

THE WEIPA SHELL-MOUNDS

Works of Man or Nature?

NOT far from Weipa, on the western coast of northerly Cape York, there are well over a hundred huge shell-mounds that promise to become the subject of a lively controversy. Are they a natural phenomenon, or the work of man? At present opinion is about equally divided. Some who have seen them describe them as kitchen-middens and attribute them to aborigines in pre-historic times. To my eye there is nothing whatever about them that suggests such an explanation. But colleagues in the physical sciences with whom I have discussed the matter do not seem to be able to suggest any plausible hypothesis for a deposition by natural means. And there, for the moment, the matter rests.

A couple of years ago I had a good look at the mounds, which are a striking spectacle both from the ground and air. They are certainly a challenge to the scientific imagination. They may be seen all around the estuary of the Hey River, and on both banks of the Embley and Mission Rivers. In shape, they are long and narrow, rather like truncated cones of asymmetrical build, usually with a flattened top, and up to 100 ft. long and 30 ft. high. Many are linked together by low connecting ridges. They are composed almost entirely—except for silt, charcoal, and old vegetable matter—of

An aerial view, showing mounds in relation to shore line and swampy ground



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uncountable millions of shells, very loosely piled and usually compacted only on top, where a few small trees and shrubs may grow through a thin grass cover. By far the most common shell is that of the so-called "ark shell", a bivalve, *Tergillarca granosa besalis*. But a few others can be found as well; there are rather infrequent specimens of two gastropods, *Trebralia palustris* and *Volegalla wardiana*, an unidentified *Neretid* and two unidentified *Venerida*. The local aborigines told me that all these shellfish are common articles of their diet and may still be found freely on the mud-flats of the estuary. They can offer no explanation of the mounds, which were there, they say, from the very beginning of things.

Evidently the mounds were first brought to scientific attention in 1902 by C. F. V. Jackson, the Queensland geologist. More recently, they attracted notice because of their possible commercial value as workable deposits of natural calcium carbonate. In bulk, they have been estimated to total something like 100,000 tons, but my own guess would be that the figure should be put much higher.

Most of the mounds lie just outside—though there are some within—the belts of mangrove that skirt the tidal estuary and its rivers and creeks. Usually, they stand on rather swampy patches of ground, a few feet above the level of high-water springs, between the mangroves and the first low ridge of the hinterland. They are all easy of access from the shallow waters of the estuary and its tributaries. If there were any commercial point in doing so, they could readily be shipped away by lighter.

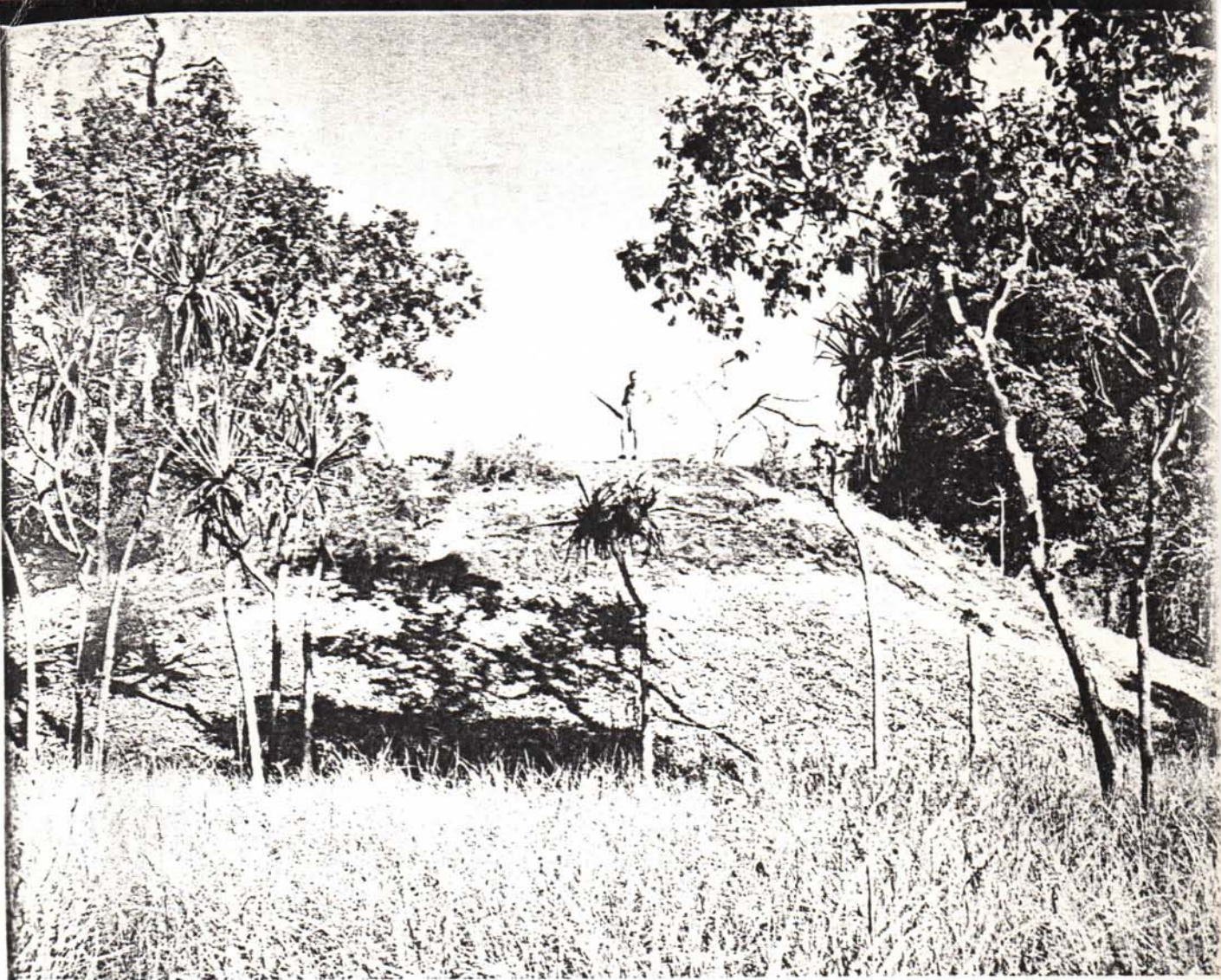
The first person to mention them to me was W. C. Wentworth, M.P., an old friend who shares with me a lifelong interest in outdoor Australia.

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An aboriginal helper took this photograph of a large mound with the author on top to show relative size

He had seen them on a visit to Weipa and had at once grasped their possible significance for an understanding of Australian prehistory. My chance to visit them came in October 1958. Then Mr. Mawby, of the Commonwealth Aluminium Corporation, kindly offered me all the facilities of that vast organization for a local reconnaissance. At Weipa, I was warmly received by Mr. Lindhe, the engineer-in-charge, who put at my disposal a truck, a launch, and an aeroplane, together with some aboriginal helpers.

It seemed sensible to do three things: to get a good aerial perspective of the region and the relation between the mounds and the topography; to make a close inspection of some of them on the ground; and, by opening some of them up, to form an idea of their structure, composition, and contents.

Mr. Lindhe kindly ran me around by truck in localities where characteristic mounds could be seen. Then I made a low-altitude flight over the entire estuary and, in the course of doing so, spotted a likely-looking cluster on the east bank of the Hey.

Next, I spent three days encamped near that cluster after making a trip by launch. Then I revisited some of the nearer mounds. By that time I had formed the opinion expressed earlier, but kept it to myself for the time being, for a good reason.

Visiting Weipa at the same time as myself was a German geomorphologist, Dr. Hartmut Valentin, who was making a survey of the whole west coast of the peninsula in order to determine its evolutionary history. He, too, was interested in the mounds, and we agreed to exchange opinions after he had made a low-altitude flight. We met for a talk after his return. Dr. Valentin was quite specific: there was no reason to suppose that the mounds were of human origin, and their appearance suggested a natural origin. On that agreement—somewhat indefinite, as it had to be in the circumstances, but nevertheless firm—we parted on our ways.

Judge then my surprise to read recently (in the report of the Second Coastal Geography Conference, held in April 1959 at the Coastal Studies Institute

of Louisiana State University) that Dr. Valentin had changed his opinion, and had gone over holus-bolus to the human-origin school. In a paper contributed to the Conference, he wrote that "the mounds are most probably artificial kitchen-middens which were piled up by an aboriginal population. . .". In the next sentence the cautious phrase "most probably" was forgotten, and the opinion took shape as fact. He wrote: "the existence of man on the old shore line is of great significance as it affords a possibility of dating the high stand of sea-level", a matter to which I shall refer in a moment. And a couple of pages later, Dr. Valentin's opinion-become-fact is cited as if it were established evidence. For we now read that "the aborigines were witness of this high stand of the ocean as is shown by their kitchen-middens around the Hey River estuary".

To the best of my belief Dr. Valentin looked at the mounds only from an aeroplane at an altitude of several hundred feet. Had he looked at a fair sample on the ground he would assuredly have found more or less what I found by doing so. That is, a number of facts that lie very awkwardly across the human-origin theory:

(a) In all the instances that I studied at close quarters the mounds lie on the surrounding earth or swamp surfaces. I tested a number and found that they extend only a few inches below the surface. There may have been, probably has been, a very shallow deposition of sediment around the bases of the mounds; their vast weight may have sunk them a little in the earth; but their formation clearly postdated the formation of the surfaces on which they lie.

(b) The mounds are more or less uniform in

shape, contour and section, though variable in size and height. Their distribution makes a pattern in relation to three things—the shape of the estuary, the shore line, and a low ridge of higher ground standing back from the shore line. On a map, or from the air, the mounds obviously conform to the broad plot made by the estuarine waters, rather as a frill of lace edges the hem of a garment. The long axis of each mound approximately parallels the present shore line, very much as a pile of seawrack follows the high-water mark on a beach. Less obviously, but in several places still clearly, the long axis conforms to the general contours of the back-lying ridge of higher ground. In many places small creeks coming down from the ridge cut through the mounds and connecting shell-ridges, which suggests that the stream-pattern also in part postdates the deposition of the mounds.

(c) The shells in the mounds show no traces of human interference or of calcination by fire (except in the case mentioned below). I looked at thousands of shells by the naked eye and hundreds with the aid of a magnifying glass without finding any sign readily interpretable as the hand of man. On top of the mounds, and to a lesser extent on the sides, the shells are broken and sometimes pulverized; but, by and large, both valves of the predominant shell lie open, separated, and unbroken. I soon noticed what might be a significant fact: a proportion of the shells—I would hazard the guess that it is a statistically significant proportion—are still whole, with both valves firmly stuck together, and filled with silt. They were laid down whole in the mounds in conditions that did not unhinge the valves. I found shells in that condition at all places on the mounds and at every depth that was accessible without controlled trenching.

(d) Internally, the mounds are not densely compacted. The sloping walls (usually steep on the estuary-side, less steep on the land-side) are easily disturbed and, underfoot, run like loose scree. Narrow trenching is difficult because of a tendency for the walls to subside. Very little suggests a long process of bedding or settling down. Many of the surface shells are very weathered but are still too tough to break easily by hand, and are intermixed with fragments that snap easily.

(e) When one of the larger mounds was bisected with a bladed tractor, the cut showed quite plainly that the formation of the mound had not been continuous. It was stratified by very thin lines of silt and carbon, each line signifying the end of a phase of deposition, and presumably a sufficient interval of time for silt to accumulate and for vege-

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tation to grow and be swept by fire. That may be the story of the other large mounds.

Although these five groups of facts may hint at one conclusion, commonsense suggests that it should be referred to what emerges from a systematic study of the ways in which the whole Weipa coast was built up. And before we introduce Man into the mutually conciliated conclusions we ought to take a long, long look at the scanty knowledge we have about Prehistoric Man in Australia.

The facts mentioned in (a) to (e) suggest some tentative conclusions. The mounds are younger than the surfaces on which they rest and older than the immediate stream-systems that dissect them; they resulted from the same processes that shaped the estuary and on much the same broad plan; they were composed originally of whole specimens that broke open *in situ*; and they were built up discontinuously, with an interval of stability between each phase, an interval during which vegetation grew on them and fire swept over them.

Dr. Valentin reached some interesting conclusions about the history of the formation of the coast, going as far back as Mesozoic times (60-180 million years ago). It makes a fascinating if somewhat conjectural story. The parts of it that have to do with the ultimate origin of the shell-mounds bring us down to the late Tertiary or perhaps the early Pleistocene period. That is, we have to start thinking in terms of something more than 600,000 years before the present. Somewhere about that time the plain of Cape York took a tilt to the west because the eastern hills were uplifted. The basin of Carpentaria subsided. Some of the present rivers took on their east-west courses but, because there was also some warping along east-south-east and west-north-west axes, other rivers converged. The Mission and the Embley Rivers were among those that took on the converging-gathering role.

Come down to the last glacial period of the Pleistocene. We are at something like 60,000 years ago. The coast bears the pattern made by half a million years. During the first advance of the ice—over a period perhaps as long as 20,000 years—the sea-level fell because so much water was locked up as ice and snow. It was probably a fluctuating process. Perhaps Man came to Australia across the Sahul Shelf during one or more of the intervals. Then, somewhere about 11,000 years ago, the wane and melt of the ice let the sea-level rise again. The Gulf waters rushed in and drowned the lower river valleys, now well cut-down. At its maximum—the “high stand” to which Dr. Valentin referred—the sea was something like 300 ft. above its former level.



A "close-up" of the shells in a typical mound

It fretted out an old shore line which is still to be seen. Then—after how long?—it receded somewhat. Perhaps at or about the same time there was a slight uplift of the land. Old beaches and benches are the memorials of that movement.

Dr. Valentin seems to think that the Weipa mounds were built between Mid- and Later Recent times. He states that they “cannot be isolated remains of an earlier beach ridge 30 to 40 ft. high as the waves of the estuary could never build up so high a feature”. I have no competence to assess his account of the coast’s growth, but am puzzled by the fact that the bases of many mounds are *below* the old beach-and-bench line while the crests of some seem to be rather *above* that line. That feature has to be reconciled with any reconstruction of the coast’s evolution. However, merely because an explanation of the mounds as the result of natural processes is difficult or at present impossible they should not be attributed positively to human agency. Nor should this assumption be used as an indirect means of dating the mounds—or as proof that there were human witnesses of the oceanic high stand, and that it was they who made the mounds. Let me insist that as far as I am aware there is no fragment of positive evidence that the mounds are man-made.

The difficulty of explaining them as natural phenomena may mean only that we have not enough facts to go on and have not used imaginatively the principles which are understood. Cape York has been much affected by both land movement and by changes in sea level about which very little is yet known. Doubtless there have been complex climate and environmental changes as well. The mechanical piling of shells into heaps by the action of wave, tide, current and wind is a familiar fact of observa-

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tion. On the open beaches near Weipa I saw similar shells being piled, by those forces, in miniature heaps not vastly unlike the mounds. I do not think it inconceivable that huge mounds might be built in that way. Consider the following possibility.

The great inundation sets in. The sea drowns the old coast and marches inland. It stays there for a long time, eating out a new shore line. Shellfish thrive and swarm in the warming shallows. There is a pluvial period of climate. The sea undergoes several fluctuations of level. Finally it recedes. At or about or over the same period the land emerges a little farther. Those four conditions—drowning of the coast, pluvial climate, fluctuation and recession of sea-level, and slight uplift of the land—all appear to have occurred. Might not such a combination provide the conditions in which the mounds could have emerged? The fluctuating sea kills millions of shellfish by exposure; the heightened run-off of fresh water kills millions more on shallow or uncovered flats; desiccation, flood, tide, scour, and wind expose the dead organisms; wave- and tide-action piles them along successive shore lines. Combinations of changing sea- and land-levels—in mixtures and by a timetable of which we now know next to nothing—eventually produce what we can see: several ranks of mounds, of variable size and height, but with a certain similarity of shape and structure, and with a broad "fit" to the estuary, shore line, and higher ground. That general process does not seem mechanically impossible. Perhaps someone who knows more about it than I do can suggest an hypothesis along some such lines.

It seems that we can rule out the very faint possibility that the mounds were there before the sea took its high stand. They are so loosely packed and friable that they could never have withstood the swirling come and go of new waters up to 300 ft. deep. If they are natural, they seem most likely to be the complex detritus of the sea's retreat.

Consider next the possibility that they are man-made. Undoubtedly there were men in Australia at or about that time. We have a carbon 14 date of $8,700 \pm 120$ years for the human occupation of a prehistoric site in South Australia. There are some tenuous indications of occupations more ancient still. No Australian prehistorian would now be surprised if we found positive proof—human bones in close association with man-made tools—that men were here before the end of the Pleistocene. But as far as Weipa is concerned there is nothing to go on.

In my short field-visit, I looked with as much care as I could at a fair number of mounds. A few—usually those nearest the far rise, where the trees creep down the slope from the hinterland—look rather like the proven middens elsewhere. The bigger ones do not. They are far too shapely and structural. I asked myself, from some knowledge of aboriginal habits and economy, what human motive could possibly lead to the piling of shells in such a fashion. I decided to imagine myself into two possibilities.

The first was that the ancient aborigines, having first—as Mrs. Beeton cautioned—found their shellfish, ate them at a highly unsuitable place, away from fresh water and down among the mosquitoes on damp ground, and then carefully threw the shells into piles in such a fashion that mounds would rise from 10 to 30 feet above the surrounding surface. Doing so, mark you, while observing with care that the resultant mounds—not one, remember, but more than a hundred—would eventually conform in shape to a design-plan of truncated, asymmetrical cones so as to fit the contours of the estuary, shore line and ridge. The other was that they ate their shellfish on top of slowly rising mounds while deferring to the same requirements. I can only say that neither seems a bit like the aborigines of the present or the recent past.

One ingenious man at Weipa did some arithmetic that fits the story here. He calculated that "if two tribes each containing 100 people ate, on 50 occasions for 200 years, 50 *Tergillarca* per head, the total number of specimens consumed would be 100 millions. Each specimen occupies approximately half a cubic inch when dead, so the resultant heap would contain 100 cubic yards of shell = 100 tons approximately". So that the total of 100,000 tons would have taken them 200,000 years. Too much! We are well back in the middle of the Riss Glaciation period. Try again: let us say 2 tribes each of 10 clans each of 50 souls, every person eating 50 shellfish every day throughout the year. That sounds a bit more like the aborigines I know. How long to eat their way through 100,000 tons? Something like 5,500 years. Yes, they could have done it since the mid-Recent; but they would have been awfully tired of shellfish.

All these maginings are a waste of time. The issue can be settled by two things. First, carbon 14 dates for a well-chosen set of mounds and, second, a controlled excavation of the same set.

If anyone can prove indisputably that they are man-made then I promise to eat 50 *Tergillarca* a day for a year. Without salt.

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