

Shell Mounds, Shell Middens, and Raised Beaches in the Cape York Peninsula

G. N. BAILEY*

Criteria for distinguishing shell middens from raised beach deposits were established by the first Danish Kitchen Midden Committee in 1851. Formed to investigate the oyster beds on the emerged shoreline of the Litorina Sea, it was a conspicuously successful example of interdisciplinary co-operation and set in motion a series of investigations which led to a revolution in archaeological method and interpretation. In Europe this issue is now mainly of historical interest, but the abundance of both middens and natural shell deposits around the coastlines of Australia prompted the geologist Edmund Gill to offer a detailed review of the problem as recently as 1954. The possibility of confusion between the two types of deposit and the increasing pace of destructive activity by an expanding industrial society continue to pose a threat to cultural relics of the Aboriginal past.

Some of the problems of identification which may arise are illustrated by the numerous shell deposits which have been recorded along the Gulf Coast of Cape York Peninsula. The most dramatic examples are the Weipa shell mounds (Fig. 1). From surveys which I made in 1972 on the ground and from the air, I estimate that there is a total of 500 shell mounds along the shores of the four rivers which flow into Albatross Bay. The sites vary in size, ranging up to mounds more than 10 m high, and represent a magnificent series of almost completely intact deposits. They were first recorded by Roth (1901) and Jackson (1902), who both observed the large mounds on the south bank of the Embley River close to its junction with the Hey River, but it was not until the discovery of bauxite in the 1950s that

aerial survey revealed the full extent of the mounds. At about the same time Valentin (1959), in the course of geomorphological survey along the Cape York coast, made aerial observations of the shell mounds on the Hey River. He considered that the sites must be middens since the largest mounds were too high to be the remains of a raised beach. He also observed that many of the shell mounds were on low natural ridges behind the modern mangroves and salt pans and inferred that the middens had been occupied during a period of sea level higher than the present.

Subsequently Wright (1963, 1971) excavated sections of two of the larger mounds and revealed the presence of artefacts, charcoal lenses and fragments of fish and mammal bone, three of the classic distinguishing marks of midden deposits. These, together with locational features, which he considered incompatible with any known process of natural accumulation, led him to conclude that the deposits were the by-products of human habitation.

On the other hand, the large mounds with their vast quantities of shells, steep-sided profiles and absence of artefacts on their surfaces have promoted a long-standing local belief in the hypothesis of a natural origin (Stanner, 1961).

Extensive shell deposits are also commonly encountered along the open coast in the form of long, low ridges behind the modern shoreline or on sand bars in the mouths of river estuaries. Superficial examination of form and location suggests that these are most plausibly explained as banks of shells washed up by marine action. Many clearly represent former shorelines or offshore bars which have been left high and dry by changes of sea level in relation to land or by silting up of bays and lagoons and pro-

* Department of Archaeology, University of Cambridge, Cambridge CB2 3DZ. Ms. received April 1977, revised July 1977.



Chenieres

Point
Cape York

▲ M

gill

or a
tures
proc-
and
hum
Rest
obse

The
the

heat to open the valves without causing heat fracture. Sometimes the valves have to be forced open to remove the meat. In other cases the meat can be removed without damaging the hinge, and the valves may close again after the shell has been discarded. I collected 50 cockles and cooked them in the above manner, ate the meat and returned to collect the discarded shells four weeks later. Four had reverted to an unopened state, while the remaining single valves were fresh in appearance and undamaged.

Continuous heat, as for example where a campfire is kept alight for long periods on a shell surface, fractures and ultimately disintegrates the shells. Breakage may also be caused by trampling of feet or by forcing open uncooked shells. In a midden, then, one would expect to find a mixture of unopened bivalve shells, intact single valves, heat-fractured shells and shell fragments. Examples of all these may be easily observed in the Weipa shell mounds. By contrast the majority of shells on Kokato Island are broken into small fragments, and many of the more complete specimens are water-worn or have been attacked by marine boring organisms, a feature also observed in the Edward River deposits.

Shell quantities

I examined in detail a total of 304 sites at Weipa for data on size and location. All the observed sites are of similar composition and consist mainly of *Anadara* shells. The tallest mound is 13 m high; the largest, in terms of volume, is 9400 m³. The total volume of all the Weipa mounds is estimated as 222 800 m³. Samples of shell collected in the course of excavation by means of a sampling procedure described elsewhere (Bailey, 1975) show that the mean weight of shell is 880 ± 110 kg/m³ and the mean number of cockles (two valves per cockle) 41 800 = 7420/m³. The Weipa mounds as a whole therefore represent 196 000 tonnes of shell or about nine thousand million cockles.

It is of some interest to assess what this figure means in terms of an annual food supply. The Kwamter radiocarbon dates indicate that shells began to be collected about 1200 years ago and accumulated more or less continuously until quite recently. The period of European contact in the late nine-

teenth century AD may be taken as the termination of the traditional pattern of shell-gathering in this area. If it is assumed that all the Weipa mounds were formed within the same span of time and that the total duration of shell accumulation, at a conservative estimate, is 1000 years, then the mean annual increment of shells is 196 tonnes or nine million cockles. One cockle contains, on the average, 3 g of meat, whose calorific value is about 50 kcal/100 g. Thus the mean annual collection of shellfood may be estimated as 27 tonnes of meat or 135 x 10³ kcal—enough to feed 6750 people for one day or 18 people for the whole year. The only information about the size of the indigenous Aboriginal population before European contact comes from isolated observations. The most that can be said is that the figure should be assessed in terms of hundreds rather than tens or thousands. Taking a conservative range of values between 100 and 500 people for the total area, the relative contribution of shellfood to the annual diet in terms of calories can be estimated between 3.7 and 18 per cent.

Quantitative analysis of the food remains excavated at Kwamter gives a very different result, indicating that the molluscs represent 94 per cent of the diet in comparison with the fish and marsupial bone. However, this figure is probably misleading, since mollusc shells tend to be grossly over-represented in archaeological deposits in comparison with other food remains (Bailey, 1975).

A useful check on these figures is Meehan's recent work in Arnhem Land among the Anbara Aborigines of the Blyth River district. Large shell mounds occur in this area, and the modern Aborigines still exploit the extensive beds of bivalve molluscs for much of the year, most of the shell-gathering being done by the women and children, while the men engage in other subsistence activities. Detailed observations of diet over the greater part of a year have shown that the molluscs contributed, on the average, between 3 and 9 per cent of the total annual diet with a maximum monthly range of 3 to 17 per cent (Meehan, 1975).

Meehan's data further show that one woman could easily collect a 12 kg load of molluscs in one day and still have time for other work. The annual figure of 27 tonnes quoted above for the Weipa area represents

eg. this
other
shell
breakage
1. tentative

Diff. 26m
to check
if 5000
m³

New
dates
disprove
this

about 31
this then
total wh
and chil
the year
period.

The W
as a pre
place, g
this type
doubt ab
The res
quantitie
could ea
peated
over a
straining
populati
They als
was a
tenance
of the in

Middens
sided pr
truncated
Brazil, P
and the
where in
to mour
fined to
a major
artificial

Two
The first
have ste
but are
irregular
ing from
means of
one dire
(1901)
the larg
are still
ing trip
settleme
mits are
be said
tion.

A sec
Weipa s
latter, b
tended t
304 site

about 310 tonnes live weight of cockles, and this therefore represents 25 833 bag-loads, a total which could be achieved by 70 women and children collecting molluscs throughout the year or by 140 people over a six-month period.

The Weipa estimates should not be taken as a precise measure of what actually took place, given the margins of uncertainty in this type of calculation. But there is little doubt about the general order of magnitude. The results demonstrate that the vast quantities of shell in the Weipa mounds could easily have been accumulated by repeated Aboriginal occupation of the area over a period of about 100 years without straining existing concepts of Aboriginal population density or technological capacity. They also suggest that shellfood, although it was a not inconsiderable source of sustenance, was by no means the chief support of the indigenous economy.

Mound formation and location

Middens of vast proportions with steep-sided profiles approximating the shape of truncated cones have been recorded in Brazil, Peru, Mexico, California, West Africa and the Andaman Islands, as well as elsewhere in northern Australia. The tendency to mound formation is not therefore confined to the Weipa area, although it has been a major stumbling block to acceptance of an artificial origin for the Weipa mounds.

Two observations are of importance here. The first is that the large mounds do not have steep, unscalable slopes on all sides, but are usually composite structures of irregular shape with lower mounds projecting from the base and a relatively easy means of ascent to the summit from at least one direction (PLATE V). The fact that Roth (1901) observed fires and huts on one of the largest mounds, and that other mounds are still occasionally used today during fishing trips by inhabitants of the modern settlement, demonstrates that mound summits are favoured campsites, whatever may be said about the agent of mound formation.

A second point is that relatively few of the Weipa sites are large mounds, although the latter, by their impressive appearance, have tended to dominate most discussions. Of the 304 sites which I examined, 171 (56 per

cent) are 1 m or less in thickness and 74 (24 per cent) between 1 m and 2 m. The mounds also tend to be distributed in clusters similar to the one illustrated (FIG. 2), each cluster containing a mixture of deposits of all sizes ranging from tall mounds to sites little more than surface scatters.

The simplest explanation of these features in terms of midden structure is that the basic unit of habitation within each cluster of mounds is small, perhaps no more than a single family group using a hut of the type illustrated by Thomson (1939:218). Thus the small middens would represent isolated habitations used relatively infrequently; long, low mounds would represent multiple or repeated habitations in preferred locations; and the tall, steep-sided mounds would represent preferred locations where the total area available for use was for some reason circumscribed, so that shells accumulated in a process of upward growth.

Peterson (1973) proposed an hypothesis to account for this upward growth pattern in connection with the earth and shell mounds of Arnhem Land. According to his observations, mounds tend to occur in low-lying areas which are important foci of subsistence during the wet season, when much of the ground is damp or flooded. A low natural ridge forming a slight eminence, or some small accumulation of shells or other midden rubbish, would represent a dry area above the surrounding marsh. It would thus be an obvious spot to camp on, and with each year's accumulation of shells would become increasingly favourable as a dry location, resulting in time in the dramatic structures visible today. It may be added that a shell deposit makes a very suitable living surface. It is dry, a good heat insulator, and, with the aid of a little bark sheeting, perfectly comfortable to sleep on. Thus the tendency to mound formation would depend on three variables: the area of dry ground initially available; the rate of accumulation of rubbish; and the total span of time over which the sites were used.

There are several factors in the Weipa area which favour this hypothesis, especially when viewed against the background of the seasonal subsistence round traditionally practised in the coastal areas of Cape York (Thomson, 1939). Marine resources are most abundant during the wet season, when

cf. Russell-Smith Plate

Horne

Chenier

agrec