Shell artefacts from northern Cape Range Peninsula, northwest Western Australia

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Abstract

This paper describes a range of flaked, ground and utilised shell artefacts that were recorded and analysed as part of a broader study of archaeological sites in a section of arid coastal northwest Western Australia. Despite the relative profusion of shell artefacts in the study area, ethnographic sources for the Cape Range region do not reference the making or using of shell artefacts by Aboriginal people. Previous and recent archaeological research in the Cape Range region are discussed and a shell artefact assemblage with components such as baler shell pendants, knives and dishes, shell beads and giant clam shell adzes is identified. Shell artefacts have been generally neglected by archaeologists in Australia, but are potentially a substantial source of information regarding the function of archaeological sites. This paper provides a resource for the identification of shell artefacts from sites in coastal northwestern Australia.

Introduction

Despite the prominence of implements made from shell in ethnographic collections and historical descriptions of material culture from coastal Aboriginal peoples in Australia (e.g. Roth 1904; McCarthy 1976; Akerman 1973, 1975), there is a relative dearth of research that describes utilised, flaked and ground shell artefacts from Australian archaeological contexts. This is particularly the case for coastal Western Australia. Recent research has investigated implements and pendants made from baler shell, giant clam and other large bivalves found on coastal shell middens in Cape Range Peninsula. This paper describes the range of shell artefacts that were encountered and recorded in Aboriginal midden sites in Cape Range Peninsula while undertaking doctoral research in a section of this arid Western Australian coastline.

The study area

Cape Range Peninsula is the westernmost extent of the Australian mainland, and is an 80 km long extension of limestone range and coastal plain jutting into the Indian Ocean. The peninsula is flanked by Ningaloo Reef to the west and Exmouth Gulf, a large, shallow, mangrove edged embayment, to the east. Cape Range Peninsula lies at the western edge of the arid zone, and the flora and fauna in the bioregion reflect this. Although arid, proximity to the sea has a slightly ameliorating effect, and conditions are not as harsh as they are further inland with respect to temperature. As a result, Cape Range is home to a diversity of plants and animals, and is unique in offering a mixture of desert, coastal and rugged limestone landscapes. The study area for this research is a 15km section of coast, coastal plain and limestone range at the northernmost tip of Cape Range Peninsula (Fig. 1).

More than 60 shell midden sites were located and recorded in the northern tip of the peninsula during fieldwork undertaken as part of doctoral research during 1997-1999 (Fig. 2) (Przywolnik 2002a). Detailed mapping and surface collections were undertaken at a sample of eight middens. Shell middens are located in a wide spectrum of coastal and sub-coastal environments, but are generally found in dune blowouts and swales behind the foredunes. Midden deposits in Cape Range Peninsula vary considerably in size, composition, location and density. All of the recorded shell middens in the Cape Range region are unstratified surface sites, ranging from dense surface accumulations of marine shell and artefactual stone to small sparse scatters of one or two species of shell (Fig.3) (Przywolnik 2002a; Morse 1996). As I have argued elsewhere, the regular occurrence of severe weather in the form of tropical cyclones is a contributing factor to the appearance and condition of the sites (Przywolnik 2002b).

Radiocarbon dates on samples of marine shell have been obtained from several midden sites in Cape Range Peninsula. Obviously, using archaeological material from an unstratified open site subject to all manner of turbation and climatic processes does not produce as reliable a sequence as would perhaps be obtained from other stratified sites. The nature of the middens precludes the use of familiar stratigraphic principles, such as the principle of superposition, therefore the dates obtained from these midden sites can only be interpreted as isolated dates for a single occupation episode at each site, rather than accurate estimates of initial, or even final,

Figure 1: Map showing inset of study area and midden sites in the Cape Range Peninsula, northwest Western Australia.

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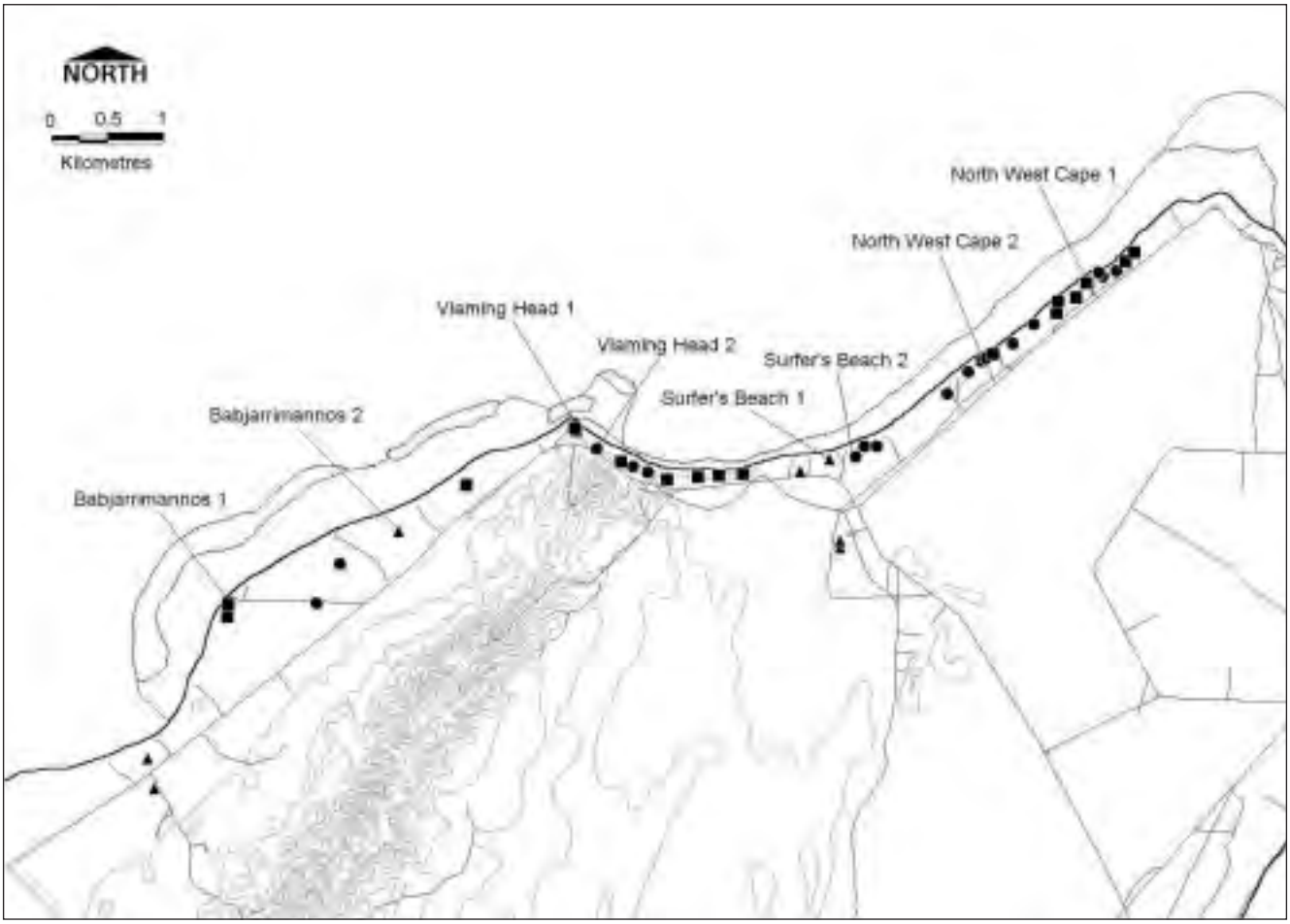

Figure 2: Map of the study area.

Figure 3: Shell middens in Cape Range peninsula.

Site	Sample material	Uncalibrated age	Lab. code	Sample location
Babjarrimannos Midden 1	Baler	960 +/- 50 BP	Wk 8467	Surface
North West Cape Midden 2	Terebralia	4830 +/- 70 BP	Wk 8468	Surface
Babjarrimannos Midden 2	Baler	5620 +/- 160 BP	Wk 8466	Surface
Mangrove Bay midden*	marine shell	109.2 +/- 0.8 BP	Beta 26269	surface
Low Point midden*	mangrove gastropod	4820 +/- 60 BP	Wk 1430	surface
Turquoise Bay North midden*	marine shell	5430 +/- 200 BP	WAIT 118	25-30cm
Coral Bay midden*	marine shell	5620 +/- 60 BP	Wk 1729	surface
Tulki Well midden*	marine shell	5660 +/- 110 BP	ARL 245	surface
Coral Bay midden*	mangrove gastropod	6270 +/- 120 BP	Wk 1728	surface
Mulanda Bluff midden*	mangrove gastropod	7210 +/- 70 BP	Wk 1429	surface
Warroora midden*	mangrove gastropod	7810 +/- 115 BP	SUA 1735	surface

Table 1: Radiocarbon determinations from coastal midden sites, Cape Range Peninsula (*Morse 1993a).

occupation. The radiocarbon determinations from Cape Range Peninsula midden sites are summarised in Table 1. All of the shell middens in this study are estimated to have been deposited during the mid- to late-Holocene. The composition of shellfish species in midden sites is consistent with excavated stratified rockshelter deposits and geomorphological information for the Cape Range region (Przywolnik 2002a).

Cape Range Peninsula ethnohistoric background

Even though European settlement of Cape Range Peninsula occurred relatively late in comparison with other coastal regions of Western Australia, documentation of the original Aboriginal inhabitants of the area is sparse. This is largely due to the perceived isolation and inhospitality of the area by settler Australians, and reflects the limited exploration and investigation of the area prior to the turn of the twentieth century. Over the period that I conducted fieldwork in the area, there were no Aboriginal people who claimed descent from the original inhabitants of the area (Dench 1998; Sid Dale, Aboriginal custodian, pers comm. 1997). As a result, very little is known about them, except what has been derived from archaeological research.

Cape Range Peninsula was designated as an area of limited agricultural potential and considerable hazard to shipping at an early stage in the state's settlement (Battye 1985). Consequently it received little in the way of the exploratory human traffic that traversed most other parts of Western Australia, particularly along the rest of the coast. Thomas Carter was the first pastoralist to settle in the Cape Range Peninsula region, establishing his lease at the southern end of the peninsula in 1889 (Vines 1968:11). Carter, who was also a dedicated ornithologist (see Carter 1902 for example), ran sheep on his pastoral lease in Cape Range for thirteen years, and was in constant search of permanent water for the entire time. The township of Exmouth only was gazetted in 1963, and was established as a service facility for the Australian/United States Naval Communications Station and the Harold Holt Naval Base (Kerr 1967:233).

E. M. Curr (1886) compiled and published details about a number of Australian Aboriginal 'tribes', one of which included the people in the Cape Range Peninsula region. The information came from an unnamed informant and describes the Cape Range inhabitants occupying an area extending from the North West Cape to thirty miles south of the Gascoyne River. In this publication, the groups of people occupying the area are called the "Kakarakala Tribe", and in the year 1877 were estimated to have numbered approximately 2000 (Curr 1886:302). Unfortunately, no explanation for the origin of the term "Kakarakala" is provided. The brief entry describes implements and weaponry used by the "Kakarakala" people such as spears, boomerangs, "chisels" and shields, scarification and some mortuary practices, and notes that they gathered grass seeds for flour and mangrove nuts which needed to be leached of their toxins. Curr also records that "for ornaments they wear around their neck rolls of string made of hair or bark, from which hangs a pearl shell" (Curr 1886:302). Interestingly, there is some discussion of the evidence of the impact of disease in the area, as "many of the tribe are strongly marked with small pox, which they call *moonnangno*, and say reached them from the eastward" (Curr 1886:302).

In 1940 Norman Tindale described the Aboriginal occupants of a large area including Cape Range Peninsula and extending to the Ashburton River in the east as Thalanyji (Tindale 1974). The Cape Range inhabitants were referred to as "Western Thalanyji", and were not seen to have a separate identity. Tindale refined this boundary in 1974 and names the Cape Range Aboriginal people Jinigudjira (current orthography uses 'Yinikutira' in preference to previous spellings [Dench 1998:4]), the western neighbours of the Thalanyji language group with territory extending from the northern tip of the peninsula to approximately Point Cloates in the south, and including the coastal strip of Exmouth Gulf north to Glenroy Station (Tindale 1974). The area east of the Yinikutira territory, including Onslow and the Ashburton River was designated Thalanyji, while south of Point Cloates, extending almost to Point Quobba, was Bayungu language group territory.

Tindale did not encounter any Aboriginal people belonging to the Yinikutira language group, and informants from neighbouring language groups described the Cape Range people as 'coast-frequenting people', who

> ventured out to sea on rafts of sticks. They also lived among the mangroves that line the eastern shore of the gulf as far north as Glenroy. Most of their food came from fish traps set in tidal estuaries. They spoke a language close to the Thalanyji and were sometimes considered only to be western Thalanyji, but informants were sure that they had separate identities for a long time (Tindale 1974: 243).

A very brief entry in Bates' catalogue of tribal organisation from 1911 lends general support to Tindale's assertion that the Cape Range Peninsula Aboriginal people maintained a separate identity from their eastern neighbours. Although the Cape Range people are ascribed a different name, Bates wrote that

> The peninsula whose apex is the N. W. Cape appears

> to have been occupied at one time by some Tallainji who were called Mulgarnu (turtles) probably from the fact of the turtle forming their chief food in the turtle laying season. There are no Mulgarnu now living (Bates nd:26).

Ethnographic and linguistic research with neighbouring Aboriginal groups has provided brief references to the Yinikutira people, which in general support Tindale's suggestion of a separate identity for the Cape Range people (Dench 1996; Randolph and Wallam 1986; Turner 1985). Patterson used the word Karlakunyayi to describe the Yinikutira people, which he translates as "own fire" (Dench 1996:2).

As far as I am aware, there is no one living who claims direct descent from the Yinikutira people who once occupied Cape Range Peninsula (Dench 1998; also Sid Dale, Aboriginal custodian, pers. comm. 1997). The exact details of what happened to the Aboriginal people of Cape Range is something of a mystery and suggestions from ethnographic and linguistic research in the regions south and east of the peninsula are that a combination of diseases of European origin and the barbaric practice of 'black birding' up and down the northern Western Australia coasted placed pressures on the Yinikutira so great that groups either died out entirely or vacated the region. For this reason archaeological research has been given a special emphasis by those Aboriginal people who now have custodianship of Cape Range, and who wish to know more about its history and significance.

The only real ethnohistorical resource from the Cape Range Peninsula region is an account of a shipwreck in 1876 and several months subsequently spent living with Aboriginal people written by the two sole survivors. After a series of adventures on the Cape Range coast the survivors, two young men aged 17 and 20 years, managed to get back to their homeland of Ragusa (now Dubrovnik), and had their story recorded in Italian by a Jesuit priest, Father Stefano Scurla roughly a year after they returned home. A copy of the original manuscript was kept by the family of one of the castaways, which was translated in 1920 from the Italian into English (Dench 1998:2). In 1990 Gustav Rathe, the grandson of one of the survivors, published a novel more or less based on the 1920 translation (Rathe 1990). Since then, another translation of the manuscript has been made by Amadeo Sala, which unlike the novel, claims not to have omitted or altered any of the original material (Scurla 1996: II-V).

The manuscript contains considerable description and discussion of the daily activities of the Yinikutira, particularly concerning food gathering, hunting and the locating of drinkable water. Marine resources are, according to the document, the main foods collected and gathered by the Aboriginal group. Some species of marine life were favoured over others, and some were avoided all together. Fish, turtles and dugong appear to the be the most commonly hunted and eaten animals, while

> they are unwilling even to taste shell fish and octopus, and even refrain from touching the latter with their hands. It is not easy to understand whether their repugnance for these creatures is the result of unjustified fear, or of superstition (Scurla 1996:56-57).

This is a particularly interesting observation, because archaeological evidence from all sites in Cape Range Peninsula suggests that this has not always been the case. Indeed, given the prominence of shell scatters in the archaeological record of the area, it seems somewhat unlikely that Aboriginal people did not consume shellfish. Morse suggests that the account is consistent with Meehan's (1982) observations of the role of shellfish in the diet of the Anbarra people of Arnhem Land, where shellfish provided a reliable 'last resort when other less reliable or predictable subsistence strategies fail' (Morse 1993a:61). It is also possible that these observations occurred during a time of the year when shellfish gathering was less productive or that they were moving through a territory where favoured shellfish species were not available or abundant, or indeed that other more appealing resources were available in the area at the time that these observations were being made.

A section of the manuscript described the tools and weaponry of the Aboriginal group (Scurla 1996:57-59), the weaponry apparently being of more interest to the storytellers. The boys described mostly wooden implements, spears, spear-throwers, boomerangs and a shield, and spears affixed with kangaroo bone and teeth barbs hafted with resin, and a spear used exclusively for fishing. Despite the prevalence and variety of wooden implements in the castaway's account, no wooden artefacts have been found in archaeological contexts in Cape Range Peninsula. Interestingly, the manuscript does not contain any reference to Aboriginal people either making or using shell artefacts.

Artefactual Shell in Oceania and Australia

Modified and utilised marine shell features strongly in archaeological assemblages from the Oceania region (see for example Kirch 2000). Shell beads and fish hooks dating from 5500 BP were found in the rockshelter site of Bui Cero Uato in eastern Timor, as well as an edge-ground and polished *Tridacna* adze dated to 2500 BP (Glover 1986:117-118). Shell artefacts from southeast Papua play a more ornamental and decorative role, and commonly occur in three forms, shell armlets, discs and 'triangles' made from *Melo amphora*, *Trochus* sp. and *Conus* sp. The three artefact types and have been noted both archaeologically and ethnographically (Egloff 1979:91-94). Small shell pierced ornaments and beads were found in excavations from the rockshelter sites of Batari and Kafiavana in the Papuan eastern highlands (White 1972:22, 96). Pierced and ground shell beads, pendants and armlets were recovered from archaeological sites on the Papuan island of Mailu, as well as two fragments of bladelike *Conus* sp. adzes with ground edges (Irwin 1985:222). Bivalve fishnet sinkers were also found in archaeological contexts in Mailu, and are characterised by a hole 'bashed' close to the valve hinge where the shell was threaded to the net (Irwin 1985:223). Spenneman (1993) lists numerous references to the use of *Cypraea* sp. (cowrie) as vegetable scrapers and peelers and fishing aids both archaeologically and ethnographically.

A majority of the artefactual shell from Pacific islands sites is chronologically limited to the late Holocene. Sites from Island Melanesia however have produced fragments of worked marine shell dated to the late Pleistocene, indicating that in some areas shell working is part of a long tradition (see for example Smith and Allen 1999). Of particular relevance to this study is the occurrence of flaked *Tridacna* adzes from Pamwak rockshelter in the Admiralty Islands. The two artefacts are edge-ground valve sections dated to 11, 000 BP, and are accompanied by similar edge-ground stone implements in the same stratigraphic layer (Fredericksen et al. 1993).

Archaeological and ethnohistorical evidence for shell

modification in Australia is not as profuse or diverse as that in the Pacific region, but is by no means less significant. In Australia, most modified shell is found in coastal or coastal hinterland sites, although some modified shell (particularly baler and pearl shell pendants) has been found in both coastal contexts and well inland, the latter a result of long distance trade networks. Some artefactual shell types have limited distribution, such as shell fish hooks, while other less specialised types have more general distribution across the continent. Shell fish hooks are found only along the eastern coast of Australia, and date to no earlier than 1200 BP (Sullivan 1987:98). The hooks were made by filing a discoid section of marine mollusc shell into the desired shape using a stone file, and many sites in eastern Australia contain fish hooks at various stages of manufacture (e.g. Lampert and Turnbull 1970; Bowdler 1976; Rowland 1981; Dyall 1982). The shell hooks share some morphological similarities with Pacific Island examples (Lourandos 1997:210-211).

Roth describes a number of modified shell artefact types observed in use and manufacture during ethnographic fieldwork in Cape York Peninsula during the late 1890s (Roth 1904). The most common shell artefacts were scrapers, fish hooks and dishes, that were made using a variety of shell species including *Melo* sp. (and other Volutidae), *Tridacna* sp., *Nautilus pompilius*, *Donax* sp. and *Strombus* sp. Roth also notes that freshly dead shells were preferred for working as the lines of fracture were more predictable and controllable; long dead shells were considered unsuitable for modification unless they had been soaked in water for a few days (Roth 1904:11).

Shell pendants for body ornamentation and ritual use have been recorded in many parts of Western Australia, both coastal and inland (Akerman 1973, 1975). Pendants were, and still are, made most commonly on pearl shell and baler shell, and many examples of engraved and ochred pearl shell pendants have been recorded in the Kimberley region of northwest Western Australia (Akerman with Stanton 1994). Shell pendants and pendant fragments have also been found that do not bear further ornamentation. McNiven (1998:7, 10) describes a fragment of broken baler shell pendant from northern Queensland, that he argues was fractured during the manufacturing process and was therefore discarded before the jagged edges could be ground smooth.

Shell pendants were made by first removing the calcareous outer layer of shell to prevent the shell from drying and splitting. The inner surface was then polished and ground to create a smooth surface and edge. To attach the pendant to hair or fibre string, one or more holes had to be drilled through the pendant, taking care not to split the shell. The shell was pierced using a fine pointed tooth or stone flake, either by incising two deep grooves perpendicular to each other on each side of the shell and then puncturing a hole at the mid point, or by twisting the incisor in a drilling motion of both sides of the shell to eventually produce a circular hole. Both methods of puncturing left distinctive patterns of wear on the pendant: the groove method leaves linear channels on both sides of the shell where the hole is, and the drilling method produces a hole with a bi-conical section. However further enlargement of the hole would sometimes obliterate these wear patterns. Pendants could also be attached to string using heated resin in a method similar to hafting stone tools to handles. Not all pendants were pierced, and some ground and polished shells intended for ritual use were incorporated into composite objects by binding with fibre (Akerman with Stanton 1994:1-4).

Akerman (1975:18) and Akerman and Bindon (1984:367-368) describe edge ground shell adzes from the Dampierland Peninsula in northwest Western Australia. Akerman and Bindon (1984:363) illustrate two edge ground baler shell adzes, one a blade collected from a surface scatter near Beagle Bay mission, the other a hafted specimen collected in 1932 from Sunday Island. Both adzes have been ground on all lateral margins to form a roughly oval blade of around 5-7 cm in length. Akerman and Bindon (1984:370-371) note that flaked adze forms, such as tulas and burrens, are absent from the areas in the Kimberley where edge ground stone and shell adzes were manufactured and used, arguing that they filled roughly equivalent places in the woodworking toolkit of the Kimberley region. They also note that shell edge ground adzes are found in areas where suitable stone materials for the manufacture of edge ground stone adzes is rare or absent (1984:367).

Modified *Geloina coaxans*, a mangrove dwelling bivalve, has been recovered from several archaeological sites from northern Australia (see for example O'Connor 1999; Schrire 1982; Beaton 1985). In all cases, flaking, chipping, polish and use wear along the lip margin was interpreted to be a result of the implement being used as a scraper, for processing moderately hard organic materials.

Also from the Kimberley region of northern Australia, Balme (2000:4) describes fragments of *Dentalium* sp. shell from the Pleistocene sediments in Riwi (dated to between approximately 30,000 and 40,000 BP), one of the caves in the Mimbi Caves complex near Fitzroy Crossing. The marine shell fragments have smooth openings, which Balme suggests indicates their use as beads. The Mimbi Caves are currently 300 km from the coast, and at 30,000 BP would have been further still as a result of lowered sea levels (Balme 2000:4).

Identifying modified shell implements in archaeological contexts

Identifying culturally modified shell in archaeological sites can be somewhat problematic. While stone can retain the characteristic attributes of modification, such as flake scars, bulbs of percussion, ridging or use wear, over long periods of time shell is a much less durable material, and in many contexts is highly susceptible to weathering and degradation. The exterior attributes of modification may be less distinguishable, if not completely removed, by exposure to the effects of wind, water and chemical action in both open and stratified sites.

Spenneman (1993) conducted experiments designed to simulate and test the action of 'natural' processes such as wave action on cowrie shells. The results were interpreted to show that biogenic processes could not readily be distinguished from anthropogenic processes in particular shell tools types (vegetable peelers, net sinkers and octopus lures), and Spenneman suggests that an examination of use wear on the individual artefacts may be the only recourse for determining whether a shell has been modified by humans or not (Spenneman 1993: 47). It should be noted that while his study highlights one of the problems inherent with shell artefact identification, Spenneman's study is specific to cowrie shell implements found in Pacific Island archaeological sites only, and his results are not applicable to other shell types or tool types.

Previous research into artefactual shell in Cape Range Peninsula

Archaeological excavation of Mandu Mandu Creek rockshelter (Fig. 1) in 1989 uncovered, amongst the artefactual stone, ochre, terrestrial bone and marine shell and bone, 22

Site	*Melo Amphora*				*Tridacna maxima*					Other Bivalve	TOTAL
	Dish	Knife	Pendant	Utilised flake	Whole adze	Broken adze	Utilised flake	Flake	Core	Utilised valve	
Babjarrimannos 1	nil	nil	nil	nil	nil	nil	2	6	1	nil	9
Babjarrimannos 2 A	nil	nil	nil	nil	nil	nil	1	3	3	nil	7
Babjarrimannos 2 B	nil	nil	nil	nil	1	1	2	4	nil	1	9
Vlaming Head 1	nil	nil	1	nil	nil	nil	3	6	1	nil	11
Vlaming Head 2 A	nil	nil	1	nil	1	2	3	4	3	nil	14
Vlaming Head 2 B	nil	1	nil	nil	nil	1	3	1	2	nil	8
Surfer's Beach 1	nil	nil	nil	1	1	2	9	11	4	1	29
Surfer's Beach 2	nil	nil	nil	nil	nil	nil	12	16	1	nil	29
North West Cape 1	1	2	1	nil	4	2	8	26	4	nil	48
North West Cape 2	nil	nil	nil	nil	nil	nil	nil	1	nil	1	2
TOTAL	1	3	3	1	7	8	43	78	19	3	166

Table 2: Number of shell artefact types per midden.

Figure 4: Baler shell dish on Surfer's Beach Midden 2.

whole and fragments of cone (*Conus* sp.) shell from the basal unit of one of the excavation squares (Morse 1993b). Morse argues that the shells display modification, use wear and evidence of size selection consistent with their use as beads, threaded on a string. The shell beads were recovered from an excavation unit dated to ca. 32,000 BP (Morse 1993b: 877), and are amongst some of the earliest artefacts of ornamentation in Australia. The Mandu Mandu Creek shell beads are unique and relatively well known, but are only one component of a broad range of shell artefact types found in archaeological sites in Cape Range Peninsula.

Morse also identified culturally modified marine shell on a number of shell middens in the southern parts of Cape Range Peninsula. She describes four types of shell modification, baler shell dishes, pendants, cone shell beads and abruptly flaked giant clam, although only the baler dishes and modified giant clam were recorded on the midden sites (Morse 1993a; Morse 1996). These pieces were identified as culturally modified shell by the negative flake scars along the working edge of the giant clam and the characteristic deliberate removal of the aperture and columella sections of the baler shells to create a rounded dish (Morse 1993a:84).

Three baler shell pendants have been collected from different locations in Cape Range Peninsula and handed to the

Western Australian Museum (Morse 1993a:80-81). One of the pendants was found in sand dunes near Point Murat in 1982 (Western Australian Museum number A15709), while the other two were found further south on the peninsula, near Yardie Creek, in the 1960s (C1745 and A13334). All three of the pendants have been edge ground to an elongated oval shape, and have holes at one end that appear to have been made by drilling through the shell on both sides. Two of the pendants are whole, and the third (A13334) is broken two thirds along its length with the pierced end intact.

Artefactual shell analysis

A total of 166 modified shell artefacts were recovered from the eight shell midden collections in this study. Seven categories of modified shell were identified, baler shell dishes, knives, pendants, giant clam adzes, flakes and cores, and whole or fragmentary shell with evidence of use or working along one or more margins. The distribution of modified shell in the midden sites studies is described in Table 2. Giant clam was the most common raw material for modification, comprising 93% of the total modified shell assemblage. Modified baler constituted 5% of the total modified shell assemblage, and the remaining 2% of assemblage was worked bivalves other than *Tridacna*. The collection from North West Cape 1 contained the most modified shell, and also presented the most diverse range of artefact types.

Baler shell dishes

Baler shells (*Melo amphora*) are large and thick, often measuring more than 35 cm in length, and were modified in a number of different ways. Baler shell dishes were made by removing the aperture, central columella and part of the apex and whorl, leaving a distinctly jagged edge where the shell has been removed. The remainder of the shell is left intact to form a rounded dish with steep sides (Fig. 4). Generally some of the thick, dense whorl is also left intact, and the heaviness at the base of the dish enables the dish to stay upright when placed on the ground. Many whole dishes were noted on the middens in the study area. Only one baler dish was collected from North West Cape Midden 1.

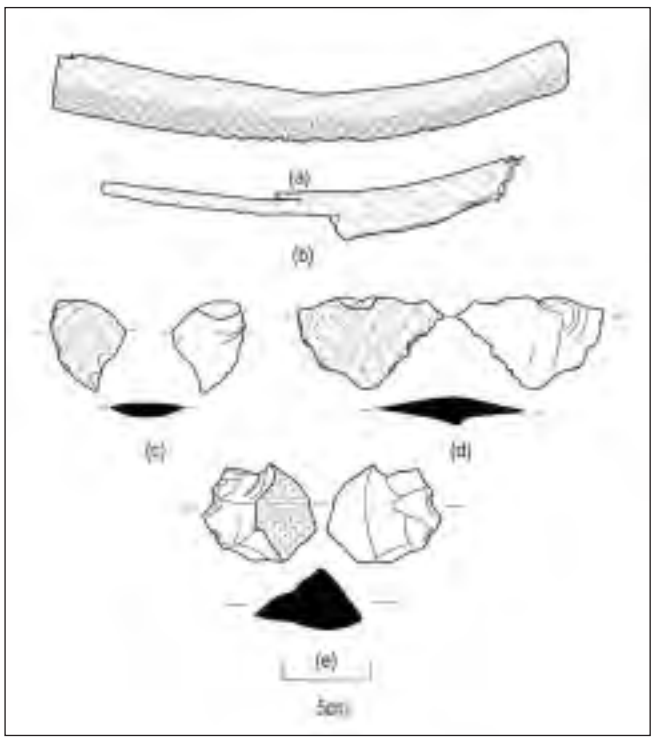

Figure 5: Baler shell knives and flaked clam from midden sites, Cape Range Peninsula (a) baler shell knife Vlaming Head Midden 2, (b) baler shell knife North West Cape Midden 1, (c), (d) *Tridacna maxima* flakes Vlaming Head Midden 1, (e) *Tridacna maxima* core Babjarrimannos Midden 1.

Baler shell knives

In Cape Range Peninsula, baler was also worked to create a shell 'knife' bearing a strong resemblance to implements described by Roth (1904). These knives were made by selecting a longitudinal section of shell and then flaking and grinding one margin to produce a sharp edge. The opposite margin remained at its original thickness, presumably to provide a more comfortable grip. The resulting tool is a long, curved section of baler roughly 2-3 cm wide, with a thin blade on one edge, and a thicker opposite edge. All of the knives that were recorded showed evidence of use wear in the form of micro-chipping and splintering of the working blade edge (Figure 5a-b). Three baler knives were found in the midden collections, from Vlaming Head Midden 1, Vlaming Head Midden 2 A and North West Cape Midden 1.

Flaked Giant clam artefacts

Giant clam (*Tridacna maxima*) are extremely dense, thick and generally large bivalves (most shells found in the study area were between 15 and 25 cm in length) that can be found washed up on the beaches of Cape Range in large quantities. Newly dead shells are still relatively soft in texture, while older shells that have been bleached in the sun are harder, brittle and chalky. All of the modified giant clam described in this study was identified by characteristic patterns of working and use, which are similar to those used to identify artefactual stone.

Aboriginal people who inhabited the coastal dunes of Cape Range used giant clam as a raw material in the same way as stone, and produced a range of implements similar to the stone artefacts that have been found in the area. The clam was first 'de-corticised', and the outer layer of weathered calcareous shell was removed from the exterior surface revealing the smoother inner layer. This inner layer of sun dried and bleached giant clam is very similar in appearance and texture to fine grained chert, and is a pale creamy colour. Once the outer layer is removed, the shell is then treated essentially as a core, and flakes can be detached, first along the outer margins. Giant clam cores and/or flaking debitage were found in all of the shell midden collections (Figure 5c-e). The collections from Surfer's Beach Middens 1 and 2 and North West Cape Midden 1 contained the largest numbers of giant clam cores and debitage, while North West Cape Midden 2 yielded only one clam flake. Giant clam flakes with evidence of use wear were recorded separately, and in all midden collections were not as common as clam flakes without evidence of utilisation.

The de-corticised giant clam was also modified by steeply flaking and retouching either the dorsal or ventral edge, keeping the rest of the valve intact. This modification resulted in an adze-like implement with a 'handle' of shell extending opposite the worked edge, and therefore requiring no hafting to be used (Fig. 6a). The working edge of the shell adzes was generally a slightly rounded, steeply retouched margin, similar in shape to a typical tula adze. Only giant clam shells still retaining the characteristic step termination fracturing

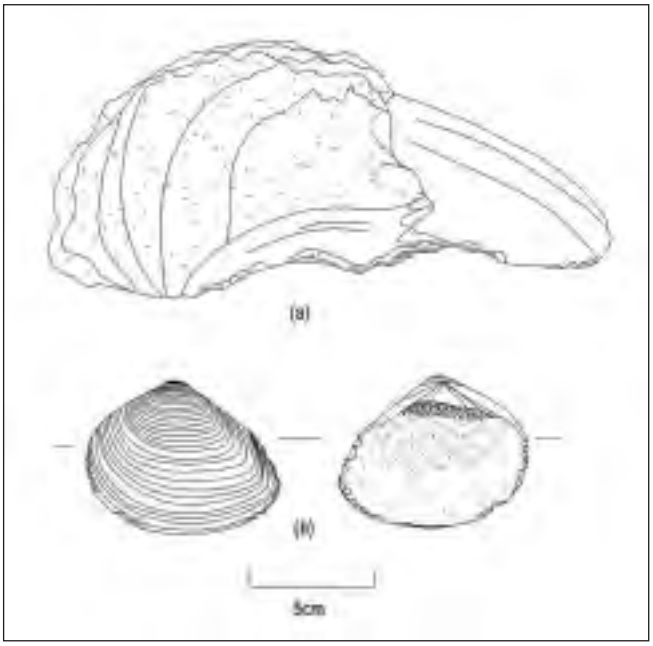

Figure 6 Shell adze and *Dosinia* sp. bivalve scraper from midden sites, Cape Range Peninsula (a) whole *Tridacna maxima*, North West Cape Midden 1, (b) *Dosinia* sp. bivalve scraper with edge damage, Surfer's Beach Midden 1.

associated with the downward striking action of hardwood processing were identified as adzes (Kamminga 1982:71). Shells with all other adze characteristics but without the step termination fracturing were identified only as cores, as without detailed microscopic analysis, cores and adzes without this particular fracturing could not be easily distinguished. The category 'broken adze' refers to modified giant clam with a steeply retouched margin and step termination fracturing on the working edge, but without intact margins along the rest of valve (Fig. 7). Seven whole and eight broken giant clam adzes were found in the midden collections. Four whole and two broken adzes were from North West Cape Midden 1. The remaining clam adzes were from Babjarrimannos Midden 2, Vlaming Head Midden 2, Surfer's Beach Midden 1.

Flaked and utilised bivalves

Another modified shell type is worked or utilised *Dosinia* sp. bivalves. One whole, and two fragments of *Dosinia* valve were found, all of which have distinct chipping and retouch along the lip margin of the shell. The whole valve was found in the Surfer's Beach Midden 1 collection (Fig. 6b), and the shell fragments are from North West Cape Midden 2 and Babjarrimannos Midden 2. The chipping and retouch is most visible along the inner surface of the lip, but occurs on both sides of the valve margin. This type of wear is consistent with that from other examples from northern Australia, where the artefact has been interpreted as a 'scraper', with the wear

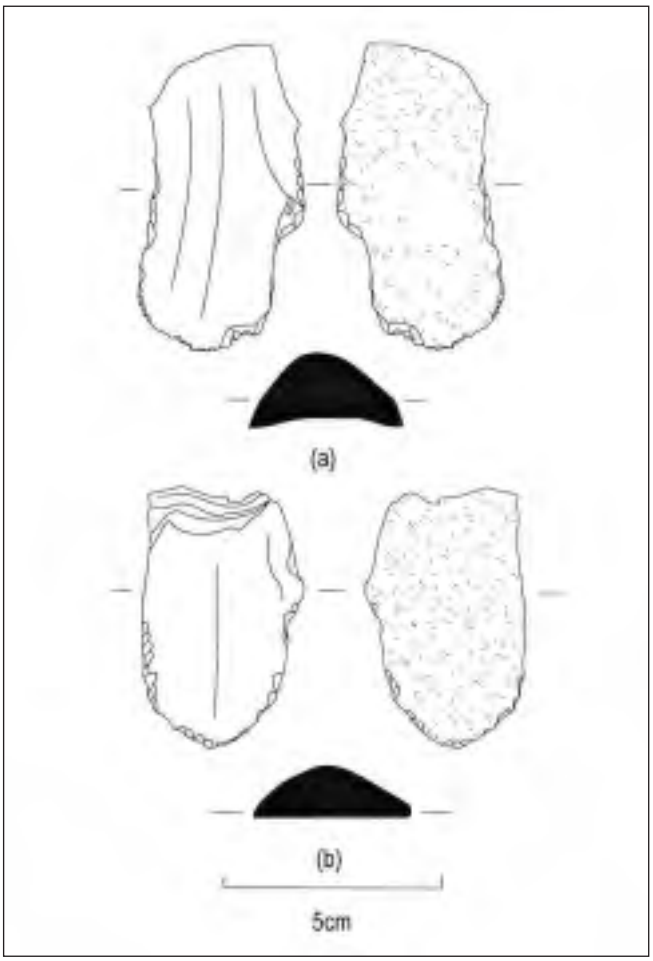

Figure 7 Broken shell adzes from midden sites, Cape Range Peninsula (a-b) transversely broken *Tridacna maxima* adzes, Vlaming Head Midden 2.

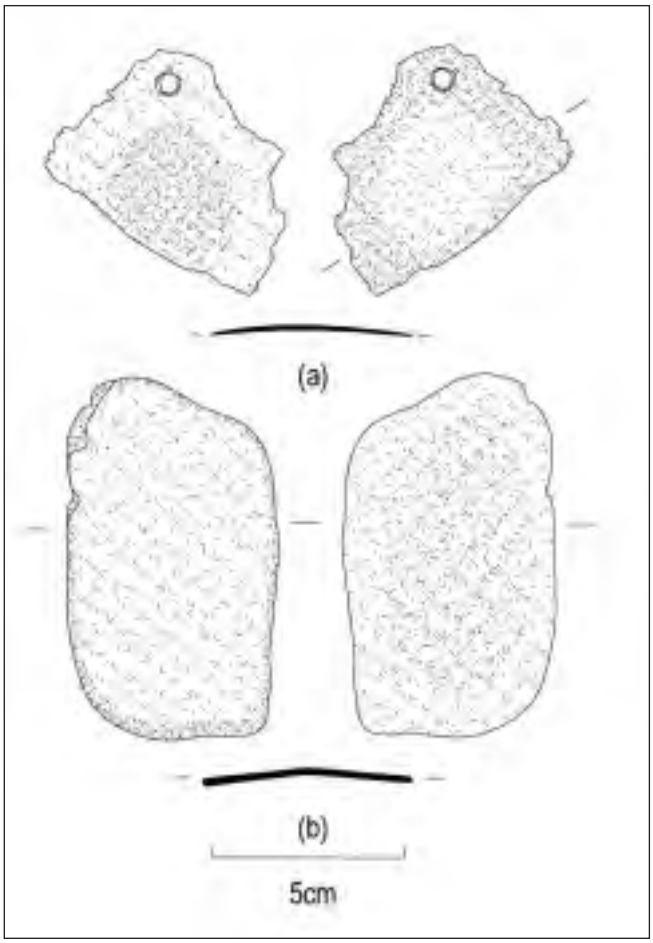

Figure 8 Baler shell (*Melo amphora*) pendants from midden sites, Cape Range Peninsula (a) pierced baler pendant fragment, Vlaming Head Midden 1, (b) non-pierced edge ground pendant, North West Cape Midden 1.

produced as a result of processing organic materials (O'Connor 1999a:80).

Baler shell pendants

Three fragments of baler pendant were found in the midden collections, from Vlaming Head Middens 1, 2 and North West Cape Midden 1 (Fig. 8). The artefacts were identified as pendants for three reasons. Two of the pendants are pierced, and show clear evidence of having been worked on both sides of the shell to produce the hole, creating the bi-conical section already discussed. While bore holes in marine shell can be made by a number of marine predators, evidence for piercing the shell is left on only one side. One pendant is broken where the pierced whole is, and it is tempting to infer that the breakage was made while the hole was being pierced. The third pendant is rectangular in shape and has clearly ground edges on along all margins. This shell is not pierced. It does remain possible that such artefacts were occasionally manufactured in the study area when stone sources were rare or difficult to obtain. All three pendants have red ochre adhering to the interior and exterior shell surface. The pendants are not engraved, like the elaborate pearl and baler pedants of the Kimberley (see Akerman with Stanton 1994), but the presence of ochre pigment (which was not observed in any other modified or unmodified shell in any of the middens in this study) suggests that the pendants were at some stage deliberately coloured.

Discussion

A close analysis of the shell collected from a series of eight shell middens located at the northern tip of Cape Range Peninsula has uncovered a diverse archaeological assemblage of flaked, ground and utilised shell artefacts. While some of the seven types of shell artefacts identified were similar to those described previously by Morse for the study area, this paper has described several 'new' types of shell artefacts, including baler shell knives and flaked giant clam adzes. The widespread use of giant clam shell as an alternate raw material to stone in the study area appears at this stage to be a localised phenomenon specific to coastal Cape Range Peninsula, although future research in adjacent geographic areas and an increased awareness of these artefacts by researchers may change this picture. The use of shell as an alternative raw material to stone seems difficult to explain on functional grounds alone given the proximity of stone quarries that are the source of fine-grained raw materials to the middens studies. This may also form a question to be addressed by future research in the area.

Conclusion

This paper has described a range of flaked, ground and utilised shell artefacts from a study of shell midden sites in Cape Range Peninsula, north Western Australia. While the Pleistocene shell beads from this region are a rare archaeological find, the more commonly occurring functional and ornamental shell artefacts have not previously been described in detail. Shell artefacts constitute a substantial source of information for determining the function of archaeological sites in Australia, but have been generally neglected by archaeologists as an artefact 'type'. The range of artefacts described here provides a resource for the identification of shell artefacts from other archaeological sites in coastal northern Australia.

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