploitation on the east coast tend to differ in character somewhat to those on the west. On the east coast early prehistoric shell middens usually manifest themselves as elongated features which extend for some considerable distance along the shore, with the Nether Kinneil site extending well over 150m along the former shoreline (Sloan 1982). In contrast the west coast shell middens tend to be represented by more localised accumulations of shells, which in some cases are physically contained within caves (though caves also feature on the east coast). What this difference means in terms of social behaviour and procurement practice is difficult to say. The presence of extensive banks as opposed to isolated mounds may indicate the exploitation of shellfish beds by larger groups than those responsible for the accumulations of the west coast middens. This may further suggest a degree of communality and social aggregation on the east coast in contrast to greater levels of group independence on the west. The presence of a substantial but little understood stone bank within the Nether Kinneil deposits (Sloan 1982) may represent further evidence for this communal activity, suggesting a considerable input of labour. The use of west coast shell middens as places for burial has been used here to argue for the need for groups to lay claim to resources and the areas from which they were exploited. However, without more detailed analysis into the patterns of depositional behaviour on the Forth Valley sites (with the excavation report on the Nether Kinneil shell midden still to appear) it is not possible to make more definite statements about their depositional histories. It is equally possible that these sites built up as a result of small group activity taking place over a considerable period of time, with middens growing longitudinally along the shoreline. The fact that one end of the Nether Kinneil site has provided older radiocarbon dates than the middle (Sloan 1982) may be suggestive of this lateral accumulation.

Detecting change or variation in the role and character of marine exploitation practice is also fraught by the difficulties created by differential visibility and survival. However, it can be suggested that a contextual overview does suggest one very important difference in the way that marine exploitation operated, on both a practical and social level. Shell middens, as defined in this work, appear to represent an intimate and immediate relationship with the sea, being located very close to, or even within, the littoral. These sites represent an interface between land and sea and as such are a focus for activities related to the transformation of marine resources into food, and both terrestrial and marine materials into elements of material culture. There is a marked contrast between these shell middens and the presence of marine resources on substantial settlement sites. The presence of marine shells on these sites appears to suggest that it is the settlement and not the shore which is the focus for activities related to processing and consumption: these processes of transformation. However, closer analysis of marine shell deposits on settlement sites has suggested that there were times when the resources were deposited in greater numbers and so may have represented an increased importance on their procurement and consumption, though this still appears to have taken place within the settlement. These are simple observations and not meant to be taken as universal rules - it is not possible to say for certain that marine shells on settlement sites mean that shell middens were not used. If this was the case, however, then there is an important difference here. The presence of marine shells in close proximity to the shore suggests one of two things:

a) shellfish were consumed on the shore and not transported to settlements further inland.

b) If shellfish were moved inland they were taken there without their shells, after being processed.

Whatever the case it is possible to suggest that a shell midden indicates that shellfish were not transported to inland settlements in their raw state, with shells intact. The settlement is therefore removed from the littoral not only by distance, which may not be considerable, but also by the transforming mechanism of resource processing. This was carried out within or very close to the environment from which marine resources were obtained, with shell middens representing the place at which the transformation from natural animal to cultured food took place.

This picture contrasts with that suggested by the presence of marine shells on settlement sites. Here processing was not confined to the shore but was carried out within the settlement itself, with marine shells very often being located with dwelling structures. This difference may indicate an important contrast in the way that people regarded the sea and its resources. Though the deposition of marine shells on substantial settlement sites may at first appear to indicate a separation from the marine environment, with the focus centred on the settlement itself, on another level it suggests the desire to integrate resources removed from one environment into activities taking place in another. Hodder's concept of the domus and agrios (1990) was noted earlier with reference to the integration of natural and wild resources within the socially constructed space of the settlement. However, what is also apparent here is a complex interplay between not only the wild and domestic, inside and outside but also land and sea, wet and dry.

When looked at in this light the shell midden, which through its presence within or very close to the littoral superficially suggests an intimate relationship with the marine environment, is also suggestive of a distinction between land and sea and what these domains mean to people. The shell midden appears to mediate between the two environments, representing a liminal zone which is neither land nor sea but a staging point between the two.

It is possible then through alternative readings of the material to identify a number patterns in the way that sites and materials were being used. Marine shells on settlements can, on one level, suggest removal from the domain of the sea. But on another they are perhaps indicative of a desire to integrate material of an overtly marine nature within the terrestrial and social environment. In a similar vein the apparent focus on the coast and the shore suggested by shell middens may in fact represent a quite distinct culturally expressed separation of the land from the sea, with anything coming from the sea being transformed at the shell midden prior to its removal into the terrestrial zone. Likewise, terrestrial raw materials such as deer bone used in the production of marine procurement equipment is also transformed on the shell midden through the process of manufacture.

It has been suggested elsewhere that economic practice can only be understood by reference to the non-economic (Tilley 1981). This was clearly established through the consideration of shell middens as funerary sites, with the placement of human remains being indicative of the need to secure access to resources. However, having completed this work it is very apparent that separating the non-economic from the economic in prehistoric Scotland is very difficult.

Much of the writer's initial interpretation of the material studied in this work was essentially functionalist, with the availability of resources and access to the resource-base regarded as the primary motivation for ritual activity being carried out on sites concerned with marine exploitation. However, what has become more apparent is that a different, but equally important, suite of motivations also had a role to play here. If the littoral is, and was, seen as a liminal zone and it is accepted that coastal environments play a part in the formation of cosmologies and world views then it is no longer possible to separate economic and ritual processes. Both of these aspects of social behaviour are intimately bound up with one another and consideration of one without recourse to the other is to see less than half the picture.

It has been established that there is a lot more to marine exploitation than shell middens but it has also been demonstrated that there is lot more to shell middens than limpets and barbed points. The shortcomings of past approaches to shell middens were recently articulated by the reviewer of a book entitled: Deciphering a shell midden (Stein 1992). The reviewer of that book states: "We are not told what is special about a shell midden, why we should go to such lengths to decipher them and what it all means in terms of past human activity" (Bell 1994). It is hoped that this thesis has succeeded where Bell felt Stein to have failed.

On the beach
Our shells are left behind,
like a library,
like a memory
of our gost-written lives.

from *Shell* by Peter Hammill

Appendix

Corpus of prehistoric sites with evidence for marine exploitation

Some notes on the corpus

The corpus is designed to present basic information related to sites which have provided clear evidence for marine exploitation. The majority (see below) of sites noted in the corpus are displayed on the map sheets displayed in this appendix and in the body of the text.

Information in the corpus is displayed as follows:

Column 1, area/no: refers to the reference number given to the site, which is a letter for the region (A,B,C,D or E) followed by a number for site designation.

Column 2, site name: lists the name by which the site is most commonly known (eg MacArthur Cave).

Column 3, locality: general location of the site. This may be an island or parish, or in the case of sites such as the Oban caves, the name of the town.

Column 4, site type: assigns the site to its classificatory group - see introduction to classifaction later in this chapter.

Column 5, NGR: national grid reference, 8 figure where possible.

Column 6, description: brief description of the nature of the site and deposits.

Column 7, exc': indicates whther or not the site has been excavated (X ; affirmative, empty box negative).

Column 8, year: year in which excavation, if any, took place.

Column 9, period: period to which the site belongs. Abbreviations as follows:
Meso = Mesolithic, Neo = Neolithic, Bro = Bronze Age, IrA = Iron Age. Suffix < or > indicates possibility of earlier or later material.

Column 10, sh: presence or absence of marine shells (X affirmative, empty box negative).

Column 11, fi: presence or absence of fish (X affirmative, empty box negative).

Column 12, mm: presence or absence of marine mammals (X affirmative, empty box negative).

Column 13, mb: presence or absence of marine birds (X affirmative, empty box negative).

Column 14, tw: presence or absence of terrestrial wild animals (X affirmative, empty box negative, ? indicates animal bones recorded but not speciated).

Column 15, td: presence or absence of terrestrial domestic animals (X affirmative, empty box negative, ? indicates animal bones recorded but not speciated).

Column 16, cg: presence or absence of cereal grains (X affirmative, empty box negative).

Column 17, m: presence or absence of metalwork (X affirmative, empty box negative).

Column 18, li: presence or absence of lithic artefacts (eg flint or chert).

Column 19, ap: agricultural procurement or processing equipment (sickles, querns etc).

Column 20, po: presence or absence of pottery (X affirmative, empty box negative).

Column 21, hr: presence or absence of human remains (X affirmative, empty box negative).

Column 22, references: lists main references or source of information - full citations provided in main bibliography.

Omissions

While every effort has been made to make this corpus as complete as possible there are some gaps in the information provided. National Grid References have been given where possible. However, many of the site records and reports consulted in this work were published prior to the introduction of the NGR system of map location and so it has not been possible to provide the relevant NGR. For this reason not all sites listed in the corpus have been included on the map sheets, though in the case of Orkney the decision was taken to display only sites mentioned in the text as they are so many in number.

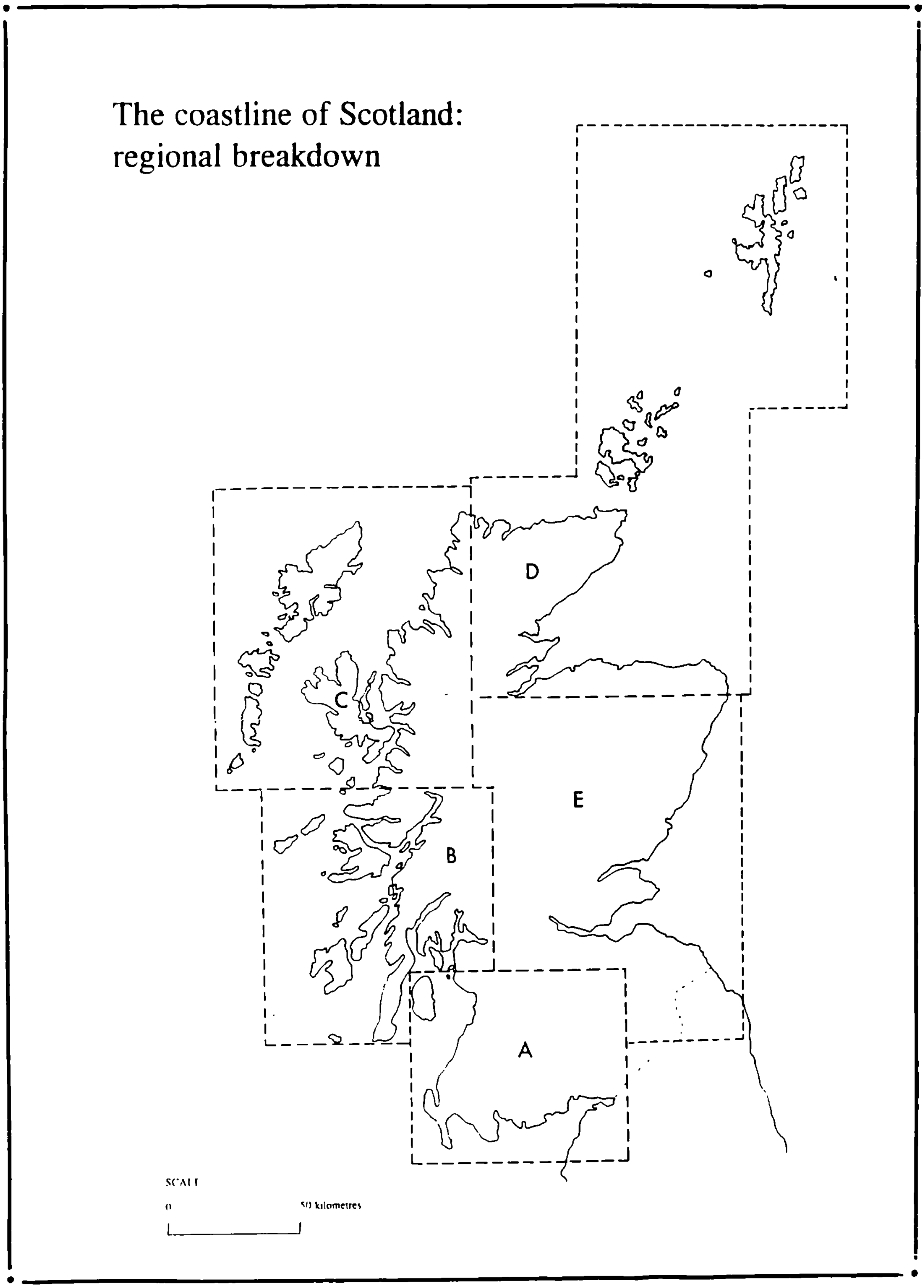


fig. 33. The coastline of Scotland

Corpus of sites with evidence for marine exploitation

no/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	tw	ld	cg	mp	tp	m	li	ap	po	hr	references
A/1	Torlin	Arran	IV?	NR955211	chmb. tmb. fish. animal. ?natrual	X	1891	Neo		X												X	Bryce 1902
A/2	Ardrossan	Ayrshire	II	NSc.238422	shell midden.	X	1890s	Meso>	X	X		X	X	X				X			X	X	Smith
A/3	Ashgrove Loch	Ayrshire	IIIb	NSc.276443	crannog with external midden	X	1890s	Iron Age	X	X			X	X		X				X			Smith 1895
A/4	Brequrd Point	Ayrshire	I	NSc.1751	cave, 3 layers shells, pot	X	1879	Iron Age>	X				X	X					X			X	Cochran-Patrick 1879
A/5	Carrick	Ayrshire	II		shell mound	X	1890s	Iron Age?	X				?	?							X		Smith 1895
A/6	Cleaves Cave	Ayrshire	I		cave, shells not noted	X		Iron Age?	?	?	X	?	?	?									Smith 1895
A/7	Donnan	Ayrshire	IV?	NXc.071807	burials beneath shells	X		Meso?	X													X	Smith 1895
A/8	Kirkoswald	Ayrshire	II?		possible shell middens				?														NSA Smith 1895
A/9	Lochlee/Tarbolton	Ayrshire	III	NSc.4227	crannog, single mussel	X	1878	Iron Age?	X				X	X			X	X	X	X	X		Munro 1879
A/10	Lochspouts	Ayrshire	IIIb	NS28750585	crannog with external midden	X	1890s	Iron Age?	X	?											X		Smith 1895
A/11	Shanter Knowe	Ayrshire	I?	NS219074	Possible shell midden	X	189?		X	X	X	X	X	X									Marquis of Ailsa 1893, Smith 1895
A/12	Shell Knowe	Ayrshire	II?	NXc.073825	name - possible shell midden	?																	Smith 1895
A/13	Shewallon	Ayrshire	artefact	NSc.3733	antler barbed point			Meso?									X						Lacaille 1939
A/14	West Kilbride	Ayrshire	II	NSc.1947	shell midden	X			X														Smith 1895
A/15	Kirkburn/Lockerbie	Dumfriesshire	IV	NY12908300	cremations, cockle frag. in pit	X	1963	Neo-Bro	X												X	X	Cormack 1963
A/16	Cairnholy	Galloway	IV	NX517539	cham.tmb. with shell deposits	X	1948	Neo	X												X	X	Piggott 1949
A/17	Borness Cave	Kirkubright	I	NX62084466	Cave, shells, anim. metal etc	X	1870s	Iron Age	X	X			X	X	X	X					X	X	Corrie, Clark and Hunt 1874, Clark 1875, 1878
A/18	Hestan Island	Kirkubright	I	NXc.839504	oyster midden			Meso-Neo?	X														Truckell 1962
A/19	Torrs Cave	Kirkubright	I	NX67674459	cave, shells	X		Iron Age	X														Morris 1937
A/20	CairnRyan Cave	Wigtownshire	I	NXc.067685	cave, shells, worked bones	X	1927	Neo>?	X				X	X					X				Gregory et a 1930
A/21	Corsewell House	Wigtownshire	I	NWc.9872	rock shelter, oyster midden	X	1927		X				X	X					X				Gregory et al 1930
A/22	Chippermore Farm	Wigtownshire	III	NX29354850	dun, shells in floor and in walls	X	1952	Iron Age?	X												X		Fiddes 1952
A/23	Garheugh/Mochrum	Wigtownshire	I	NXc.2650	midden deposit in front of cave	X	1880?		?														Wilson 1881
A/24	Glenluce	Wigtownshire	artefact	NXc.1856	bronze fish hooks (2)			Bro?									X						Wilson 1881
A/25	Ouchtrimakain Cave	Wigtownshire	I	NXc.9856	cave, shells, animal bone	X	1927		X				X	X									Gregory et al 1930
A/26	St Medan's Cave	Wigtownshire	I	NX14373159	cave, with internal walls				?														Gregory et al 1930
A/27	St Ninlron Agen's Cave	Wigtownshire	I	NX3441	cave, shells, structures, crosses	X	1880s	'on Age-pos	X													X	Maxwell 1885, 1887
A/28	Stranraer	Wigtownshire	II	NX06276040	Shell midden with oysters				X										X				DES 1969, p41
A/29	Teroy	Wigtownshire	III	NX091641	broch with shells	X	?	Iron Age	X					X									Curle 1912
A/30	Russell Cave/L.Cumbrae	Buteshire	I	NS14205075	cave, shells, bones	X	1930s	Meso?	X				X	X									Marshall 1938, Lacaille 1954
B/1	Cladh Aindreis	Ardnamurchan	IV	NM547707	chmb tmb, shells in rabbit scrapes			Meso/Neo?	X														Henshall 1972
B/2	Bruach na Maorach	Arnamurchan	II?	NM646676	poss' former midden, flints			Meso?	?														NMRS
B/3	Risga	Ardnamurchan	II?	NM611599	shell midden	X	1921/2	Meso-Neo	X	X	X	X	X			X	X		X			X	Lacaille 1951
B/4	Sanna Broy	Ardnamurchan	II		shell middens			Neo-Bro?															Lacaille 1954
B/5	Crarae	Argyll	IV	NR987973	Chmb. tmb. shells chamb & ext.	X	1960	Neo	X				X				X				X	X	Scott 1961
B/6	Clachbreck/S.Knapdale	Argyll	IV	NR765760	cist with food vessel and cockles	X	1963	Bro	X												X	X	DES 1963
B/7	Crarae/Fairy Knowe	Argyll	II-IV	NR98759735	Bro cairn over shell midden	X	1923	Neo/Bro	X				X	X								X	Scott 1961

no/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	tw	ld	cq	mp	tp	m	li	ap	po	hr	references
B/8	Crinan/river Add	Argyll	I	NR799937	Cave with shells and burials	X		Bro ?	X					X									Mapleton 1881
B/9	Dungallon/Sunart	Argyll	II?	NM647600	kitchen midden				?				?	?									Thornber, DES 1974, p19
B/10	EileanOna/Craignish	Argyll	I	NM764022	r-shelter, shells, possible seal b				X		?												DES 1992, p60
B/11	Duntroon/Kilmartin	Argyll	I	NR80049587	Cave with shell deposits	X		Meso-Neo?	X										X				Mapleton 1873
B/12	Dumbuck/DumBrorton	Argyll	II		Crannog, shells,	X	1890s	Iron Age	X														Bruce 1900
B/13	Eilean Ona/Craignish	Argyll	I	NM764022	r-shelter, shell midden, poss seal				X		?												McVean, DES 1992, p60
B/14	Ellary boulder Cave	Argyll	I	NR73937650	rock shelt, shells, pottery	X	1988	Neo/Bro	X	?	?		?				X						Smith 1988
B/15	Kintraw	Argyll	V?	NM83004	shells beneath B.A. cairn	X	1966	Bro	X					X								X	Simpson 1967
B/17	Port Ann	Argyll	I	NR911864	shell mounds on 25' beach			Meso?	X														Campbell and Sanaeman 1962
B/18	Shuna	Argyll	I	NM91474968	r-shelter, shell refuse, scrapers	X	1958	Meso?	X				?						X				Coles 1958, NMRS
B/19	Tinkler's Cave	Argyll	I		cave with beaker deposits			Neo-Bro	X										X		X		Smith 1989
B/20	Clachan Ard	Bute	III	NS035580	fort with midden deposits	X		Iron Age	X				?	?						X	X		Marshall 1964
B/21	Dunagoil Cave	Bute	I	NS08415312	cave with shell and bone deposits	X	1933	Bro-Iron Ag	X	X			X	X				X			X		Marshall 1934
B/22	Dunagoil fort	Bute	III	NS084553	fort with bones and shells	X	1933	Iron Age	X				?	?							X		Marshall 1915
B/23	Glecknabae	Bute	II	NS688003	shell midden beneath chm.tmb.	X	1904	Meso/Neo?	X				X	?									Bryce 1904
B/24	Little Dunagoil	Bute	III	NS08655330	fort with shell refuse in rampart	X	1960	Iron Age	X				?	?						X	X		Marshall 1964
B/25	Farland Hill/G. Cumbrae	Buteshire	I	NS17275450	cave, shell deposits, lignite	X	1930s		X				?	?									Marshall 1938, Lacaille 1954
B/26	Sorrisdale	Coll	IIIb		Struct. Beaker, midd. burial	X	1976	Neo/Bro	X												X	X	Ritchie etal 1978
B/27	Loch Eatharna	Coll	III	NM399189	3 hut cirlces with midden deposit	X	1910	Iron Age?	X	X			?	?							X		Beveridge 1911, RCAHMS 1980
B/28	no name	Coll	III		midden deposits and strctures			Iron Age	X				?	?					X	X			Ross 1881
B/29	Port Aoir	Coll	II?	NM151525	possible shell midden site			Iron Age?	?														Davies 1971
B/30	Crystal Spring Cave	Colonsay	I	NR39599792	Cave with shells and bones				X				?	?									Stevenson 1881, Grieve 1883
B/31	Ardnave	Islay	III	NRc.2974	stone dwelling with midden deposit	X	1982	Bro	X		X		X	X					X		X		Ritchie and Welfare 1983
B/32	Kilchoman	Islay	I	NR22006353	cave shell deposits	X	1950s		X										X				PSAS 1961
B/33	Uamh phort luinge	Islay	I	NRc.438474	polish. st. axe, arrow hd. etc			Neolithic	X				?	?			X		X				Mitchell 1898
B/34	Port a' Chotain	Islay	I	NR397836	cave, shell deposits-historic	X	1974	18th c	X				X	X									MacKie 1974
B/35	Sanaigmore	Islay	III	NR236709	settlement, burIron Agels, shells, pot			Iron Age?	X				?	?				X	X		X	X	Pellenberg and Booth DES 1974, p11
B/36	Sanaigmore	Islay	III	NR242712	sand dunes, shells, flints, walls			Iron Age?	X				X	X				X			X		Pellenberg and Booth DES 1974, p11
B/37	Keil Cave	Kintyre	I	NR67150775	cave, shells, metal working	X	1933-35	Iron Age	X				X	X									Ritchie 1967
B/38	Kildonan	Kintyre	III	NR781278	midden material from dun	X	1938?	Iron Age	X				X	X				X			X		Fairhurst 1939
B/39	Millknowe/Campbeltwn	Kintyre	III?	NRc.7121	Meso flints seal tooth fish	X	1894	Meso		X									X				Gray 1894
B/40	West Loch Tarbert	Argyll	I	NR792599	cave, shell midden				X														Purvis DES 1985, p49
B/41	South fort	Luing	III	NM737067	broch with shells	X	189?	Iron Age	X	X			X	X									MacNaughton 1891 and 1893
B/42	Cardingmill Bay I	Oban	II	NM84742935	shell midden in rock cleft			Meso-Neo											X		X	X	Connack et a 1992
B/43	Cardingmill Bay II	Oban	II		shell midden in rock cleft			Meso-Bro											X		X	X	no ref
B/44	Distillery Cave	Oban	I	NM85953043	cave, shells, hum rems. pottery			Meso-Bro	X				X						X		X	X	Anderson 1895, Lacaille 1954
B/45	Druimvargie rock.sh	Oban	I		cave, shell midden, artefacts			Meso					X						X				Anderson 1898
B/46	Dun an Fheurain	Oban	IIb		midden at base of stack fort	X	various	Iron Age		X											X		Anderson 1895, Ritchie 1971
B/47	Ganavan House	Oban	I	NM85243146	rock shelter, shells, human rems.	X	1906	Meso>?	X				?						X			X	MacDougall 1907
B/48	Gasworks Cave	Oban	I		cave, shells, human rems, pot			Meso-Neo	X				X	?									Turner 1895

no/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	tw	td	cq	mp	lp	m	li	ap	po	hr	references
B/49	MacArthur Cave	Oban	I	NM85953043	'Obanian' type site	X	1895	Meso/Neo	X	X	?			?		X	?						Anderson 1895a
B/50	Mackay's Cave	Oban	I	NM86053005	cave, shells, lithics, hum.rems	X	1869	Meso-Neo	X					X	?				X			X	Anderson 1895a
B/51	North Dunnollie Cave	Oban	I		Cave, shells, emptied for ice house			Meso?	X														NMRS
B/52	Dunollie Cave	Oban	I		*cave below castle, shells, hum rems*			Meso-Neo?	X													X	
B/53	Raschoille Cave	Oban	I	NM855289	*shells, human rems,*	X	1984	Meso/Neo	X	X			?			?	X						Cannock 1985
B/54	Ardantive/Kerrera	Oban	I		rock shelter, shells, food vessel	X		Bro	X										X		X		Lethbridge 1950
B/55	Coisl. nan Gilleanll	Oronsay	II	NR35868000	shell midden	X		Meso														X	Mellars 1987
B/56	Caistal nan Gilleanl	Oronsay	II	NR35828797	shell midden	X		Meso														X	Briel 1922, Grieve 1922, Bishop 1914
B/57	Cnoc Coig	Oronsay	II	NR36058857	shell midden	X		Meso														X	Mellars 1987
B/58	Cnoc Sligeach	Oronsay	II		shell midden	X		Meso														X	Mellars 1987
B/59	W. Priory midden	Oronsay	II	NR347899	shell midden			Meso?	X														Jardine 1971
B/60	S.W. Priory midden	Oronsay	II	NR359888	shell midden			Meso?	X														Jardine 1971
B/61	Brolevuillan	Tiree	II-III?		I.A. hut circle, shell midd.	X	1912	Iron Age	X														Livens 1956, Mackie 1963
B/62	no name	Tiree	II		hut floor in sand dune	X	1905	Bro ?	X												X		Mann 1906
B/63	Dun *Mor Vaul*	*Tiree*	*III*		*broch*, shells, animal bones	X	1973		X	X	X	X	X	X	X	X	X	X	X	X	X	X	MacKay 1974
B/64	Ulva Cave	Ulva	I	NM431384	cave, shells, anim.bones, pot	X	1987	Meso/Neo	X	X	?	X	X								X		Bonsall 1987, 1988, 1989
B/65	Freeland/Millport	Cumbrae	I		cave, midden deposits	X	1930		X	X			X	X									Marshall 1938, Lacaille 1954
B/66	Coll	Coll	III		shell deposits near structures			Iron Age	X				?	?				X			X		Ross 1881
B/67	Port Aoir	Coll	II	NM148550	midden deposit with slag, pot etc			Iron Age?	X				?	?				X	X		X		Davies 1971
B/68	Port Aoir	Coll	II?	NM148552	possible shell midden site			Iron Age?	?														Davies 1971
B/69	Ardmore Point		I	NS315787	rock shelter with shells and bones	X	1958	Iron Age	X				X								X		DES 1958 p21
C/1	Allasdale	Brorra	III		Wheelhouse with shell refuse	X		Iron Age	X		X		X	X						X	X		Young 1953
C/2	Dun Cuier	Brorra	III		Dun with shells in inter mural	X		Iron Age	X		X												Young 1956
C/3	Eoligarry	Brorra	?	NF705070	blown sand, patches of midden			Iron Age?	X				?	?				X			X		Davies 1971
C/4	Mingulay	Brorra	IIorIII?	NL5634	spread of shell, bones, pot			Iron Age	X				?	?					X		X		
C/5	no name	Brorra	III	NF657032	midden material with structures			Iron Age?	X	X			?	?				X	X		X		Davies 1971
C/6	no name	Brorra	III?	NF659031	midden material with structures			Iron Age?	X				?	?				X	X				Davies 1971
C/7	Uamh an Duin	Brorra	I	NF69560798	cave, peat ash and shell debris				X														Young 1958
C/8	Vaslain	Brorra	IIorIII?	NF693057	4 hearths, burnt shell, bone, pot			Iron Age	X				?	?				X	X		X		
C/9	Ensay	Harris	*II or III?*	NF973867	beaker midden, knapping debirs			Bro	X				X	?					X		X		
C/10	Northton	Harris	III	NF9890	beaker settlement	X		Neo-bro	X	X		X	X	X					X		X		1928 RCAHMS Inventory
C/11	Paible/Taransay	Harris	III	NBc.033992	earth hse. with midden			Iron Age	X				?	?									1928 RCAHMS Inventory
C/12	Undesignated																						
C/13	Sheabie	Harris	III?	NF896800	shell deposits, earth hse near			Iron Age	X				?	?									1928 RCAHMS Inventory
C/15	Traigh na Berie	Harris	II & III?		shell deposits, hut circles			Iron Age?	X				?	?							X		1928 RCAHMS Inventory Stevenson 1972
C/16	Aignish	Lewis	II?		midden deposit	X	193?	Iron Age	X	X	X		X	X							X		Gibson 1933, Curwen 1939
C/17	Brorvas	Lewis	III	NB348518	structure, midden, crouched inhu			Bro	X				?	?					X		X	X	Cowie et al DES 1986, p52-53
C/18	Bosta/Uig	Lewis	III	NB137401	beaker midden, structure	X?		Bro	X				?	?							X		Smith DES 1989
C/19	Cnip	Lewis	III	NB09753665	settlement, midden deposits	X																	
C/20	Dun Brorabhat	Lewis	III	NB098353	Island broch, underwater midden	X	1985	Iron Age	X				?	?									Harding and Topping DES 1985

no/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	lw	ld	cq	mp	lp	m	li	op	po	hr	references
C/21	Golson	Lewis	II & IV		midden, hearths, burIron Agels	X	various	Iron Age	X	X			X	X							X	X	Broden Powell 1937, Hill 1952, Stevenson 1952
C/22	Golson	Lewis	III		earth house with midden	X	?	Iron Age	X	X			?	?							X		Edwards 1924
C/23	Gress/Stornoway	Lewis	III	NBc.495419	earth house with shell refuse	X	1874	Iron Age	X				?	?									Liddel 1874
C/24	Gresslodge/Stornoway	Lewis	III	NB494419	earth house with shell refuse	X	1946	Iron Age	X				X	X							X		Mackie 1966
C/25	Loch na Berie/Uidg	Lewis	III	ND103351	cellular struct. in broch, shells	X	1993	Iron Age>	X				?	?									DES 1993, p110
C/26	Mangersta	Lewis	II, III?	NB009311	midden deposits			Iron Age	X	X			X	X							X		Carson 1977
C/27	Rudh' an Teampuill	Lewis	III?	NBc.969913	midden deposits with structs.				X				?	?							X		1928 RCAHMS Inventory
C/28	Sheader/Sandray	Lewis	II?	NL631920	shell midden beneath structure			Neolithic	X														Foster, DES 1991
C/29	Sithean an Altair	Lewis	IV		Cist with oyster shell	X	?	Bronze Age	X													X	Beveridge 1911, Megaw and Simpson 1961
C/30	Tolsta	Lewis	IIIb	.	Crannog with shell refuse	X	187?	Iron Age	X				X	X									Liddel 1874
C/31	Teampull Eoin/Brorvas	Lewis	III		shell deposits and hut circles				X				?	?							X		1928 RCAHMS Inventory
C/32	Traigh Bosta/G Bernera	Lewis	III	NB13734010	eroding dunes, walls, middens			Iron Age>	X				X	X							X		DES 1993, p110
C/34	Valtos	Lewis	II	NBc.0937	hut circles with middens			Bro/Iron Age	X				?	?						X	X		Lacaille 1937
C/35	Broc Nic Connain	North Uist	II		Earth house with whalebone	X	?	Iron Age	?	X													Callander 1932
C/36	Brolesnare	North Uist	II	NF776615	eroding midden and cist	X	1993	Iron Age	X				?	?							X	X	DES 1993, p110
C/37	Ceardach Ruadh	North Uist	II	NF7761	shell refuse with hut circle?			Iron Age?	X		X		?	?							X	X	RCAHMS 1928 Inventory
C/38	Cletteraval	North Uist	II	NF749714	Iron Age shell refuse in chmb. tmb	X	1933	Iron Age	X												X		Lindsay Scott 1934
C/39	Crogary na Hoe	North Uist	II	NA975725	hut circle with shells & bone			Iron Age?	X				?	?									1928 RCAHMS Inventory
C/40	Druim na h-Uamh	North Uist	I	NF906597	shells and pottery in cave				X												X		1928 RCAHMS Inventory
C/41	Dun Tomaidh	North Uist	III	NF769751	dun with shell refuse	X	?	Iron Age	X				?	?							X		Callander 1931
C/42	Foshigarry	North Uist	III		Earth house with refuse	X	?	Iron Age	X	X			X	X							X		Callander 1931
C/43	Loch na Buaile	North Uist	III		midden deposits near structs.				X				?	?					X		X		1928 RCAHMS Inventory
C/44	Lochdrach	North Uist	III		Earth house with whalebone	X	?	Iron Age	?	X													Callander 1932
C/45	Sithean Mor	North Uist	IIIorII?		shell deposit in sands				X				?	?							X		1928 RCAHMS Inventory
C/46	Sollas	North Uist	III		wheelhouses with middens etc	X	1957	Iron Age	X	X	X	X	X	X	X	X	X		X	X	X	X	Campbell 1991
C/47	Sloch na Chore	North Uist	III?		midden deposit																		
C/48	Sloc Sabhaidh	North Uist	III?		shell refuse nearby burials			Iron Age?	X				?	?							X	X	1928 RCAHMS Inventory
C/49	The Udal	North Uist	III	NF8277	settlement complex	X	ongoing	Neo-Norse	X	X	X	X	X	X	X	X	X	X	X	X	X		Crawford 1986
C/50	Unival	North Uist	III		hut built into chamb. tmb	X	1947	Iron Age	X				?	?							X		Lindsay Scott 1948
C/51	Shellesder	Rhum	I	NG3267020	cave with shells and seal bone				X		X												RCAHMS Vol 20
C/52	Rhona	Skye	I	NG628577	shell deposits below med' in cave				X														SKye SMR
C/53	St ColumBro's	Skye	II	NG418485	shell midden under Med' site				X														Skye SMR
C/54	AnCarran/Staffin	Skye	I		rock shelter midden	X	1993	Meso>?	X	X	X	X	X						X				Mikel 1994
C/55	Cairn na Bhodachd	Skye	III		earth house with shells	X	?	Iron Age	X				X	X									Callander 1914
C/56	Dun an Iardhard	Skye	III		dun with small amount of bone	X	?	Iron Age	?				?	?						X			Macleod 1915
C/57	Dun Beag	Skye	III		dun with shell refuse	X	?	Iron Age	X				X	X						X	X		Callander 1921
C/58	Dun Flodigarry	Skye	III	NGc.4671	dun with shell refuse			Iron Age	X				?	?							?		
C/59	Gleann Torramhichaig	Skye	II	NG59452680	shell midden				X														DES 1989
C/60	Meall Buidhe	Skye	III	NG54393139	'D'enclosure, midden, flints				X				?	?					X				DES 1989
C/61	Rhona	Skye	II?	NGc628577	shells beneath med' cave deposit				X				?	?									Skye SMR

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C/62	Rudh' An Dunain Cave	Skye	I		pot. lithics shells. metalworking	X		Bro/Iron Age	X	X				X				X			X		Scott 1934
C/63	St Columbas	Skye	II?	NG418485	shell midden beneath med' church				X				?	?									Skye SMR
C/64	A Creadach Mhor	South Uist	III		wheelhouse with shells	X	196?	Iron Age	X				X	X						X	X		Young 1960
C/65	A' Creadach Beag	South Uist	III		wheelhouse with shells etc	X	1970	Iron Age	X	X			X	X							X		Fairhurst 1971
C/66	Cladh Hallan	South Uist	II	NF729221	3 shell midden layers in dune	X	1989	Iron Age?	X		X		?	?						X	X		DES 1989. p70
C/67	Daliburgh	South Uist	II & III?		shell deposits in dunes				X				?	?							X		1928 RCAHMS Inventory
C/68	Dun Vulan	South Uist	IIIb	NF71412982	broch and external midden	X	1993	Iron Age	X				?	?							X		DES 1993. p110
C/69	no name	South Uist	III		hut circle with whalebone	X	?	Iron Age?	?	X													1859 check this
C/70	Kildonan parish	South Uist	III	NF729284	circular struct. with midden deps	X	1989	Iron Age	X				X	X				X			X		DES 1989. p69
C/71	Rosinish	South Uist	IV		burial chamber with shells	X	1976	Neo-Bro	X												X	X	Crawford 1977
C/72	Village Broy	St Kilda	III		Souterrain with shell deposits			Iron Age	X														1928 RCAHMS Inventory. Stell and Harman 1992
C/73	Achnahaird	Wester Ross	II?	NC018133	sand dunes. shell mounds			mixed?	X				?	?				X			X		Newall and Newall DES 1974. p60
C/74	Achnahaird	Wester Ross	III	NC016134	sand blow-out. bone. pot. flint				X				?	?				X	X		X		Gourlay. Musgrove. Harden p.23
C/75	Allt Na H-uamha/Craig	Wester Ross	I		boulder cave. limpet heap				X														Gourlay 1984
C/76	Camus a' Charraig	Wester Ross	IIIb	NG891956	hut circle in dunes with shells			Iron Age?	X														NMRS
C/78	Cleann A' Chaolais	Wester Ross	I	NH121994	rockshelter midden			Meso?	X				X	?									Crawford 1983
C/79	Dun an Ruigh Ruaidh	Wester Ross	III		dun with shell refuse	X	1968/78	Iron Age	X				X	X									Mackie 1980
C/80	Dun Lagaidh	Wester Ross	III	NH143914	broch with shell refuse	X		Iron Age	X				X	X							X		Mackie
C/81	Inverlael	Wester Ross	IV	NH183850	cairn. mussel shell in cist	X	19?	Bronze Age	X								X		X			X	Cree 1914
C/82	Keppoch/Arisaig & Moid	Wester Ross	I	NM62928791	cave. shells. bones. med sherd			<Med?	X				?	?							X		Cassells. DES 1991. p41
C/83	Muckle Skerry	Wester Ross	III	ND46267843	midden and stonework in cliff				X														Hunter and Dockrill 1982
C/84	Priest Island. South	Wester Ross	I	NB927016	untraced midden in cave				X		X	X											NMRS
C/85	Sheildaig	Wester Ross	IV	NGc.808727	cairn. shellsand bones in pits	X	1977	Bro	X				X	X						X	X	X	
C/86	Sandwood Loch	Sutherland	II	NC215649	shell midden deposit in sandblow				X				?	?									Smith. DES 1989. p49
D/1	Ackergill/Wick	Caithness	III	NHc.3553	bones and shell in hut circle	X	1910	Iron Age?	X				?	?									Cree 1911
D/2	Carn Liath/Golspie	Caithness	IIIb	NC870013	midden outside broch with shells	X	1972>	Iron Age	X				?	?		X	X				X		Love 1989
D/3	Bray of Sanwick	Caithness	III	ND397733	eroding midden dep. masonry			Iron Age?	X				?	?							X		DES 1993. p42
D/4	Crosskirk	Caithness	III	ND014697	broch. middens. shells. bones	X		Iron Age	X	X	X	X	X	X	X	X	X			X	X	X	Fairhurst 1984
D/5	Curchyard mound/Keiss	Caithness	II		shell midden beneath broch	X	186?	Meso/Neo?	X	X			?	?					X				Laing 1868
D/6	Dunbeath	Caithness	III	ND15533045	midden material in broch wall matr	X	1990	Iron Age	X	X			X	X									Banks 1990
D/7	Freswick Links	Caithness	IIIb	NDc.3767	hut circle and external midden	X	1926	Iron Age	X	X			?	?							X		Edwards 1926. 1927
D/8	Freswick Links	Caithness	II?	NDc.3767	midden deposit. shells. lithics etc			Neo?	X	X		X	X	X					X		X		Lacaille 1954
D/9	Ham	Caithness	IV		Chmb tmb with shells and fish b	X	?	Neo?	X	X													P.S.A.S. vol 59
D/10	Harbour mound/Keiss	Caithness	III		broch with shells in deposits	X	186?	Iron Age	X													X	Lang 1868
D/11	John O' Groats	Caithness	III?		Norse graves with earlier settle'	X	1989	Bro-Norse			X?		X	X							X	X	Driscoll 1992
D/12	Kirk stne of Stroupster	Caithness	IV		chambered structure with limpets	X	1915	Neo?	X														Nicolson 1916
D/13	Kettleburn	Caithness	III		broch with lower jaw of whale	X	?	Iron Age			X												Rhind 1854
D/14	Little Ferry	Sutherland	II		shell mounds			Meso/Neo?	X				?	?					X				Tait 1870
D/15	Lower Dounrey	Caithness	IV?	NC9976798	chmb. tmb. with shell and fish	X	192?	Neolithic>	X	X		X	X	X							X	X	Edwards 1929

no/cr n	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	tw	ld	cg	mp	tp	m	li	ap	po	hr	references
D/16	Marymas Green/Dunnet	Caithness	III	ND219706	stone wall, midden, shell, bones			Iron Age?	X	X			?	?									Myatt, DES 1992,p40
D/17	Ousadle	Caithness	IVa	ND072188	broch wirh shells and bones	X	1891	Iron Age>	X				X	X							X	X	Mackay 1892
D/18	Rattar/Dunnet	Caithness	III?	ND253742	cists in midden deposit	X	1872	Bro/Iron Age	X									X				?	Campbell 1872
D/19	Sae Breck	Caithness	III		chamber in broch with shells	X	?	Iron Age>	X												X		Calder 1952
D/20	Skitten broch	Caithness	III		shells, bones etc in passage	X	1948	Iron Age>	X	X			X	X									Calder 1948
D/21	Westerburn/Birkle Hills	Caithness	II &III?		shell middens and Iron Age cists?	X	1866	Bro/Iron Age	X				?	?		?						X	Lang 1868
D/22	Wag of Forse	Caithness	III		Wag with shells etc in wall	X	1947–8	Iron Age	X				X	X									Curle 1948
D/23	Tulach an t-Sionnach	Caithness	IV		chmb. tomb with shells & bones	X	1965	Neo	X	X			X	X							X	X	Corchoran 1966
D/24	Culbin	Moray	II		shell midden		1969	Bro	X				X	X							X		Coles and Taylor 1970
D/25	Findhorn	Moray	II?		flint scatter, pot, shells			Neo/Bro?	X										X		X		DunBror 1929
D/26	Covesea	Moray	I	NJ17427062	cave, midden material			Bro–Ro	X				?	?							X		Keillar 1969
D/27	Covesea II	Moray	I	NJ17457066	cave, midden material			Bro–Ro	X				?	?							X		Keillar 1969
D/28	undesignated																						
D/29	Sculptor's Cve/Covesea	Moray	I		cave, midden deposits, metalw	X	192?	Bro–Iron Age	X	X	X		X	X					X				Benton 1931
D/30	Spynie	Moray	II	NJ228658	sh midden, lithics 150m away			Meso?	X														Sloan DES 1983
D/31	Benni Cuml/Stronsay	Orkney	III	HY67152142	pass broch, midden section			Iron Age	X		X		X	X							X		Lynn and Bell DES 1989
D/32	Berstane/mainland	Orkney	III	HY47521002	broch with midden in section			Iron Age	X				?	?							X		Orkney SMR
D/33	Blackhammer/Rousay	Orkney	IV		chmb. tmb. bird and other bone	X	193?	Neolithic				X	X	X									Callander and Grant 1937
D/34	Borthwhick	Orkney	III		broch with shells in. and ext.	X	188?	Iron Age	X	X	X	X	X	X							X		Watt 1882
D/35	Breckness/Stromness	Orkney	III	HY225093	broch well filled with midden	X	1993	Iron Age	X			X	X	X				X			X		DES 1993
D/36	Calf of Eday	Orkney	IV?		Chmb. tmb. fish bones – otter?	X	193?	Natural		X													Calder 1937
D/37	Fethaland	Orkney	III		Iron Age struct. with shell refuse	X	1904?	Iron Age?	X				?	?		X					X		Abercromby 1905
D/38	Hillswick	Orkney	II or III?		midden in section, shells etc.			Iron Age	X	X			X								X		Coughtrey 1872
D/39	Knowe of Ransaay	Orkney	IV		cmb. tmb. with shells, fish etc	X	193?	Neolithic	X	X		X	X	X								X	Callander 1936
D/40	Knowe of Scartan/Sand'	Orkney	III	HY71624383	sea eroded mound, midd/masonry				X				?	?									RCAHMS 1980
D/41	Knowe of Yarso/Rousay	Orkney	IV		cmb. tmb. with shells, ox etc	X	193?	Neolithic	X	X			X	X							X	X	Callander and Grant 1935
D/42	Kyle of Tongue	Orkney	II, III?		Midden deposits with shell			Iron Age?	X				?	?									1911 RCAHMS Inventory
D/43	Midhowe/Rousay	Orkney	IV		chmb. tmb. with shells etc.	X		Neolithic	X	X		X	X	X							X		Callander and Grant 1933
D/44	Midhowe/Rousay	Orkney	III		broch with shell refuse	X	?	Iron Age	?	X	X	X	X	X							X		Callander and Grant 1933
D/45	Ness of Gruting	Orkney	III		house with refuse	X		Bro ?	X					X							X		Calder 1956
D/46	Mound of Skelwick	Orkney	III	HY48934524	mound, midd section, human rems.			Iron Age?	X				X	X								X	RCAHMS 1983
D/47	Runthell Shore/Stronsay	Orkney	III	HY62402961	walls and shells in eroded section			Medieval?	X				?	?							X		Lynn and Bell DES 1989, p65
D/48	Benni Cumi/Stronsay	Orkney	III	HY67152142	midden in section near broch			Iron Age	X		X		X	X							X		Lynn and Bell DES 1989, p65
D/49	Holm of P. Westray (N)	Orkney	IV	HY50445227	Chmb.tmb. shells in fill, fish bone	X	1854>	Neo	X	X			X	X							X	X	Henshall 1963, RCAHMS 1983
D/50	Knowe of Skea/West'	Orkney	III	HY44144181	mound with eroded midd/mas			Iron Age	X														RCAHMS 1983
D/51	Auskery/Eday	Orkney	III	HY67521589	mound with eroding midden			Iron Age?	X				?	?									RCAHMS 1984
D/52	Auskery/Eday	Orkney	III	HY67101690	mound, midd/mas			Iron Age?	X				?	?									RCAHMS 1984
D/53	Ayre/Sanday	Orkney	III	HY65224123	mound, eroded midden/masonry				X				?	?									RCAHMS 1980
D/54	Brockiskaill/P Westray	Orkney	II?	HY48445082	limpet midden next to naust			modern?	X	X			X	X	X								RCAHMS 1983
D/55	Brolfour Castle/Shapins'	Orkney	III	HY47301621	eroded section, midd/mas			Iron Age	X				?	?							X		RCAHMS 1987

/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	lw	ld	cg	mp	lp	m	li	ap	po	hr	references
D/56	Bralfour Mains/Shapins'	Orkney	II?	HY46891704	shells, dark earth in ploughsoil				X														RCAHMS 1987
D/57	Bray of Skaill	Orkney	V	HYc.2319	Cist with fish bone	X	1880?	Iron Age		X				X				X				X	Watt 1888
D/58	Broch of Ayre	Orkney	II	HY470014	broch with midden deposits	X	1913?	Iron Age	X	X		X	X	X							X		Graeme 1914
D/59	Burray	Orkney	IIb	ND48979881	midden outside broch	X	1852	Iron Age	X		X		X	X	X								Farrer 1857
D/60	Clodyhall	Orkney	IV		Cairn with shells			Bronze Age	X												X		Orkney SMR
D/61	Copinsay Farm/Deerness	Orkney	III	HY60880150	eroding section, midd/mas				X				?	?									RCAHMS 1946, 1987
D/62	Cross of Nebister/Sand'	Orkney	III	HY63163701	eroded section with midden/walls				X				?	?									RCAHMS 1946 1980
D/63	Crosskirk/Sanday	Orkney	II?		Eroded Bronk with midden deposits				X				?	?									RCAHMS 1946
D/64	East Corny Quoy/P West	Orkney	III?	HY49344950	Kitch-midds reported in dunes				X														RCAHMS 1946, 1983
D/65	Eastscott/P Westray	Orkney	III	HY48575045	mound with shells ploughed up				X														RCAHMS 1983
D/66	Farar/Eday	Orkney	IV?	HY52743797	chmb.tmb. midd in passage	X		Neo>?	X				X	X							X	X	RCAMS 1946, 1984
D/67	Garso/N. Ronaldsay	Orkney	II or III?	HY77245547	dense limpet midden eroding				X														RCAHMS 1980
D/68	Garson/Stromness	Orkney	III		eroding section, walls, midden			Iron Age?	X				?	?							X		Lynn and Bell DES 1985
D/69	Golf Course/Sanday	Orkney	III	HY71984181	mound, eroded section, midd/mas				X				?	?									RCAHMS 1980
D/70	E.N.E. of Hahouse 1	Orkney	III	HY46704663	eroded section, midd/mas			Iron Age?	X														RCAHMS 1983
D/71	E.N.E. of Hahouse 2	Orkney	III	HY45395119	eroded section, midd/mas			Iron Age?	X														RCAHMS 1983
D/72	Hallbreck/Wyre	Orkney	III	HY43792645	structure with midden material				X				?	?									RCAHMS 1984
D/73	Hermisgarth Farm/Sand	Orkney	III	HY66414313	former earth house/ploughed shells			Iron Age?	X														RCAHMS 1980
D/74	Hermisgarth	Orkney	IV		cremations, cramp as pyre			Bronze Age														X	Downes 1993
D/75	Hill' of Fea/S. Ronalds'	Orkney	III	ND49299557	probable broch, eroding sections			Iron Age	X														Orkney SMR
D/76	Hogdalee/Westray	Orkney	III	HY46644473	mound with eroding midd section			Iron Age?	X														RCAHMS 1983
D/77	Holm of Eday	Orkney	III		poss broch wih shell in deposits	X		Iron Age?	X														Farrer 1856
D/78	Hooking/N. Ronaldsay	Orkney	III	HY76735338	mound, eroded section, midd/mas				X				?	?									RCAHMS 1980
D/79	Howe/Stromness	Orkney	III		chmb tmb and later settlement	X		Neo-Iron Age	X	X			X	X							X	X	Carter 1984
D/80	Howe/Stromness	Orkney	III		complex multi-period settlement	X	1983>	Neo-Iron Age	?				?	?							X	X	Carter et al 1984
D/81	Howemae/N. Ronaldsay	Orkney	III	HY75835227	settlement complex			Iron Age?	X				X	X							X		Traill 1885, 1890, RCAHMS 1946, 1980
D/82	Isbister/S.Ronaldsay	Orkney	IV		Chmb.tmb. with shells etc	X		Neolithic	X		X	X	X	X	X				X		X		Ritchie 1959, Hedges 1983
D/83	Kestro/Westray	Orkney	III	HY4479315	mound with midd/mas carin above			Bro? Iron Age	X														RCAHMS 1983
D/84	King's Craig/P Westray	Orkney	III	HY48405062	26m eroded section, midd/mas				X				?	?									RCAHMS 1983
D/85	Knap of Howar	Orkney	III	HY483518	Neolithic houses and shell refuse	X	various	Neolithic	X		X	X	X	X							X		Traill and Kirkness 1937
D/86	Knowe of Saverough	Orkney	II		Poss. broch with ext. midden	X	186?	Iron Age?	X														Farrer 1868
D/87	Knowe of Skogar	Orkney	II	HY26392340	broch mound midden close by			Iron Age	X				?	?									Orkney SMR
D/88	Knowe of Sunloft/West'	Orkney	II	not known	reference to k-m on links			Iron Age?															RCAHMS 1983
D/89	L. Cairn/Braebster/Hoy	Orkney	III	HY21810541	Earth house with shells and bone	X	1884	Iron Age	X	X	X	X	X	X						X			RCAHMS 1946, 1987
D/90	Ladykirk/Sanday	Orkney	III	HY67673986	report of kitchen-midden				X				?	?									RCAHMS 1946, 1980
D/91	Lamb Head/Eday	Orkney	III	HY68962154	mound with dense shell midden				X														RCAHMS 1984
D/92	Grobust/Links of Noll'	Orkney	II?	HY428493	midden in dune, bones, shell, fish			Neo?	X	X	X		X	X									Lynn and Bell DES 1990, p45
D/93	Links of Nolland/West'	Orkney	III	HY428493	Neolithic settlement complex	X		Neo	X	X	X	X	X	X	X	X	X				X		RCAHMS 1983
D/94	Lopness/Sanday	Orkney	III	HY75904368	mound with midd/masonry eroded				X				?	?									RCAHMS 1980
D/95	MayBrock/P Westray	Orkney	III	HY49545240	Mound with eroding limpets				X														RCAHMS 1983

no/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	tw	td	cq	mp	tp	m	li	ap	po	hr	references
D/96	Middle Skerry/S.Ronald.	Orkney	III	ND464784	eroding sections, midden			Iron Age?	X														RCAHMS 1946
D/97	Mirkady/Deerness	Orkney	III	HY53820705	former eroding section midd/mas				X				?	?									RCAHMS 1987
D/98	Ness of Burgi	Orkney	III		Broch with shell refuse in cell	X	193?	Iron Age>	X				?	?							X		MowBrory 1936
D/99	Ness of Tuquoy/West	Orkney	III	HY459343325	3om eroded section, midd/mas			Iron Age	X				X	X									RCAHMS 1983
D/100	Nev Hill/S. Ronaldsay	Orkney	IV	ND42928931	cairn, shells in cist, perf pebble			Bro	X														Orkney SMR
D/101	Neven, N. Ronaldsy	Orkney	III	HY77185508	mound with shells and bones				X				?	?									RCAHMS 1980
D/102	Northskaill/Sanday	Orkney	III?	HY68364442	midden material in eroded dunes				X				?	?									RCAHMS 1946 1980
D/103	Oronsay	Orkney	IV		poss. viking burial with limpets	X	1890		X													X	McNeil 1891
D/104	Peerie Howe	Orkney	III	HY54750324	eroded section in mound, shells				X				?	?									RCAHMS 1987
D/105	Peter Kirk/Sanday	Orkney	III	HY71364363	chapel on midden deposits				X				?	?									RCAHMS 1946
D/106	Pierowall/Westray	Orkney	II?	HY4348	foundations revealed midden				X				?	?									RCAHMS 1983
D/107	Pierowall/Westray	Orkney	II?	HY43534847	foundations revealed midden				X														RCAHMS 1983
D/108	Pierowall Quarry	Orkney	IIIb		Iron Age house with ext. midden	X	198?	Iron Age	X														Sharples 1984
D/109	Pierowall Quarry	Orkney	IV?		chmb. tmb. shells external	X	198?	Neolithic	X													X	Sharples 1984
D/110	Point of Cott/P West	Orkney	IV?	HY46544744	chmb tmb, bone etc - poss later?	X		Neo>	X	X			X	X							X	X	Brorber 1989? RCAHMS 1983
D/111	Pool/Sanday	Orkney	III	HY61943785	Neolithic-Norse settlement	X		Neo/Iron Age	X	X	X	X	X	X					X	X	X		RCAHMS 1980, Hunter 1990
D/112	Quanterness	Orknay	IV	Hy418129	chmb.tmb.				X			X	X	X					X		X	X	Renfrew 1979
D/113	Queena Howe/Westray	Orkney	III	HY2504948	Poss' broch eroded section 85m			Iron Age?	X				?	?									RCAHMS 1983
D/114	Quoyness	Orkney	IV	HY677379	chmb.tmb shells bones	X	1950-1	Neo	X				X	X							X	X	Childe 1952
D/115	Quoy Ness/Sanday	Orkney	III?		Multiple kitch midds in dunes				X				?	?									RCAHMS 1946
D/116	Quoygrew/Westray	Orkney	III	HY44335065	eroding section, midd/mas			Iron Age	X				X	X							X		RCAHMS 1983
D/117	Rennibister	Orkney	IV		Chmb tmb? with shells	X	1925	Neo?	X													X	Marwick 1927
D/118	Rendall/Mainland	Orkney	III	HY42502097	poss broch, section, masonry etc			Iron Age	X				?	?							X		Orkney SMR
D/119	Riggan of Kami	Orkney	III	HY59180743	'semi broch' with midden deposit			Iron Age	X				?	?									RCAHMS 1987
D/120	Rinyo/Rousay	Orkney	III	HY43983228	Neolithic settlement complex	X	1937/8	Neo	X				X	X									Childe and Grant 1939, 1947
D/121	S.E. of Cleat/Westray	Orkney	III	HY46704663	eroded section, midd/mas				X				?	?									RCAHMS 1983
D/122	Sandquoy/Sanday	Orkney	III	HY74674532	mound, eroded section, midd/mas				X				?	?									RCAHMS 1980
D/123	Sandquoy/Sanday	Orkney	III		Earth house with midden deposits			Iron Age?	X				X	X								X	RCAHMS 1946
D/124	Sands of Rothiesholm	Orkney	III	HY68962154	40m eroded section midd/mas			Iron Age?	X	X			?	?									RCAHMS 1984
D/125	Sandsend/Shapinsay	Orkney	III	HY51801983	eroding section, midd/mas				X				?	?									RCAHMS 1987
D/126	Shorehouse/P Westray	Orkney	III	HY49885295	80m eroded section, midd/mas				X				?	?									RCAHMS 1983
D/127	Skaill	Orkney	III	HY588064	Settlement complex	X		Bro-Iron Age	X				X	X							X		Gelling 1985, RCAHMS 1987
D/128	Skara Brae	Orkney	III a & b		settlement with middens	X	1914>	Neolithic	X	X	X	X	X	X	X	X	X		X	X	X	X	Childe 1929,30,31
D/129	Stromness/N. Ronald'	Orkney	III	HY76105130	large mound with eroded section			Iron Age-No	X				X	X				X					RCAHMS 1980
D/130	Surrigarth/Westray	Orkney	II/III?	HY4945	kitchen midden reported				X														RCAHMS 1983
D/131	Swdna/S.Ronaldsay	Orkney	III	ND39028510	mound, eroding section, shells			Iron Age	X														Orkney SMR
D/132	Tafts/Westray	Orkney	III	HY496417	mound with shell and bone				X				?	?									RCAHMS 1983
D/133	Tinkler's Cru/S.Ronalds	Orkney	III	ND390851	eroding section, masonry, shells			Iron Age?	X														Orkney SMR
D/134	Tofts/Sanday	Orkney	III	HY74754615	mound, eroded section, midd/mas				X				?	?									RCAHMS 1980
D/135	Tofts Ness	Orkney	III	HY760470	structure and midden layers	X	1985	Bro?	X				?	?							X		Dockrill, DES 1985

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D/136	Tafts of Broyan	Orkney	II		shell midden				X														Irvine 1885
D/137	Wasbister/Rousa	Orkney	III	HY40153342	structures, shell and bone near			Iron Age	X				?	?									Orkney SMR
D/138	Weland/Shapinsay	Orkney	III	HY49211961	eroding section, midd/mas				X				?	?									RCAHMS 1987
D/139	Westborough/Sanday	Orkney	III		mound, eroded stones & shells				X														RCAHMS 1946
D/140	Warbeth/Mainland	Orkney	III		broch well with midden material	X	1988	Iron Age	X	X	X		X	X	X						X		Bell and Dickson 1989
D/141	Woo/Sanday	Orkney	III	HY66794533	mound, eroded section, midd/mas				X				?	?									RCAHMS 1980
D/142	Yinstay/Deerness	Orkney	III	HY5084	Earth house with shells, bones etc	X	1906	Iron Age	X				?	?							X		RCAHMS 1946, 1987
D/143	Bu	Orkney	III		broch, marine shells, bones	X	1980	Iron Age	X	X	X	X	X	X	X		X	X			X	X	Hedges 1987
D/144	Gurness	Orkney	III		broch, animal bones	X	1920s	Iron Age	X		X		X	X			X				X		Hedges 1987
D/145	Broch of Ayre	Orkney			broch	X	1913	Iron Age	X		X	X	X	X							X		Graeme 1914
D/146	Flaws/S. Ronaldsay	Sutherland	IIIb?		midden near earth house			Iron Age?	X				X	?									Brown 1933
D/147	Brolnapaling I	Ross&Crom	II	cNH801692	site of former shell midden	X	1887		X	X		X	X	X									Duns 1887 Lubbock 1863
D/148	Brolnapaling II	Ross&Crom	II	NH804689	shell midden in face of quarry				X														RCAHMS Vol 6
D/149	Bray of Nigg	Ross&Crom	II	NJ9504	shell midden			Meso?	X	X			?	?									Simpson 1943, Hunt 1987
D/150	Caird's Cve/Rosemarkie	Ross&Crom	I	NH744594	Cave with shells	X	1912	Iron Age	X				X	X							X		Stevenson 1955 Woodham 1956
D/151	Castle Corbet	Ross&Crom	?	NH903833	shells in rabbit scrapes				X														Name Book, Rosshire, p60 RCAHMS Vol 6
D/152	Castle Corbet	Ross&Crom	II	NH902833	shell midden				X														Name Book, Rosshire, p60 RCAHMS Vol 6
D/153	Castle Haven	Ross&Crom	II/III?	NH931873	numerous shell middens reported				X														Name Book Ross-shire *no 30, p7*
D/154	Castle st/Inverness	Ross&Crom	II?		Meso. lithics and shell frag.	X	198?	Meso	X											X			Wordsworth 1984
D/155	Delnies	Ross&Crom	II or III?	cNH8057	former middens (no trace)				X														Gordon 1866 RCAHMS Vol 5
D/156	Embo	Ross&Crom	IV?		chmb. tmb. with shells etc.	X		Neo/Bro	X	X		X	X	X							X	X	Henshall 1957, 1963
D/157	Moraytown/Dalcross	Ross&Crom	II		poss souterrain near cists	X	1899	Bro?	X				?										Wallace 1900
D/158	Muirtown/Inverness	Ross&Crom	II	NH652457	shell midden in estuary	X	1989	Meso/Neo	X		X												Myers and Gourlay 1991
D/159	Meikel Tarrel	Ross&Crom	II	NH904804	traces of a shell midden				X														RCAHMS Vol 6
D/160	Mountrich 1	Ross&Crom	II?		possible shell midden				X														RCAHMS Vol 6
D/161	Mountrich 1	Ross&Crom	II?	cNH562604	site of fomer shell midden				X														Macrae 1923 RCAHMS Vol 6
D/162	Mountrich 2	Ross&Crom	II?	cNH562606	former shell mid' flints nearby				X														Macrae 1923 RCAHMS Vol 6
D/163	Ness of Portnaculter	Ross&Crom	II or III?	NH744848	disturbed midden, shell, burnt st				X														DES 1993, p50
D/164	Rosemarkie	Ross&Crom	I		cave, shell deposits etc.	X	1912	Iron Age?	X				X										MacLean 1931, Woodham 1956
D/165	Rosemarkie Church yd	Ross&Crom	II	NH737576	site of former shell midden				X														St Duthac 1912 RCAHMS Vol 9
D/166	Tain	Ross&Crom	II?		midden deposit, shells, antler			Meso?	X				X										Callander 1931 Hunt 1987
D/167	Inverness	Ross&Crom	II	NH645465	shell midden			Meso-Neo?	X														Myers and Gourlay 1991
D/169	Inverness	Ross&Crom	II	NH6446	shell midden			Meso-Neo?	X														Myers and Gourlay 1991
D/170	Inverness fire staion	Ross&Crom	II	NH6446	shell midden			Meso-Neo?	X														Myers and Gourlay 1991
D/171	Brigses/Loch Spynie		II	NJc.2265	shell middens , pot, iron hooks			Iron Age?	X							X					X		Lubbock 1872, Sloan DES
D/172	Ness of Bourgi	Shetland	III		broch, marine shells, animal bones	X		Iron Age	X	X	X		X								X		Mowbray 1936
D/173	Clickhimin	Shetland	III		broch settlement , middens	X		Iron Age	X		X	X	X	X		X		X		X	X		Hamilton 1968
D/174	Jarlshof	Shetland	III a & b		Bronze Age & Iron Age settlement	X	various	Bro-Iron Ag	X	X	X	X	X	X			X		X	X	X		Bruce 1907, Childe 1938, Curle 1933,32,34,36,
D/175	Levenwick/Dunrossness	Shetland	III		broch deposits	X	1870	Iron Age	?				?	?							X		Gowdie 1872
D/176	Papil/Cullivoe	Shetland	II	HP543042	pre-broch shell midden	X		Iron Age	X				?	X							X		Beveridge DES 1971

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D/177	Scalloway	Shetland	III	HU406399	broch with midden deposits	X		Iron Age	X				X	X							X		MacCullagh
D/178	Saverock/Kirkwall	Shetland	III		Souterrain? with scattered midden	?		Iron Age?	X				?	?									Thomas 1848, Kirkness 1928
D/179	Underhall/Unst	Shetland	III		Iron Age and later settlement	X		Iron Age>															Small 1966
D/180	Fimber	Shetland	IV		Bro cairn with half scallop	X	?	Bronze Age	X													X	Mann 1922
D/181	Breken	Shetland	III?		Ember pit, steatite bracelets, shells	X	1971?	Iron Age	X					X						X	X		Beveridge 1971
D/182	Houland	Shetland	III		earth house ext refuse			Iron Age?	X				?	?									Mitchell 1868, Thomas 1868
D/183	Upper Scalloway	Shetland	III	HU406399	broch	X	1989	Iron Age	X		X		X	X							X	X	Smith ,Turner and McCullagh 1989, p68
D/184	Underhall/Unst	Shetland	III		Iron Age and later settlement	X		Iron Age>															Small 1966 - check this
D/185	Achaidh/Creich	Sutherland	III		prob later bones and shells	X	1909	intrusive	X					X									PSAS vol 44
D/186	Cuthill Links/Dornoch	Sutherland	II	NH74308705	eroding midden, shells, lithics			Meso/Neo?	X				?	?				X					Davidson 1945, DES 1993, p54
D/187	Kilphedir/Helmsdale	Sutherland	II	NDc.0215	shell midden 150' feet above sea				X	X		X	?	?									Joass 1864
D/188	Kilphedir/Helmsdale	Sutherland	IV	ND024165	cairn with skull and shell in cist	X	?	Bro	X													X	Joass 1864
D/189	Kintradwell	Sutherland	IIIb	NCc.9007	earth house?	X	?		X				X	X									Joass 1864
D/190	Kintradwell/Golspie	Sutherland	III	NCc.9007	earth house with int. shell refuse	X	?	Iron Age?	X				?	?									Stuart 1868
D/191	Kintradwell/Golspie	Sutherland	IIIb	NCc.9007	broch with ext. midden deposits	X	?	Iron Age?	X				?	?									Stuart 1868
D/192	Skilbo	Sutherland	II		shell mound with lithics			Meso/Neo?	X										X				Tait 1870
D/193	Smoo/Durness	Sutherland	I		cave, shell midden			Iron Age>	X	X			X	X				X			X		Pollard 1992
D/194	Alll Smoo/inlet	Sutherland	I		former cave, eroding shell midden				X				X							X			Pollard 1992
D/195	Tain	Sutherland	II	NHc.2882	shell midden																		
D/195	Ceard's Cove/Aberdour	Aberdeenshire	I	NJ880650	cave, limpet and whelk deposit	X	1960s	Iron Age?	X														Newell 1969
E/1	Filhie	Aberdeenshire	II?	cNO632536	midden deposit with flint arr/hds			Neo/Bro?	X										X				Jervise 1870 RCAHMS Vol 4
E/2	Dundarge Castle	Aberdeenshire	III?		midden deposit under round tower	X	1913			X	X		?	?									Beveridge 1914
E/3	Newburgh	Aberdeenshire	II	NK101256	shell middens and lithic scatter			Meso?	X														Hawke-Smith1980
E/4	Newburgh	Aberdeenshire	II	NJ991212	shell middens and lithic scatter			Meso?	X														Hawke-Smith1980
E/5	Ythan	Aberdeenshire	II	NK010256	shell middens flints nearby	X	1865		X										X				Dalrymple 1866
E/6	Hurley Hawkin	Angus	III	NO332328	fort with shell refuse	X	1980	Iron Age?	X				X	X				X			X		Taylor 1982
E/7	Ardestie	Angus	III		souterrain, pit infill with shells	X	1950	Iron Age>	X				X	X							X		Wainwright 1963
E/8	Boyndie	Branffshire	II?	NJc577648	midden spreads, shells, pottery	X	1890	<Med	X				?	?							X		Anderson 1891
E/10	Dilly Moeanan	Branffshire	III		'pit dwellings' with shells	X	1867		X														Hunter 1868
E/11	Edington Mains	Berwichshire	II?	NT 8955	poss. midden at foot of Bronk			-															RCAHMS Vol 10 Wilson 1875, 1884
E/12	Hutton Castle	Berwickshire	II?	NT892547	poss. midden deposit																		RCAHMS Vol 10 Wilson 1884
E/13	N. Berwick Law/Berwick	Berwickshire	III?	NT555840	midden deposits with pot	?		Iron Age?	X												X		Richardson 1907
E/14	Siccar Point	Berwickshire	III	NT811709	shell in area of fortification			Iron Age?	X				?	?									RCAHMS vol 10 Hardy 1886
E/15	Torryburn	Dunfermline	II	NT028854	oyster midden			Meso-Neo?	X														Sloan 1985
E/16	Torryburn	Dunfermline	II	NT031853	oyster midden			Meso-Neo?	X														Sloan 1985
E/17	Torryburn	Dunferml ne	II	NT032052	oyster midden			Meso-Neo?	X														Sloan 1985
E/18	Torryburn	Dunfermline	II	NT028855	oyster midden			Meso-Neo?	X														Sloan 1985
E/19	The Ghegan/Seacliff	E. Lothian	IIIb		promontory struct with midden	X	1870	Iron Age	X				X	X						X	X	X	Laidlaw 1870

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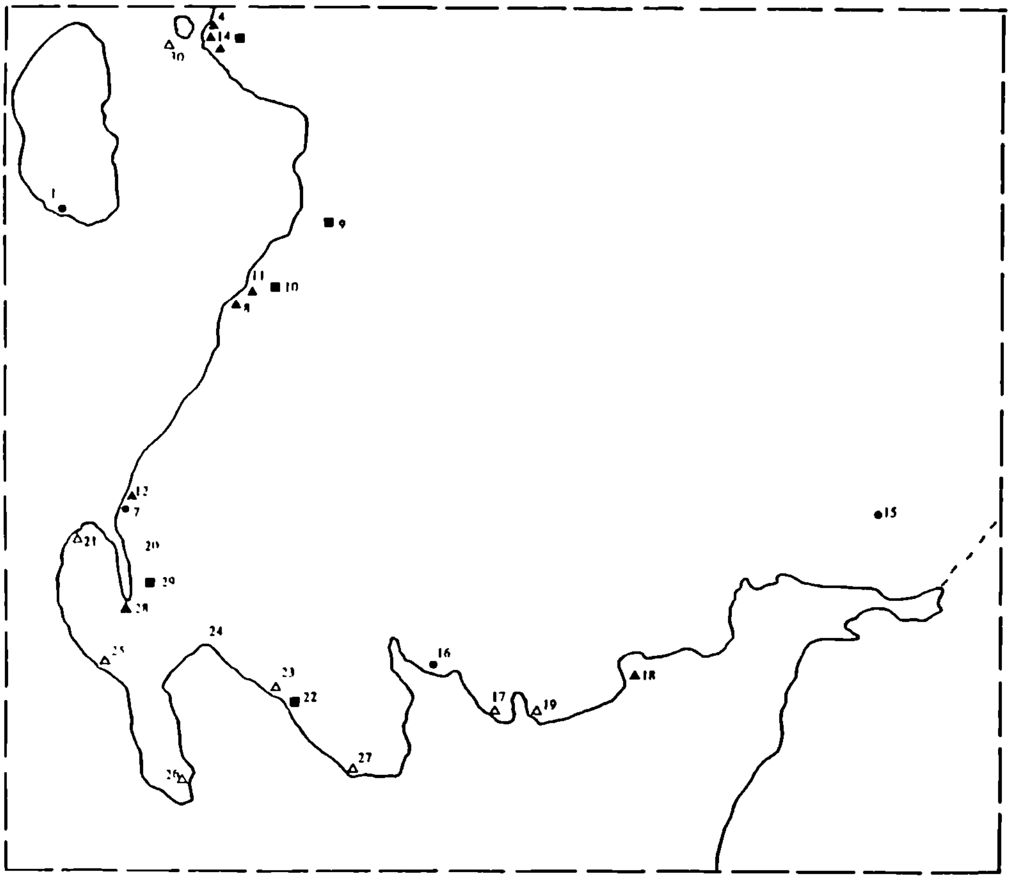
E/20	East Kerse	Falkirk	II	NS96968032	oyster midden			Meso-Neo?	X														Sloan 1985
E/21	East Kerse	Falkirk	II	NS96748025	oyster midden			Meso-Neo?	X														Sloan 1985
E/22	East Kerse	Falkirk	II	NS96668024	oyster midden			Meso-Neo?	X														Sloan 1985
E/23	Cadger's Brae	Falkirk	II	NS940794	oyster midden			Meso-Neo?	X														Sloan 1985
E/24	Deil's Burn	Falkirk	II	NS978806	oyster midden			Meso-Neo?	X														Sloan 1985
E/25	Inveravon	Falkirk	II	NS953798	oyster midden animal bones	X	1970	Meso-Neo	X				X	?									Grieve 1871, Mackie 1971
E/26	Kinneil	Falkirk	II	NS960801	possible oyster midden			Meso-Neo?	X														Sloan 1985
E/27	Little Kerse	Falkirk	II	NS940794	oyster midden			Neo?	X														Sloan 1982
E/28	Millhall	Falkirk	II	NS939794	oyster midden			Meso-Neo?	X														Sloan 1985
E/29	Mumrills	Falkirk	II	NS921797	oyster midden			Meso-Neo?	X														Sloan 1985
E/30	Nether Kinneil	Falkirk	II	NS95758005	oyster midden, animal bones	X	1982	Meso-Neo	X				X	X									Sloan 1982
E/31	Northfoot	Falkirk	II	NS944795	probable oyster midden			Meso-Neo?	X														Sloan 1985
E/32	Piggery Midden	Falkirk	II	NS943795	oyster midden			Meso-Neo?	X														Sloan 1982
E/33	Polmonthill	Falkirk	II	NS948796	oyster midden animal bones	X	1946	Meso-Neo?	X														Stevenson 1947
E/34	Shelly Bronk Midden	Falkirk	II	NS976805	oyster midden			natural?	X														Sloan 1985
E/35	Constantine's Cave	Fife	I		shells, bones and pottery	X	1914?	Iron Age?	X				X	X							X		Wace and Jehu 1915
E/36	Brorns Farm, Dalgety	Fife	IV	NT178842	shells in pit in Bro cemetery	X	1973	Neo-Bro	X														Watkins 1982
E/37	Inchkeith	Fife	II	NT2982	former shell midden			Meso?	X														Grieve 1873, mowat et al 1973
E/38	Kinkell Cave/St Andrews	Fife	I	NO533158	shells, paved floor, bones	X	1914	Iron Age>	X	X			X	X							X		Wace and Jehu 1915
E/39	Largo Bray	Fife	III?		some shells, comb iron eel spear	X	1901	Iron Age>	X				X	X					X				Munro 1901
E/40	Tentsmuir Sands	Fife	II		numerous shell middens				X														Paul 1905
E/41	E. Wymss	Fife	I?	NT345972	middens in front of caves			I.A.-Med	X	X		X	X	X					X		X		Clark 1991
E/42	Fithie	Forfarshire	IIIb		kitchen midd noted near ?broch				?				?	?					X				
E/43	KilBrogie	Kincardinshire	II?	NS923892	possible shell midden				X														GUARD 1994
E/45	Bowtrees	Kincardinshire	II?	NS906860	possible shell midden				X														GUARD 1994
E/46	Halls of Airth	Kincardinshire	II?	NS91098631	possible shell midden				X														GUARD 1994
E/47	Kincardine	Kincardinshire	II	NS93208715	shell midden with flints				X									X					GUARD 1994
E/48	Inch Farm	Kincardinshire	II	NS94128666	shell midden				X														GUARD 1994
E/49	Archerfield/Dirleton	E. Lothian	II	NT498507	cave, shell deposits	X	1908	Iron Age	X					X							X		PSAS Vol 43
E/50	Broxmouth	E. Lothian	III	NT697775	hillfort, fish, whale, seal,	X	1970s	Iron Age	X	X	X	X	X	X	X			X		X	X		Barneston 1983
E/51	Gullane	E. Lothian	II?		midden deposit with pot, metalw	X	193?	Iron Age	X		X	X	X	X			X				X		Younger 1936
E/52	Gullane	E. Lothian	IIorIII?	NTc497855	k-m deposit, shells, pot, floor?	X	1907	Bronze Age	X				X	X							X		Richardson 1908
E/53	Gullane	E. Lothian	IIorIII?	NTc497855	k-m deposit, shells, pot, floor?	X	1907	Bronze Age	X				X	X							X		Richardson 1908
E/54	Gullane	E. Lothian	IIorIII?	NTc497855	k-m deposit, shells, pot, floor?	X	1907	Bronze Age	X				X	X							X		Richardson 1908
E/55	Bridge of Allan/Carse	Stirling	artefact	NS817964	whale bones with antler implement			Meso?			X												RCAHMS 1963, Hunt 1987
E/56	BurBronk/Carse of Stirl'	Stirling	artefact	NS712982	whale bones with antler implement			Meso?			X												RCAHMS 1963, Hunt 1987
E/57	Cardross/Carse Stirling	Stirling	artefact	NSc.6097	whale bones with antler implement			Meso?			X												RCAHMS 1963, Hunt 1987
E/58	Causewayhead/Carse	Stirling	artefact	NSc.8095	whale bones with antler implement			Meso?			X												RCAHMS 1963, Hunt 1987
E/59	Cornton/Causewayhead	Stirling	artefact	NSc.8095	whale bones with antler implement			Meso?			X												RCAHMS 1963
E/60	Mieklewood/Carse of S'	Stirling	artefact	NSc.7295	whale bones with antler implement			Meso?			X												RCAHMS 1963, Hunt 1987

no/area	site name	locality	dep.type	NGR	description	exc	year	period	sh	fi	mm	mb	tw	td	cq	mp	tp	m	li	ap	po	hr	references
E/61	Stannergate/Dundee	Tayside	II	NOc.4331	shell midden - Bro cists above	?		Neo?	X				?	?					X				Mathewson 1879
E/62	Black Rocks/Gullane	E. Lothian	IV?		inhumation in cairn, broken shells	X	1908	Bro?	X													X	Ewart 1908
E/63	Culbin		II?		shell middens with pot	X	?	Bro>	X				X	X							X		Black 1891 Collander 1911
E/64	Fithie		III		Poss. broch with refuse			Iron Age?	?														Jervise 1870
E/65	Fortrose		II	cNH723565	site of shell former shell midden				X														Macrae 1923 RCAHMS Vol 9
E/66	Gullane/N.Berwick	E. Lothian	II?	NTc.4682	shell deposits, bones, pot	X		Bro	X				?	?					X		X		Richardson 1902
E/67	Gullane/N.Berwick	E.Lothian	IV	NTc.4682	corbelled chamber, shells	X	1902	Bro	X													X	Paul 1905
E/68	Inchkeith	E. Lothian	II?	NT2982	shell deposit, boens				X		X		X	X									Grieve 1872
E/69	Inveravon/Linlithgow		II		shell midden			Meso-Neo	X														Grieve 1872
E/70	Lossiemouth		II?	NJc.2270	shell deposits, green glaze pot			Med?	X				?	?							X		Duff 1882
E/71	Melt/Elgin		II		shell midden, pot and flints near	X	1872	Meso-Neo?	X														Morrison 1872
E/72	Morton/Tayport	Fife	II	NO465258	shell midden, lithics, bones etc	X		Meso	X	X		X	X						X				Coles 1970
E/73	Nether Warburton		I	NG327020	cave with shells, skull, pottery	X	c.1847		X				?	?							X	X	Bryson 1850
E/74	Norham/river Tweed	E Lothian	artefact		bronze harpoon head													X					Smith 1870
E/75	Rhodes Links/N.Berwick	E Lothian	I and III	NT5786	boulder cave with structures	X	?	Iron Age?	X	X			X	X				X			X	X	Richardson 1907
E/76	Rhodes Links/N.Berwick	E Lothian	IIor III?	NT5786	dunes, pot, bone, ash, shells	X	1900	Iron Age	X				X	X							X		Richardson 1900
E/78	Traprain Law	E Lothian	III	NT582747	hillfort with ling and seal bones	X	1914	Iron Age		X	X		X	X									Ritchie 1916
E/79	Tusculum/N.Berwick	E Lothian	II or III?	NTc.5786	2 shell middens, EBro pottery	X	1907	Bro	X				?	?					X		X		Cree 1908



Key

- △ Type I
- ▲ Type II
- ■ Type III
- ● Type IV

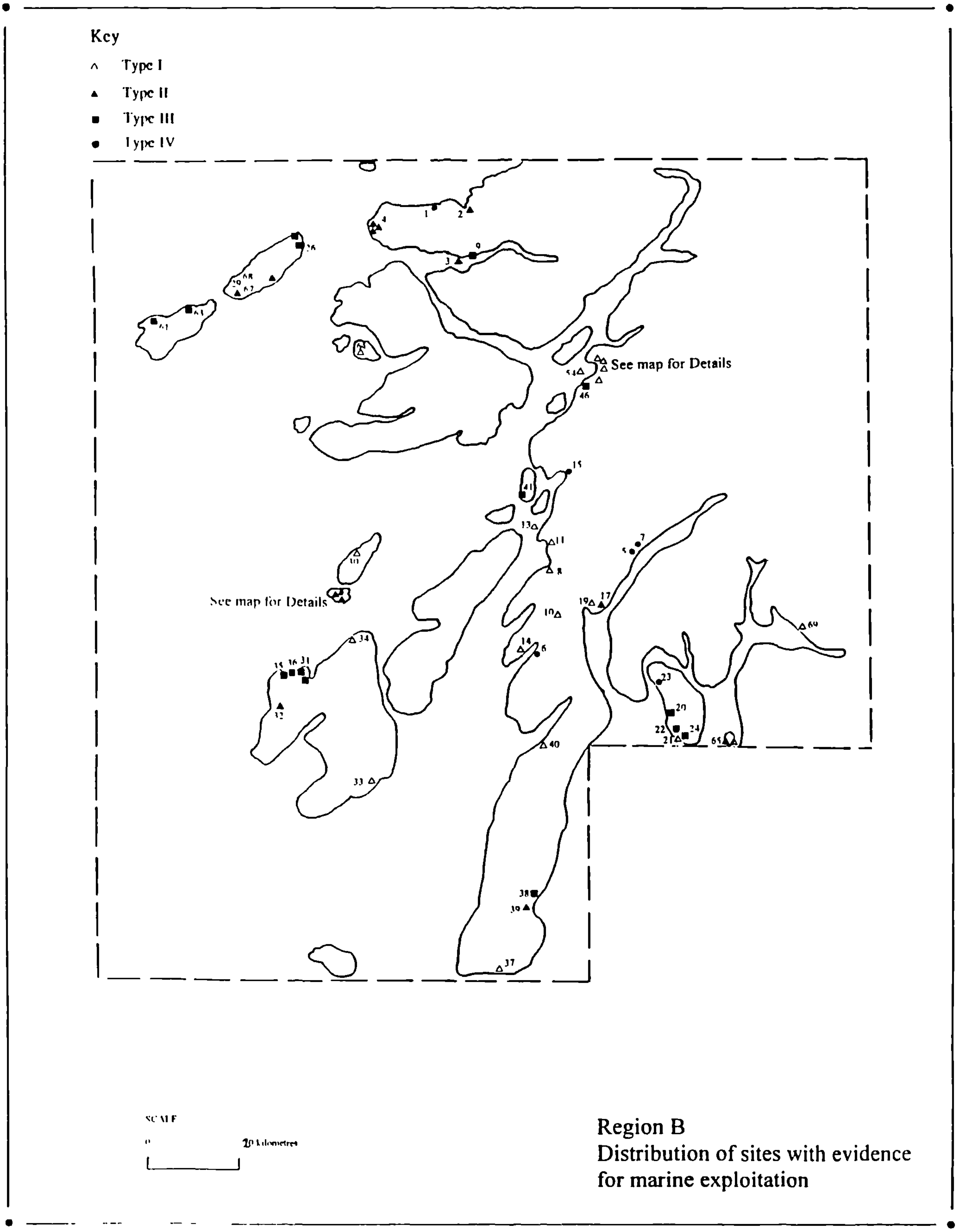
SCALE

0 20 kilometres

Region A
Distribution of sites with evidence for marine exploitation

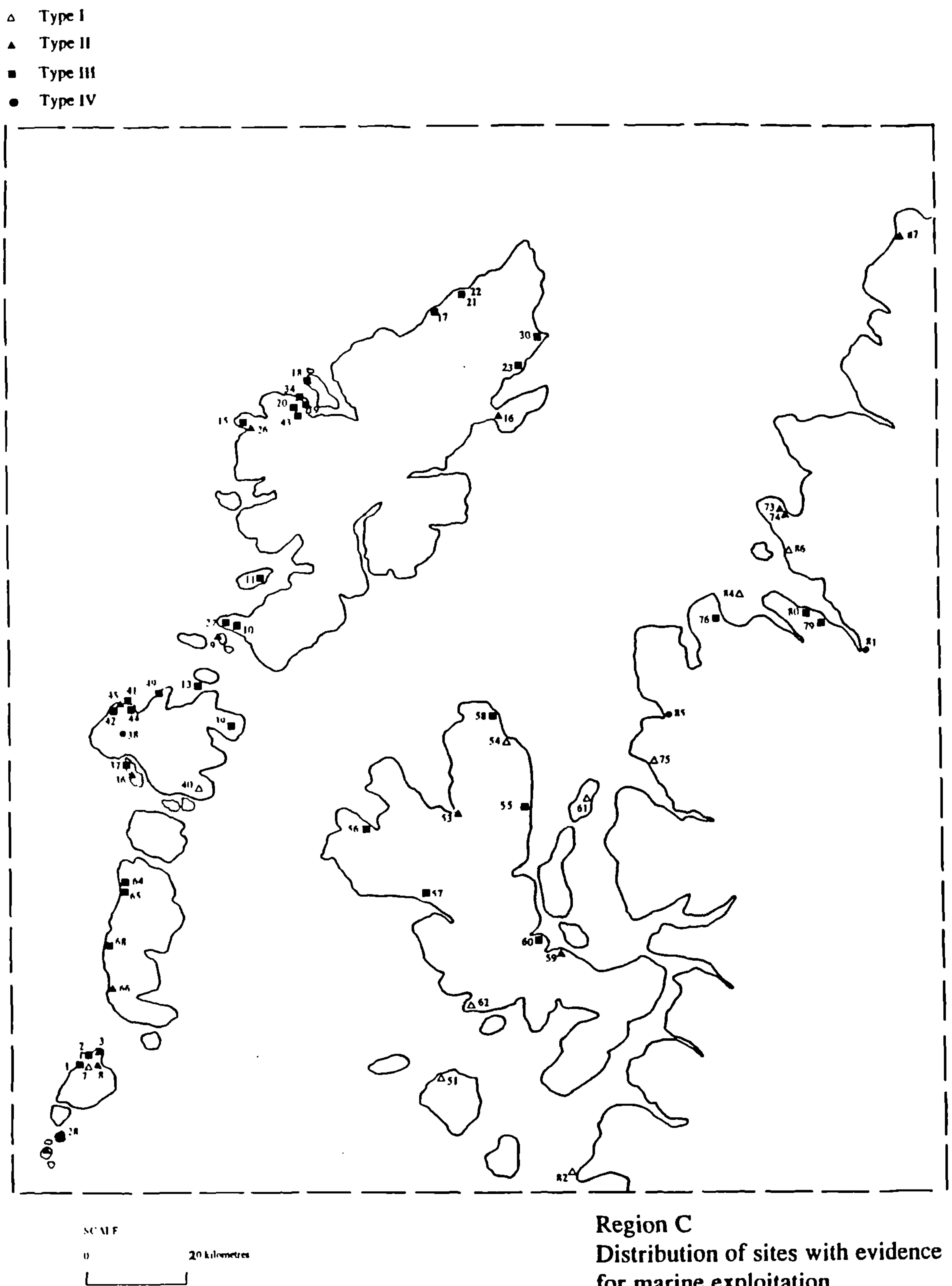
See corpus for site details

fig 32. Mapof Region A



Region B
Distribution of sites with evidence for marine exploitation

fig 33. Map of region B



See corpus for site details

Region C
Distribution of sites with evidence
for marine exploitation

fig 34. Map of region C

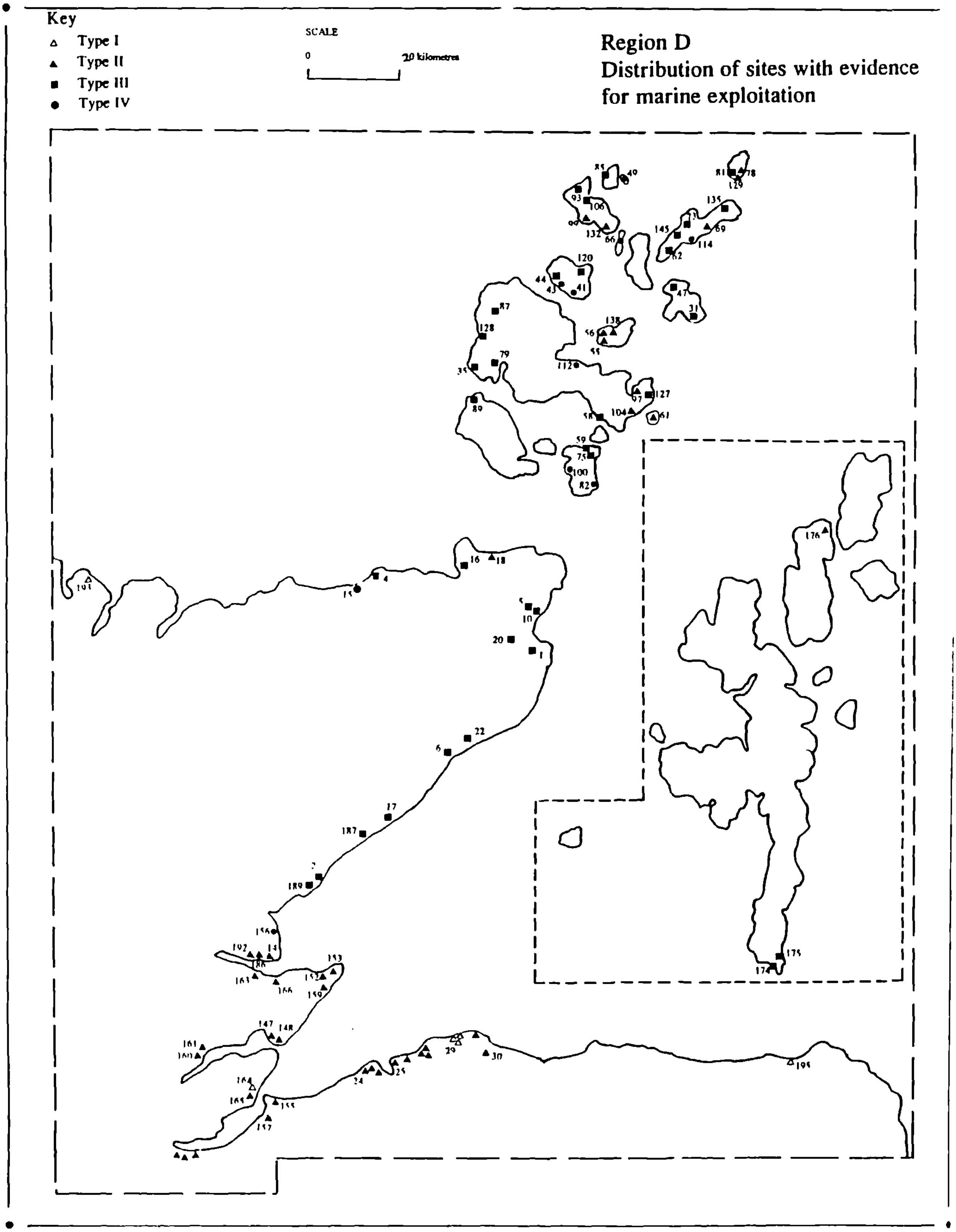


fig 35. Map of region D

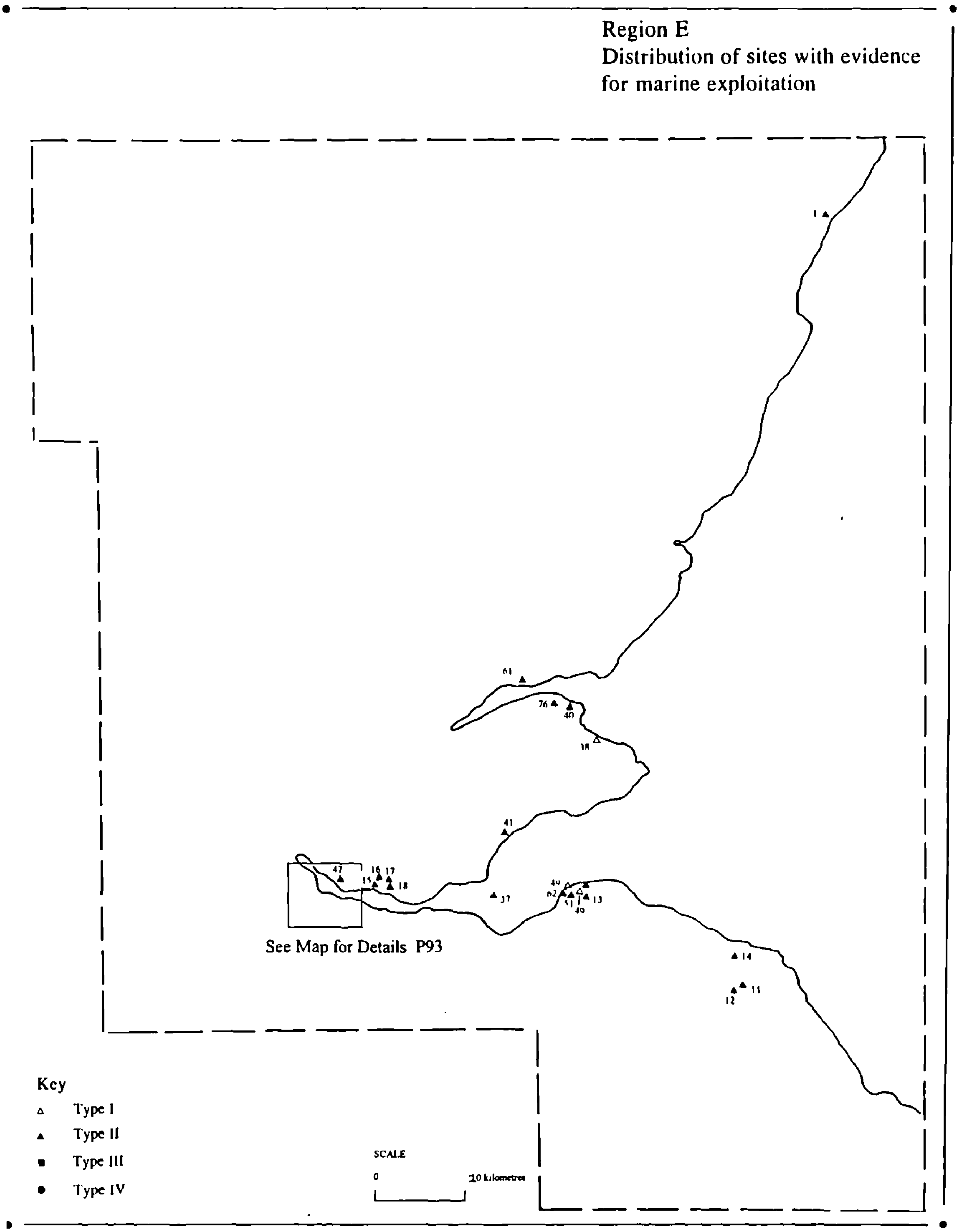


fig 36. Map of region E

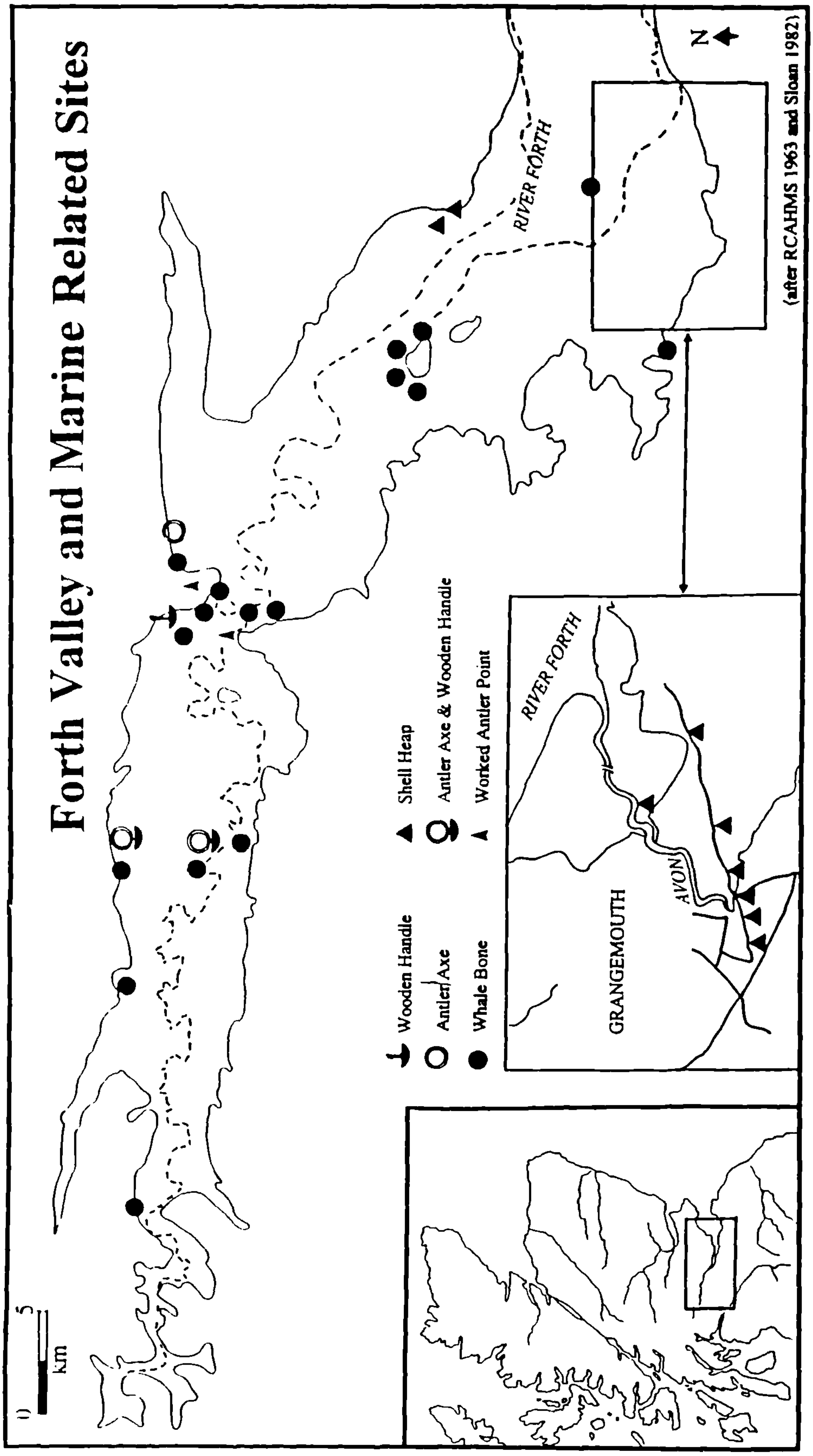


fig 37. Map of Forth valley and marine related sites

Bibliography

Abbreviations used

Glas. Archaeol. Journ. Glasgow Archaeological Journal.

Journ. Archaeol. Science. Journal of Archaeological Science.

Journ. Irish. Archaeol. Journal of Irish Archaeology.

Proc. Soc. Antiq. Scot. Proceedings of the Society of Antiquaries of Scotland.

T.D.G.N.H.A.S. Transactions of the Dumfriesshire and Galloway Natural history and Antiquarian Society.

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