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Discussion: middens of the sea peoples

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Introduction

When Julius Caesar wrote his description of Britain he distinguished between a people who inhabited the interior, lived off meat and milk, grew no corn, and claimed to be aboriginal, and recent Belgic immigrants who tilled the soil and controlled the coast. In much the same way, western Pacific populations distinguish 'bush people' from 'sea people', recognizing a distinction in settlement which is often also between an inland population of ancient ancestry and later maritime migrants speaking Austronesian languages of recent Asian origin. Whether the Holocene populations of Atlantic Europe were also divided between coast and interior, and variations in that by region and period, is the subject of continuing debate. Irrespective of its resolution, there is at least an archaeological sense of a newly focussed coastal adaptation during the Mesolithic which is manifested in shell middens.

The distribution of the Atlantic shell middens in space, time and relation to resource opportunities, was the central theme of the workshop. The papers fall into two groups: those that survey the nature of the archaeological resource; and those that focus more on issues of analysis and interpretation. I shall comment on these and then delve a little into Pacific archaeology in order to provide an additional perspective upon some matters of midden interpretation that are relevant to the Atlantic research agenda.

Atlantic façade

The review papers discuss the distribution and nature of shell middens along the 'Atlantic façade', which is here the European stretch of the Atlantic coastline. It shares more ecological similarity than the 35 degrees of latitudinal span might suggest, largely because of the influence of the Gulf Stream, but how far beyond resource similarity the Atlantic façade is a useful, so much as a convenient, appeal to regionalism, is not clear here. The appearance of a maritime Atlantic region in a cultural sense, as described by Cunliffe (2001), was rather later and its most convincing manifestations were dependent upon the development of effective seaborne mobility and trade.

The distribution and longevity of shell middens in the archaeological record, which here excludes Germany, the Low Countries and southern Britain, discloses considerable variation. Amongst the reasons suggested for that, history is widely acknowledged, both as a differing antiquity of systematic shell midden research which began in the 1830s in Denmark and 1880s in Portugal, but rather later in Britain, Ireland, France and Spain, and as evidence that shell middens were quarried and otherwise destroyed, particularly for agricultural lime (Andersen, Milner and Woodman, Wickham-Jones).

Coastal ecology is of obvious significance to distribution, given that shell middens in general are correlated with conditions suited to mass harvesting of molluscs. There are very few Mesolithic shell middens in Norway and Bjerck argues, the Skoklefald shell midden and its taphonomic implications notwithstanding, that the maritime geography of Norway lent itself with greater facility to fishing than shellfishing. The frequent unsuitability of isostatically-emergent rocky coastlines for intensive shell fishing is borne out on the Swedish west coast (Schaller Åhrberg), while the inverse proposition for drowned coastlines is demonstrated by Cantabrian Spain (Fano). The more common superiority of shallow, soft-shored coastlines for systematic mass

harvesting is shown in Denmark where there are thousands of shell middens and shell heaps (the Danish distinction is a formal one), especially of oyster, and notably during the late Mesolithic, *c.* 6000–4000 cal BC. Deposition continued into the Neolithic, reflecting a resource stability that seems to have diminished thereafter with declining salinity and water temperature. In fact, salinity correlates generally with the age-frequency distribution of Danish shell middens (Andersen).

The differential loss of early shell middens by the Flandrian transgression, and consequent changes in coastal geomorphology, are significant factors in other cases. Rising sea levels are held to account substantially for the absence of Mesolithic middens in the Orkneys (Wickham-Jones), southern Ireland (Milner and Woodman) and southwest France (Dupont *et al.*). Conversely, in the Tagus Basin (van der Schriek *et al.*), the advent of shell middens coincided with the onset of estuarine conditions, by rising sea level around 6200 cal BC. Shell middens then disappeared with continuing sedimentation and the development of fluvial conditions.

The onset of neolithicization with its different settlement patterns and a narrower focus amongst marine resources, as well as other changes in economic strategy and social organisation, are also thought significant in shaping the pattern of shell midden distribution. One factor underpinning those, though seldom modelled explicitly, must have been substantial increase in consumer demand by rising coastal population density, itself a function of the high nutritional status and cost-efficient procurement of coastal resources. It seems improbable that it could have been fully absorbed by agricultural production. If not, a continuing and significant contribution of marine resources to Neolithic economies could be expected. Andersen describes a Mesolithic-Neolithic continuity manifested in 'stratified' Danish middens. In north and east Ireland, there are some Mesolithic middens, but most seem to have begun in the Neolithic (Milner and Woodman), while in France, the geographical distribution of Mesolithic and Neolithic middens is virtually exclusive (Dupont *et al.*). Continuing maritime exploitation across the Mesolithic-Neolithic transition, especially of inter-tidal resources, seems to have occurred within different strategic contexts by district as well as more generally in the region.

Several of the technical papers also take up this issue, sharpened as it has been by debate (*e.g.* Richards *et al.* 2003; Hedges 2004; Milner *et al.* 2004) about the extent to which stable isotope analyses show that the onset of the Neolithic was marked by an abandonment of marine resources. Heron *et al.*, describe the early stages of a project to identify marine lipids in residues on sample sets of late Mesolithic versus early Neolithic pottery. Fischer, who has made the survey of Danish underwater sites of settlement and procurement his own speciality, argues that fishing weirs have a Mesolithic antiquity but developed stronger construction during the Neolithic. This implies significant continuity in, and perhaps even greater development of, coastal resource procurement after the Mesolithic. Fischer attributes declining $\delta^{13}C$ values across the Mesolithic-Neolithic transition to relatively increasing eeling which, because of the anadromous habit of eels, can produce in human bone some stable isotope signatures in the terrestrial range, despite a diet rich in estuarine fish species. The more substantial Neolithic weirs might have been built to operate in both directions of eel movement, from freshwater to sea as well as the reverse, according to season.

The problem here is that there are relatively few faunal data to show that eels were processed on a sufficiently large scale at Neolithic midden sites to exert the proposed impact on isotope distribution. The relative scarcity of eel remains is a problem elsewhere too. Mass harvesting of eels was a major industry in late prehistoric New Zealand, and it continued as a traditional Maori activity (Beattie 1994). Substantial weirs and traps were used on rivers and estuaries, very like those in Denmark, and eels were dried for storage. Remains of eels, however, are exceedingly scarce in middens. One possibility is that since dried eels were seldom headed or boned, and were generally taken elsewhere for consumption, they simply bypassed the coastal middens. Even at consumption sites, eels were often eaten bones and all, and dogs accounted for anything left. A similar problem, and possibly a similar solution, at least in part, may apply more generally to the decline in fish remains, as observed in post-Mesolithic Irish middens (Milner and Woodman). It is worth pointing out that in Oceania people usually prefer to eat fish heads than bodies because of their sweeter taste and higher fat content. They just crunch up the bones of the smaller fish. Coprolite analysis might assist in establishing the former proportions of eel consumption.

For other fish taxa, there is some direct midden evidence of selective targeting. Schaller Åhrberg found abundant fish bone at Dammen and argues that the narrow diversity, mainly herring and cod, suggests two specialised techniques, seining and longlining respectively, and that the catch may have been preserved for storage; in fact, that fishing for storage might have been common during the Mesolithic. Were it so, then the question arises of whether many shell middens in the Mesolithic were more often used for mass-harvest and

preservation of shellfish and fish, such as eels in Denmark, than as places of group residence in the longer term. That, in turn, would question the literal accuracy of the venerable term 'kitchen-midden' and, more importantly, open issues about anthropogenic impacts upon local resource stocks.

Resource depletion

Holocene anthropogenic resource depletion was raised in several papers, although it is not an important issue, yet, in Atlantic midden research. However, the addition of an historical and archaeological record to the ecological understanding of changes in marine ecosystems and the issues of conservation is becoming an important inter-disciplinary research programme (Jackson *et al.* 2001; Berkes *et al.* 2006; Braje *et al.* 2006), to which the Atlantic archaeological data will almost certainly become of interest as the subject develops its antiquity of enquiry. It is worth considering some aspects of the archaeological study of anthropogenic marine resource depletion here.

It was raised briefly in relation to changes in shellfish size in level 4 at Pico Ramos cave. However, as level 4 represents an occupation of extended but unspecified length from the late Mesolithic into the Neolithic (Zapata *et al.*), the plausibility of this proposition is uncertain. Some remarks on size-reduction in patellid limpets between Azilian and Mesolithic layers from Cantabrian Spanish sites (Fano) raises the same issue. Mannino and Thomas, likewise, in applying a refined oxygen-isotope analysis of *Monodonta lineata* for seasonality to the Culverwell midden, have identified a possible pattern of resource depletion through intensified exploitation. The trend occurred across a period of about 700 years, within which the Culverwell samples from layers 9 and 8 were separated by nearly 600 years. Might this have given sufficient time for recovery in shellfish beds? It depends, of course, on whether shellfish exploitation is assumed to have continued during that interval, but from other, and possibly vanished, sites. At any rate, trends in data need to be matched by appropriate temporality in the construction of interpretations.

Another perspective upon resource depletion is opened by evidence from the first site to be discovered in the Shetlands with Mesolithic deposits (Melton and Nicholson). This has characteristics of resource depletion associated with initial island colonization. It had a lower midden of various shellfish taxa, amongst which some individuals were unusually large, and bones from marine mammals and birds, and an upper midden composed almost entirely of cockle-shell. The middens were separated by dune sands, and it may be unlikely that local resource depletion accounts significantly for the change in contents between them, but nevertheless the chronology is relatively brief, perhaps not more than a century or two, and the lower midden is just what might be expected from a colonization site. In Norway, too, there seems to have been an early emphasis upon sealing which switched later to fishing and marine fowling (Bjerck).

That is a suitable point at which to describe some comparative evidence from large and small Pacific islands. New Zealand (267,000 km^2) lies between the United Kingdom and Norway in size and coastline length and occupies a similar mid-latitude maritime position. Unlike those, it has a very brief prehistory of no more than 500 years, from the thirteenth century when it was colonised by Maori from eastern Polynesia, until European settlement at the beginning of the nineteenth century, by which time the Maori population had reached 80–100,000. At the beginning of the settlement sequence, when tuber agriculture was incipient at best and, in any case, probably restricted to the northernmost district, there are extensive, concentrated, shell midden sites that, like many of those in the Atlantic Mesolithic, were also the main settlements, or situated close to them. The Shag River site, for example, extended across 3 hectares on a sand-spit between sea and estuary as a small village of huts marked by 44 hearths. The middens contained remains of an estimated 6000 moas (Dinornithiformes), 7000 marine mammals, mostly fur seals (*Arctocephalus forsteri*), 7000 dogs, 50,000 small birds, 180,000 fish and 10 million shellfish (Anderson *et al.* 1996). At Wairau Bar, a 7 hectare site of similar type and location, which also contained about 50 human burials, there were an estimated 33 tonnes of bone representing 4,000–12,000 moas butchered and 1600 tonnes of shell, mostly cockle, in addition to unquantified but common remains of dog, dolphin, seal and fish (Anderson 1989).

The distribution of faunal remains in these and other early shell midden sites throughout New Zealand, consists typically of a basal concentration of bones from high value but vulnerable resources such as moas, other flightless birds, and seals mixed in a dense, greasy deposit of charcoal, ash and burnt rock from cooking, with shell and fish bone middens located above (Fig. 18.1). Moas and many other flightless birds disappeared within 150 years of colonisation and seal breeding colonies retreated from northern (34° South) to southern (46° South) latitudes over about 400 years (Smith 2005). Within any particular site, however, faunal change by resource depletion occurred extremely rapidly. For example, both Wairau Bar and Shag River can be shown, by large suites of radiocarbon

dates on different sample materials (charcoal, bone, shell, eggshell), to have been occupied for only a few decades each (Higham *et al.* 1999). It has been argued that the large, early, midden sites were 'transient villages', occupied year-round by groups of 50–150 people who moved to other locations when resources became substantially depleted, thereby creating a serial settlement pattern (Anderson and Smith 1996). The transient village mode depended on an ability to move to another location of pristine resources, but as population increased, probably rapidly (2–3% natural increase in the first century or two of colonisation) and as territoriality developed, both facility of movement and economic opportunity declined. This is manifested by evidence of rapidly shortening exchange networks in obsidian and adzes, and the disappearance from settlement patterns of the large coastal villages within 300 years of initial colonisation.

Exploitation of fish does not seem, generally, to have produced unequivocal evidence of resource depletion (Leach and Davidson 2001). Some reef fish, such as labrids, may have been depleted (Leach and Anderson 1979a) and there were some changes in species ranges, which are more probably environmental in origin (Anderson 1997, in press), but as a rule zooarchaeological evidence of the main species targeted in prehistoric New Zealand discloses no changes of plausibly anthropogenic origin. It is argued that the fish populations were too large, too inaccessible for much of the time, and too mobile to be vulnerable to pre-industrial fishing levels (Anderson in press). Shellfish patterns are different, at least locally. There are various instances of apparent resource depletion, especially in rocky shore shellfish, including crayfish (Rowland 1976; Swadling 1976; Leach and Anderson 1979b; Anderson 1981), but also of recovery of stocks, and of changes in range caused by climatic change (Szabo 2001).

If, for the sake of argument, the palaeoeconomic sequence from New Zealand is regarded as encompassing phases of subsistence behaviour and transitions that were analogous to those of Mesolithic and Neolithic Atlantic Europe, then what might it suggest? First, it shows that much of the resource depletion is likely to have occurred very early in the long-term exploitation sequence. Where there had been late Palaeolithic maritime economies along the Atlantic façade, they may have re-shaped faunal diversity significantly before the Mesolithic. Second, where the Mesolithic represents the initial substantial focus upon coastal resources, depletion of larger taxa may have occurred very rapidly and could be represented in only the basal occupation level. That proposition could be reversed, of course, to test whether Mesolithic, or indeed Neolithic, shell middens marked the initial rise of systematic coastal harvesting.

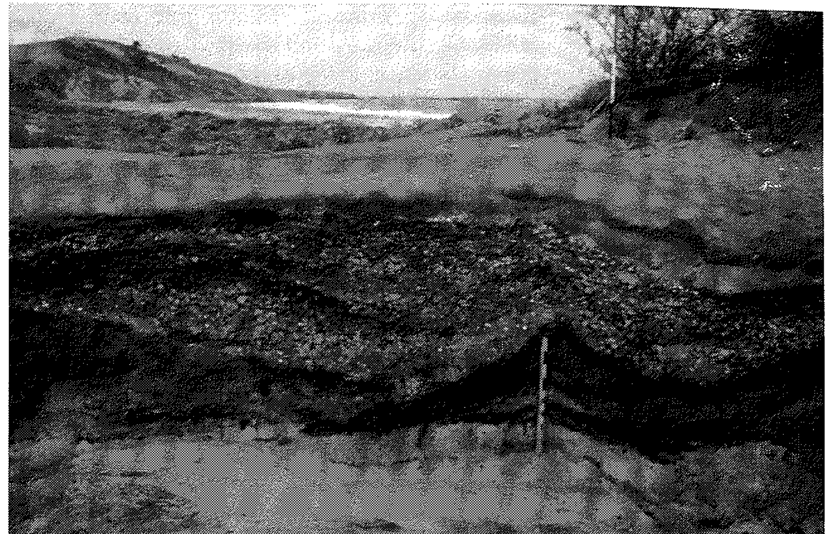

Fig. 18.1: Section through midden at Shag River Mouth, showing black layers with megafaunal bone below and shell middens above.

Turning to the relatively small islands of tropical Oceania, there is a similar pattern of early resource depletion, although it characteristically involved the loss of turtles, flightless birds, colonial, ground-nesting seabirds (Moniz 1997) and large coral reef gastropods, for example in Tonga (Steadman *et al.* 2002), Norfolk Island (Anderson and White 2001), the Marquesas (Rolett 1998) and the Gambiers (Conte and Kirch 2004). Over Polynesia as a whole, it is apparent that seals, sparsely distributed in tropical waters, disappeared very soon after human arrival (Walter and Smith 1998), while there was a massive decline in the abundance of turtles, especially the Green turtle (*Chelonia mydas*). In early tropical Oceanic sites or layers, turtle remains can reach up to 50% of the estimated meat weight, but their contribution dropped rapidly (Allen 2003). Other large taxa which occur in the earliest sites or layers, but not thereafter, included many large flightless birds, notably giant megapodes such as *Sylviornis neocaledoniae*, land crocodiles, such as *Volia athollandersoni* from Fiji, and other reptiles such as giant iguanas and varangid lizards (Worthy *et al.* 1999; Steadman *et al.* 2002).

The succeeding emphasis upon fish and shellfish brought similar but generally slower trends. Both large-bodied reef fish, and the larger reef and lagoon shellfish taxa declined in relative abundance or size-frequency but over longer periods of up to several thousand years (Kirch and Yen 1982; Butler 2001; Allen 2002). There is also some evidence to show that fishing in general declined during tropical Oceanic prehistory, but whether because of depleted near-shore fish stocks or by attention shifting towards more

intensive agriculture, remains uncertain (Allen 2003). Clearly, the point to draw from the tropical island evidence, is the demonstration of density-dependence in resource depletion; higher relative consumption or, to put it the other way, relatively lower resource stock, on and near smaller islands, produced greater vulnerability to anthropogenic change for fish and shellfish than in large islands like New Zealand. From an Atlantic point of view, the greater probability of resource depletion probably lay in localized, topographically well-separated, fiords or bays than in the low relief and sheltered waters of northeast Denmark, for example, where resource patches were more readily accessible, one to another.

In Oceania, and in some other regions of midden research, notably in North America, changes in coastal resource harvesting patterns have been investigated largely in terms of the various theorems of optimal foraging theory (*e.g.* Anderson 1981; Nagaoka 2001, 2002), which is suited particularly well to relatively brief and intensive periods of procurement and deposition where the impact of the exploitative thrust can be measured without compromise by significant natural recovery or environmental change, or at least where it is possible to take those into account. Optimal foraging theory is an approach to investigating change in midden sequences that is not mentioned in the current papers, even where the evidence seems to warrant its consideration, *e.g.* in the Dupont *et al.* discussion of changing 'selection' patterns in French middens. Of course, much depends upon being able to dissect the structure of shell middens in terms of constituent episodes of accumulation. Nielsen shows that variation in land snail composition can be used to define stratigraphic points at which surfaces became exposed, a useful idea, and Estevez *et al.* describe their precise identification of successive occupational units of middens in Tierra del Fuego. However, the New Zealand experience, at least, shows that for the larger sites there is no substitute for very substantial radiocarbon dating programmes in order to determine the tempo of midden deposition. Where it turns out to have been mainly rapid, anthropogenic environmental impacts are correspondingly more probable. Indeed, different temporal modes of accumulation could be interpreted in terms of consumer ecology. It could be argued (after Dechaume-Monmarchont *et al.* 2005), that where the main resources were relatively predictable and accessible, as in the case of important marine resources, the efficient means of exploitation was by consumer clustering, but where resources occurred temporarily and somewhat uncertainly, the optimum strategy was consumer dispersal. Variation of this kind would lead, in the first case, to rapid accumulation and a higher probability of faunal depletion in vulnerable taxa, and in the second, to slow accumulation with change, where it occurred, representative mainly of environmentally-induced transitions.

Becoming sea peoples

Beyond the nature and distribution of middens lie many other questions about how and why marine resources became so prominent in the early and mid-Holocene along the Atlantic façade. One that interests me is, to what extent was it connected with a new technology and ideology of the sea? If one new element might have driven a new relationship between sea and people it was surely the boat. Boats replaced a largely oblique view of the sea as a reflective surface beyond which knowledge of its depths was substantially confined to what it cast up on the shore, with a new vertical penetration by sight and technology, and an ability to undertake horizontal movement across it. Dugouts occur from the early Mesolithic in Atlantic Europe and they doubtless facilitated a new capability in inshore fishing, including line and net fishing, spearing and the construction of weirs and traps, not to mention inshore travel and carriage of cargo. A tiny insight into the late Mesolithic status of the dugout is afforded by the intricate decoration on two paddles at Tybrind Vig, Denmark (Cunliffe 2001, 123). The boat was not just a subsistence platform, as we know from its ritual significance in later rock art. In the north Atlantic, it was probably the early development of skin boats that was critical to coastal expansion, notably in Norway where it occurred very rapidly (Bjerck). The antiquity of skin boats is unknown, but if the identification of a possible skin-boat rib at Husum, North Germany, is correct, then it might reach back to the Ahrensburgian culture (Ellmers 1984), and possibly earlier.

In Polynesia, hardly surprisingly, the sea dominated ideological expression; Tangaroa, god of the sea, was usually the most powerful deity, islands were frequently conceived as fish that had been caught by great culture heroes such as Maui, and they were divided like large fish, with territories assigned either side of a 'backbone' and the 'head' and 'tail' nominated. Social organization flowed from the original canoe ancestors and, in New Zealand, the waka, or canoe, was the highest segmentary descent category. These and other aspects of society reflected the dominating role of the sea in people's lives. Was it also true of the Mesolithic sea people in Atlantic Europe; did the new level of engagement with the sea entail a wholesale re-arrangement of social patterning and ideology? That could have occurred very quickly

and quite profoundly, as in the startling reversal of European attitudes to the sea and shore, from horror and disgust to delight and fashionable enthusiasm, which occurred in barely a century, AD 1750–1840 (Corbin 1994). It was part of the Romantic movement but it was more than literary and artistic. Marine science, medicine and a nascent concern for the depletion of marine resources were encompassed *inter alia* in an enduring paradigmatic change. Why not also in the Mesolithic?

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