3

Investigations on Morotai Island

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The island of Morotai (Fig. 3.1) is approximately 70 km long by 45 km wide. It has a particularly rugged interior (never penetrated by the research team), which lacked any substantial human settlement at the time of our research. A number of mountains rise to more than 1000 m above sea level, and these are separated by a radial drainage pattern. All modern villages are located around the coastline, especially close to where rivers reach the sea. No modern topographic maps were available for Morotai during the fieldwork, and we were obliged to use old naval charts and an unpublished series of coastal maps compiled by the Allied Geographical Section in 1944 and held in the ANU library. The most useful map available, albeit not located until after the fieldwork ended, was the 1:250,000 geological map (Peta Geologi Bersistem, Lembar Morotai) published in Bandung.

Morotai is separated from northern Halmahera by Morotai Strait (Selat Morotai), which exceeds 15 km in width. Seabed depths between the two islands are recorded variously as much as 585 m or greater than 200 fathoms (depending on the source used), according to maritime charts with depth soundings held in the National Library of Australia, so there is no possibility that both islands were ever joined by dry land connections during Pleistocene glaciations. Indeed, available information on the tectonic history of this region (Hall et al. 1988; Hall 2013) gives no reason to assume that Morotai and Halmahera were ever linked by dry land during their geological histories, although this statement can only be based on negative evidence. Morotai and the northern tip of Halmahera do share a common suite of pre-Miocene volcanic rocks, and late Oligocene to early Pliocene sedimentary rocks, but from the viewpoint of human prehistory it is most probable that a sea gap from Halmahera at least 15 km wide has always existed. The fauna of Morotai, according to Flannery (1995a), is rather impoverished. Apart from bats, the only native mammals are *Rattus morotaiensis* and *Phalanger ornatus*, both shared with Halmahera.

The rockshelters of Morotai are to be found in a zone of raised coral, which lines the southern, eastern and northeastern coasts of the island in a continuous strip up to about 5 km wide (Hall et al. 1988: Fig. 6). The sites located during our research lie in this zone, along the southern coast of Morotai from Tanjung Dehegila to Sambiki (Fig. 3.1). The topography of this raised coral coastal strip reflects the presence of a series of raised reefs that increase in height inland. The prominent but very discontinuous major coral cliff line closest to the sea is the one that contains the caves and rockshelters investigated. Although shelters and small caves do occur further inland, we were never able to locate any with good archaeological potential. We were also unable to extend our surveys north of Sambiki owing to one simple problem: there was no road at the time of the survey, and the contemporary rough sea conditions did not invite extensive boat travel. Furthermore, we found so many interesting sites on the south coast that all our available time on the island was fully occupied. Future archaeological teams might find the east

and northeastern limestone coasts of Morotai worthy of attention, and indeed have recently done so with the research of Rintaro Ono and his colleagues (Ono, Aziz et al. 2017; Ono, Oktaviana et al. 2017; Ono et al. 2018) at the Early Metal Phase burial cave of Aru Manara. This new information will be addressed further in the concluding chapter of this monograph.

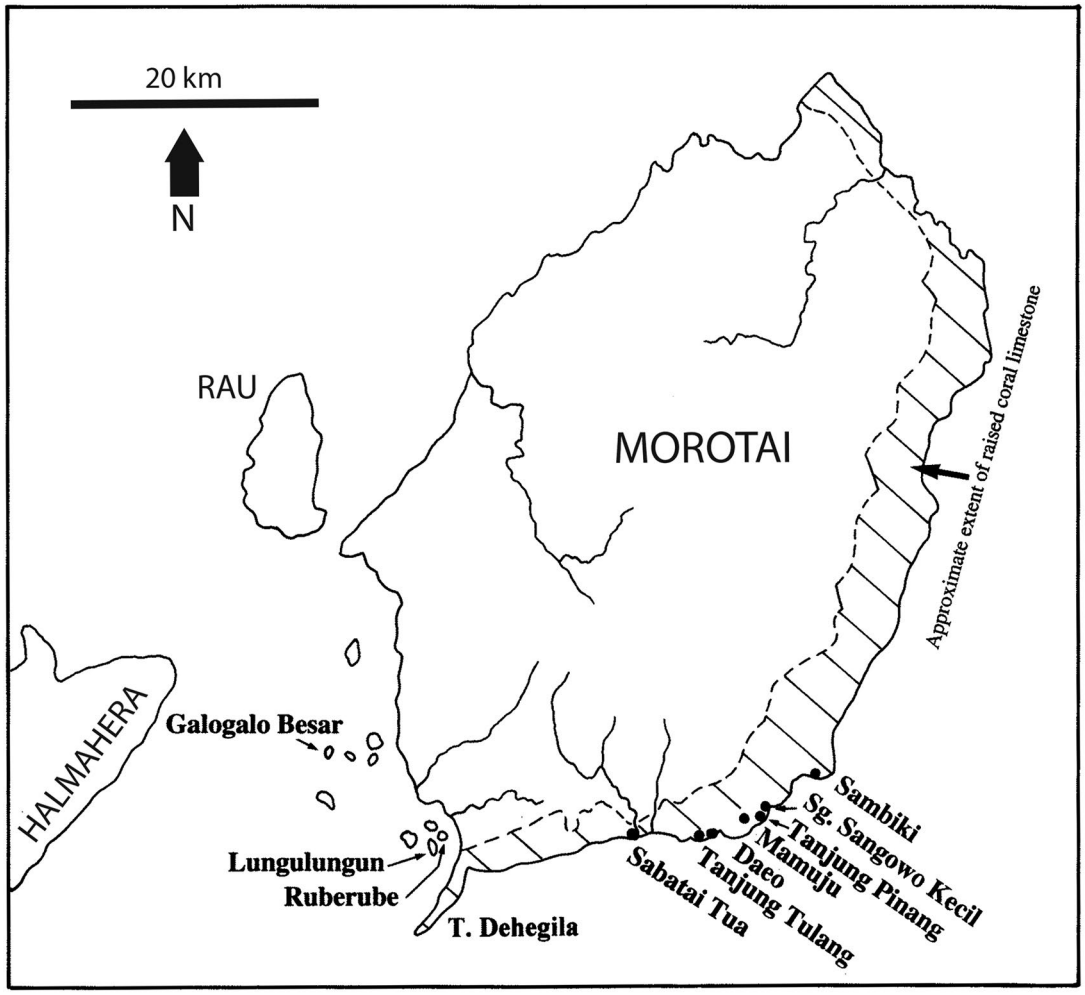

Figure 3.1 Map of Morotai, showing excavated sites.
The diagonally shaded area is raised coral limestone.
Source: Peter Bellwood.

Tanjung Pinang

The Tanjung Pinang rockshelter faces due east and is located in the side of a block of uplifted coral, about 110 m inland from the present beach. The floor of the shelter, which lies about 9 m above present high tide level, is approximately 10 m long by 4 m wide (Figs 3.2 and 3.3). Beyond the drip-line outside the shelter the ground falls quite steeply through about 4 vertical m, down a limestone rubble scree slope, which has resulted from erosion of the massif, to the level of the surrounding terrain. The massif itself is of particularly crumbly-looking rock and has doubtless decayed rapidly and extensively since being exposed to subaerial weathering. Indeed, the scree slope in front suggests that the existing shelter could once have been much larger than it is today.

Figure 3.2 Tanjung Pinang rockshelter.

A: Squares J2 to F2 (at rear) at completion, excavated in 1994. Daud Tanudirjo is standing in F2. B: The initial excavation in 1991, looking south. C: Human remains (including cranium TP5 and other cranial parts), a large *Tridacna* shell (front left) and volcanic pebbles in J2 and H2, 15–20 cm depth (upper Layer 1), 1994 excavation.

Source: Peter Bellwood.

Between the massif and the modern beach there is another very low subsidiary coral cliff, only about 2 m high or less, which presumably represents the most recent phase of uplift or sea level retreat (Holocene?) along this stretch of coast. This low cliff is too small to contain habitable shelters. The modern beach consists of a dark grey sand derived from both coral and volcanic sources, with lots of rounded beach pebbles of volcanic rock. Such pebbles were used in large numbers by the inhabitants of the shelter, both for tool making and for cooking stones (Chapter 8).

Offshore from the beach lies a shallow lagoon about 250 m wide, with a floor of coral rubble, sand and sea grass, exposed at low tide but under approximately 1.5 m of water at high tide. The reef beyond the lagoon drops off steeply, and contains potential rockshelters a few metres below modern sea level, which can be observed by snorkelling. These rockshelters contain deposits of coral rubble and coral fingers—an observation that will be returned to below. Whether the underwater shelters contain any archaeology is a question only a diving team can answer—my own suspicion is that there could be too much tidal and wave surge in the area of snorkelling visibility for coherent archaeological deposits to survive.

In 1991, three 1x1 m squares were excavated in the Tanjung Pinang shelter, denoted F3, G3 and H3. In 1994, Squares F2, G2, H2 and J2 were added directly alongside the 1991 trench (Fig. 3.3). Thus, an area of 7 m^2 was excavated in total, and the results will be described here as a single excavation unit. The stratigraphy is shown in Figure 3.4, which differentiates two major layers numbered 1 and 2. The shelter floor is covered by a thin layer of goat dung from the small herd belonging to the late Mr Ong Chan, who was still living in a house below the shelter when research began in 1991. Beneath the dung, which was stripped off and discarded, the floor is

quite flat, hard and dry. Layer 1, approximately 80 cm thick, contains evidence of human activity throughout and is dated by a well-ordered series of marine shell C14 samples to between 10,000 and 3000 BP (Fig. 3.4, Table 3.1). Layer 2, which extends from the depth of 80 cm to the point at which massive rocks stopped excavation at 2.40 m below the surface, contains absolutely no signs of human activity. It has two rather enigmatic C14 dates on marine shell, from two points about 1.3 m apart vertically, close to the top and bottom of its profile, both of c. 40,000 cal. BP. As discussed below, these two dates presumably come from shells that dropped naturally out of crevices in the uplifted coral reef.

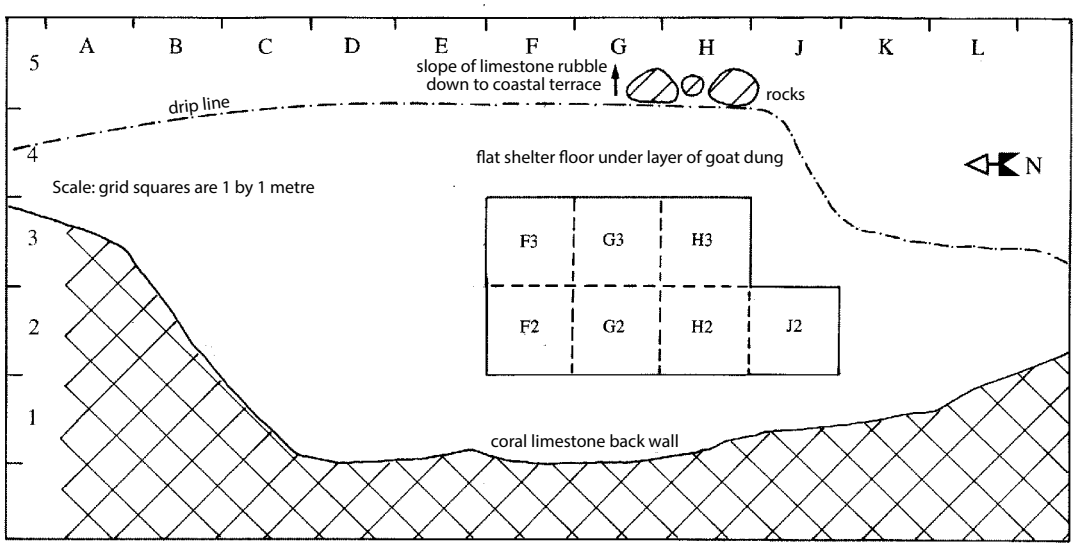

Figure 3.3 Plan of the Tanjung Pinang Shelter, showing excavations in 1991 (F3 to G3) and 1994 (F2 to J2).

Source: Peter Bellwood.

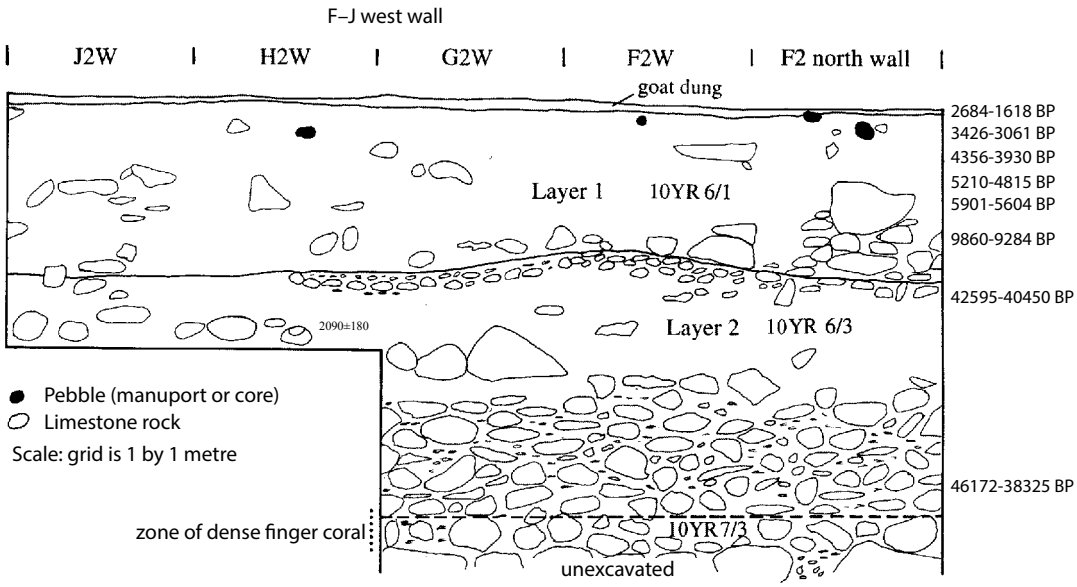

Figure 3.4 Conjoined section of Squares F2 to J2, west and north walls, Tanjung Pinang.

Dates are listed in Table 1.1.

Source: Peter Bellwood.

Layers 1 and 2 are both silty sands, similar in texture but different in colour; the interface between them is quite sharp. Layer 1 is slightly darker in colour (light grey) than Layer 2 (pale brown), which perhaps reflects the incorporation into Layer 1 of charcoal particles and other humanly created occupation materials. Charcoal particles are totally absent in Layer 2. Yet, Layer 2 does contain small amounts of marine shell, together with land snails. This poses issues of interpretation, to be examined in more detail below.

Tanjung Pinang Layer 1

As will be seen from Table 3.1, Layer 1, which extends to a depth of c. 80–90 cm below the shelter surface, contains all the positively identified artefactual material in the site. Artefacts and bones (but not marine shells or land snails) occur only in Layer 1, and are entirely absent in Layer 2. The C14 dates form a well-ordered series from roughly 9500 to 2000 cal. BP.

Marine shells occur in quantity in Layer 1, with a peak at around 10–50 cm, but fall off towards the base of the layer at about 90 cm. Most of these marine shells can be considered food discard in Layer 1, but not so the land snails of the genus *Obba*, which live in trees and probably entered the shelter fortuitously by falling from above. It will be noted that the fall-off in *Obba* from Layer 1 downwards into Layer 2 is far less marked than that for marine food shells and *Pythia* land snails. The latter like to inhabit rotten wood along the beach and drop off remarkably in the middle depths of the site, possibly because of the retreat of the coastline away from Tanjung Pinang in the millennia either side of the Last Glacial Maximum, when this coastal species would not have survived so far inland. Both land snail species inhabit the vicinity of the shelter today.

On the other hand, animal bone and flaked beach pebbles both show similar Layer 1 distributions to the marine shells, being absent in Layer 2. *Canarium* anvils seem to peak in numbers at around 20–40 cm. So also do unmodified volcanic rock beach pebbles, many probably used as cooking stones (not listed in Table 3.1), whereas lithic debitage peaks between 50 and 70 cm. All these categories relate to preceramic occupation between 10,000 and 3000 BP, seemingly most intensive between about 5500 and 3000 BP, which interestingly was also the time of intensive preceramic occupation in the cave of Siti Nafisah on Halmahera Island.

Human bones and sherds seem to reveal a different vertical distribution in Layer 1 from the above categories, with very definite peaks located *above*, rather than below, the 20 cm depth. Human bones, sherds and a number of whole *Tridacna* and other large reef shells seem to go together in this upper zone, despite difficulties of proving absolute association. The site contains many secondary burials of human crania and occasionally other bones, probably dug into very shallow pits, although no actual pit boundaries were visible during the excavation. These human bones were perhaps buried in some kind of association with the pottery and the large shells (the latter as remnants of funerary feasting?), even though the pottery is now reduced to sherd form and rather scattered, and there is no clear evidence for jar burial. Nevertheless, the finding of several large pieces of one reconstructable footed vessel in this upper zone indicates that pots might originally have been buried whole, as grave goods of some kind.

A sample of the human bone has been dated (ANU 8439) to 2684–1618 cal. BP. It will be noted that the maximum spit weight for human bone, at 10–20 cm, occurs slightly lower in depth than the maximum spit weight for pottery, which is very close to the surface of the site. This may be because the skulls were placed in shallow holes whereas the pots were originally placed on the shelter floor, later to be broken and scuffed into the topsoil. The Tanjung Pinang human bones are described by David Bulbeck in Chapter 11.

Table 3.1 Distribution of the contents of Tanjung Pinang by depth in cm. Details of the C14 dates are listed in Table 1.1.

Tanjung Pinang, depth cm	C14 date BP (hb = human bone; all others marine shell)	Total shell weight in gm (Squares F2–G2)	*Obba* land snails by number (Squares F2–G2)	*Pythia* land snails by number (Squares F2–G2)	Animal bone, all squares, gm	Non-core debitage, Squares F2 to J2 only, no./gm	Flaked beach pebbles, all squares, no./gm	*Canarium* anvils, all squares, no./gm	Human bone, all squares, gm	Sherd numbers, all squares (see also Table 7.5)
0–10	2684–1618 hb	3400	36	0	57	31/310	8/3775	3/1000	578	735
10–20	3426–3061	6925	69	7	0	21/227	3/635	4/1425	1265	345
20–30		10,300	70	6	14	34/355	4/1820	6/2400	623	36
30–40	4356–3930	5550	57	17	69	29/124	5/1250	4/1560		
40–50	5210–4815	2300	23	16	14	25/179	3/435	1/450		
50–60	5901–5604	1850	11	10	4	54/508	2/415			
60–70		1200	9	7	10	90/605	2/935			
70–80	9860–9284	825	39	4	3	19/95	2/80			
80–90		500	18	0	1	4/17	1/15	(Layer 1/2 boundary)		
90–100	42,595–40,450	200	3	0						
100–110		600	11	0						
110–120		200	7	0						
120–130		175	7	0						
130–140		135	13	0						
140–150		20	6	0						
150–160		25	12	1						
160–170		90	38	0						
170–180		140	74	0						
180–190		80	24	2						
190–200		115	19	4						
200–210		120	6	5						
210–220		90	12	10						
220–230	46,172–38,325	115	10	14						
230–240		60	0	15						

Source: Peter Bellwood.

Observations of artefact distributions therefore point to two phases within Layer 1: an earlier with preceramic midden and flaked lithic deposition, dating overall to between 10,000 and 3000 BP; and a later one when the site was used for burial purposes with pottery grave goods, possibly from about 2000 BP onwards. Given that the flaked pebbles and debitage extend up to the surface of the site, and are hence in apparent association with the burials, one must ask if this association was culturally real, or caused by fortuitous disturbance. This issue will be discussed further in Chapter 8 since flaked lithic debitage definitely becomes rare in Neolithic and later contexts in other Northern Moluccan sites such as Uattamdi and Buwawansi, so Tanjung Pinang is a little unusual in this regard.

Tanjung Pinang Layer 2

Layer 2 poses problems of dating and interpretation. The two C14 dates of 37,500 uncal. BP, from top and bottom of the layer, are absolutely identical in their means. This suggests that primary deposition between the deaths of the dated shells must be ruled out. Otherwise, we have to explain how more than 1 m of sediment accumulated in Layer 2 almost instantaneously, whereas the same depth took 10,000 years, even with a confirmed human presence, to accumulate in Layer 1. Indeed, the very sudden jump in radiocarbon ages between >38 ka at 90–100 cm and only *c*10 ka about 10–20 cm above raises a major question. Could the interface between Layers 1 and 2 really represent a phase of non-deposition or erosion lasting for 30,000 years or more? If the dated shells from Layer 2 were *in situ* and buried immediately after death, then Layer 2 would have to be an instantaneous product at c. 40,000 BP, and such an intervening hiatus with Layer 1 above would be a certainty. One might then expect the two layers to be rather different in grain size composition, since limestone-rich Layer 2 would have undergone a great deal more weathering and solution—at least 30,000 years more than Layer 1.

To test this possibility, soil samples were taken from just above and below the Layer 1/2 interface and analysed at ANU with the help of John Magee. The results are shown in Table 3.2. According to Magee, these grain size distributions are not sufficiently differentiated to claim that the two layers are either of different origin or reflect different post-depositional histories. Essentially, it seems that the most reasonable hypothesis is to regard Layers 1 and 2 as the products of a continuous process of deposition, with the darker colour of Layer 1 reflecting simply the appearance of humans producing charcoal and bringing other organic materials into the shelter. Neither layer contains visible quantities of beach sand and both must be considered entirely terrestrial in origin, except perhaps for some of the coral fingers and lumps in the base of Layer 2.

Table 3.2 Grain size distributions by layer from Tanjung Pinang.

Layer and depth below ground level	Sand %	Silt %	Clay %	Munsell*
Analysis 1: Layer 1, 70 cm	44.89	46.04	9.10	10YR6/1
Analysis 1: Layer 2, 100 cm	59.65	32.97	7.38	10YR6/3
	>0.063 mm (coarse) %		<0.063 mm (fine) %	
Analysis 2: Layer 1, 70 cm	61		39	
Analysis 2: Layer 2, 100 cm	70		30	

* Fine fraction, oven dried.

Source: Peter Bellwood.

As already noted, Layer 2 is completely lacking in any traces of a human presence, except potentially for the marine shells, which occur continually and in quite large quantities right to the base of the site. Indeed, the shells were still continuing in gaps between the large rocks at the base when excavation ceased. *Obba* land snails continued in the same way and, as noted above, these could simply have entered the site by falling from overhanging vegetation. The strandline snail *Pythia* sp. has a different distribution, as discussed above, being totally absent in the upper half of Layer 2 (Table 3.1), presumably because the sea was much further from the site during the Last Glacial Maximum than it is today.

The Layer 2 marine shells are basically of the same reef and surge zone species as those of Layer 1 (lots of *Turbo* and *Nerita* in particular). Many are broken, some are extremely small and thus useless for food, and all below about 100 cm are surprisingly light in colour and 'clean', unlike the dirtier specimens from Layer 1. More to the point perhaps, absolutely no shells below about 95 cm below the surface are burnt, whereas in Layer 1 and into the Layer 1/2 interface there is much burnt shell. The answer seems clear, although it was not realised during the excavation (when the Layer 2 shells were thought to reflect human activity), and so could not be checked on the spot. *The shells have fallen from the shelter wall and roof due to weathering of the limestone massif*. Originally, they must have been incorporated in cracks and crevices in the living reef just as dead shells are today. This explanation was actually suggested most clearly to me by Tim Flannery after my return to Australia in 1994. Since no opportunity has arisen to go back to the site, I have been unable to examine the limestone to see if the cracks within it do indeed contain shell fragments. However, if this assumption is correct, then the Layer 2 shells have been falling into the soil matrix continuously from the shelter roof. This Layer 2 soil matrix was presumably built up continuously within the shelter, from bottom to top, after the coral massif was raised above the sea. This uplift occurred c. 40,000 years ago according to the two shell dates, but in view of the contamination problem noted above it would probably be unwise to accept this date too rigidly.

If the dates are correct, then they imply quite a rapid rate of tectonic uplift along this coastline, since regional sea levels at 40,000 BP are estimated by many authorities to have been around 90 m below present (Hope 2005). A rate of uplift approaching 2 m per millennium could be inferred from these data.

As there is no sign of a human presence in Layer 2, there seems little point in debating these geological issues further. Meanwhile, we are left with the Tanjung Pinang overall stratigraphic sequence, which I would now interpret as follows:

1. The shelter was presumably formed by wave action after the coral reef was uplifted c. 40,000 years ago. The lower half of Layer 2 contains very dense coral rubble, with increasing numbers of coral fingers towards the base. Much of this might have been incorporated within the shelter prior to uplift, when it was still beneath the sea on the outer edge of the submerged coral reef.
2. After the sea retreated due to uplift, the terrestrial soil matrix of Layer 2 began to be deposited continuously within the shelter, incorporating land snails and marine shells, the latter (at least two being c. 40,000 years old) falling down from crevices in the eroding massif itself. Roof fall was also particularly heavy during deposition of the lower part of Layer 2.
3. In the upper part of Layer 2, the quantity of roof fall decreased markedly. The strandline snail *Pythia* sp. also vanished for a time, presumably due to the onset of worldwide glacial conditions and a general lowering of sea level.
4. At the top of Layer 2, and running up into the lower part of Layer 1, there was increasing roof fall, perhaps a result of a wetter and warmer postglacial climate, human arrival, or both. Traces of human occupation start right at the base of Layer 1 at about 10,000 BP, with a few items even in the top of Layer 2, but perhaps scuffed downwards in this instance by the shelter occupants.

5. Between 5500 and 3000 BP, the shelter was used intensively by preceramic hunting and gathering populations, users of flaked stone tools, ochre, and pebble anvils, with exploitation of fish, shellfish, rodents, and phalangers.
6. After about 2000 years ago (or less), the shelter was used for secondary burial of skulls and sometimes other small bones, the bones being placed in shallow pits and in apparent association with pottery and large reef shells.

The description of the stratigraphy and cultural history of Tanjung Pinang has turned out to be something of a saga. Not all of the saga relates to human activity. But there is a moral in the saga because during the excavation of Layer 2 the archaeologists on site believed that the shellfish within the layer were reflecting human activity. Subsequent consideration has suggested they do not.

The excavation of two caves behind Daeo Village

The village of Daeo lies about 3.5 km west of Tanjung Pinang. Immediately behind the village and about 160 m inland from the head of the beach lies a coral cliff, which contains three caves. These were numbered Daeo 1 for the most westerly, Daeo 2 for the central one, and Daeo 3 (which was not excavated or mapped) for the eastern. All are quite deep from front to back and low in roof height—more cave-like than shelter-like—but whether their origin is submarine or due to wave cutting at sea level is not very evident. The latter seems most likely since the caves lack vertical roof solution holes. None are now high enough inside for standing and all three have been filled to a considerable extent with sediments. The sediment surfaces of caves 1 and 2 lie about 8 m above high tide level, and are thus at about the same absolute level as the sediment surface of the Tanjung Pinang shelter. Both are fronted by scree slopes of coral rubble, which drop down about 4.5 m to the coastal plain on which the village of Daeo is located. All in all, their altitudinal and geomorphic situations can be stated to be identical to those of Tanjung Pinang.

Daeo 2 was the second of these caves to be excavated, but since it yielded the best archaeological record we deal with it first. Daeo 1 had only a poor record in comparison and its deposits seemed to be more disturbed.

Daeo 2

This cave lies 160 m inland from the top of the beach, behind the centre of Daeo village. It measures about 3.5 m in maximum width and about 5.5 m from the drip-line to the back wall, but the roof today is only about 1 m above the floor owing to sediment fill. The cave floor itself is quite flat and very dry, but becomes damper towards the front. Within the cave, six small rectangles were laid out for excavation, each 1x0.67 m in size and labelled E4–E6 and F4–F6. The total excavation was thus a rectangle of 2x2 m (Fig. 3.5). Excavation was undertaken in 5 cm spits and all material was sieved through 2.5 mm meshes.

Daeo cave 2 contains one continuous cultural layer. This is a dark brown, clay-rich, alkaline soil, termed Layer 1. It contains many small fragments of coral, but very few large lumps. The cave roof in Daeo 2 seems to have been much less prone to roof fall than that in Tanjung Pinang. Layer 1 is 80–90 cm thick and shows no internal layering, although about two-thirds down its profile in E5 and E6 there is a layer of soft travertine/stalagmite about 5 cm thick. Another much bigger stalagmite, which presumably goes down to meet the cave floor, protrudes into the base of Layer 1 towards the wetter front of the cave in F4. These stalagmites represent periods of heavy roof dripping quite early in the sequence of human occupation, possibly about 14,000 years ago, although they could represent short-term leaks in the cave roof rather than any specific change in rainfall intensity.

The interface from Layer 1 into Layer 2 below is quite sharp. Layer 2 is a light yellowish-brown and very clayey soil, which shows no signs of human occupation. It is about 110 cm deep and becomes gradually darker (dark yellowish-brown) towards its base. It was not fully excavated but was cored to the presumed limestone bedrock by a soil auger.

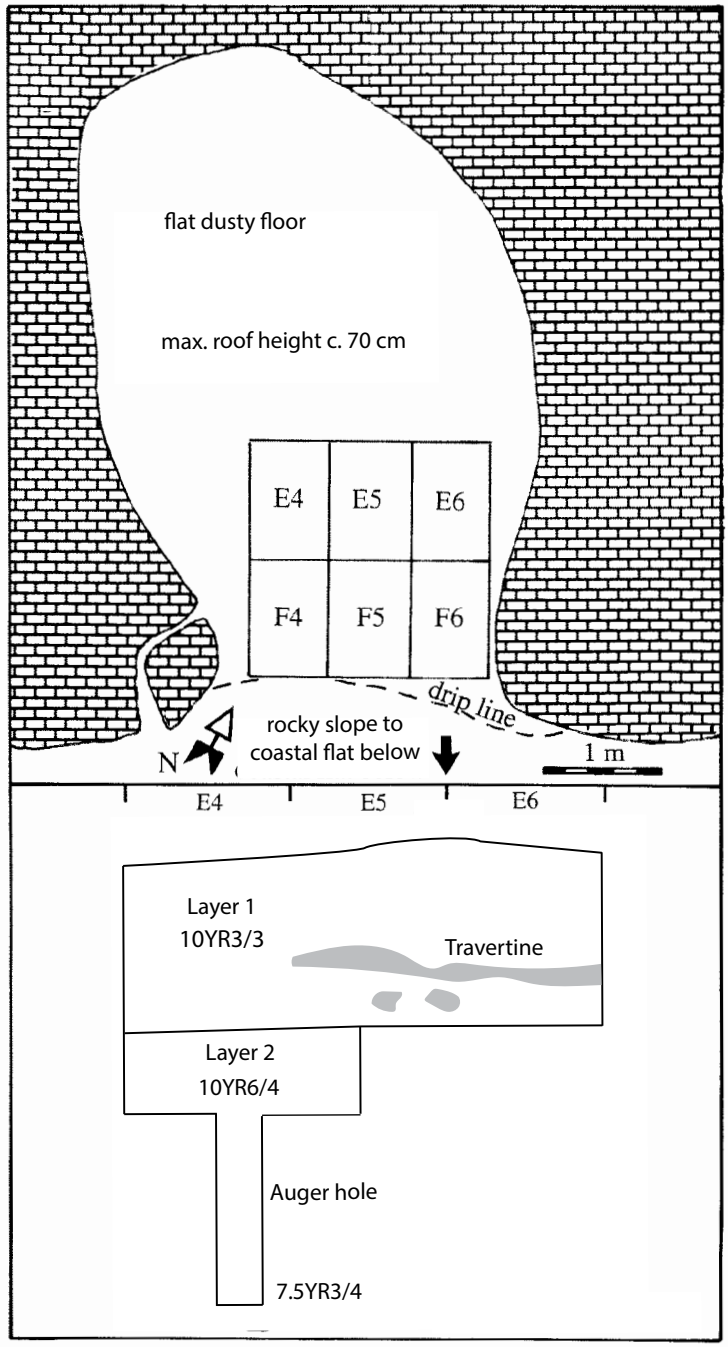

Figure 3.5 Daeo 2: plan and section.
Source: Peter Bellwood.

Layer 1 has four C14 dates. Its base may be a little older than the marine shell sample from 60–65 cm (ANU 9450), which dates to 16,767–15,889 cal. BP, and the *Canarium* charcoal from 50–55 cm, which dates to 13,065–12,731 cal. BP (OZD 768). As Table 3.3 shows, however, there is almost no cultural material below a depth of 70 cm, so there is no good reason to claim a date for first use of the cave much in excess of the oldest date of 16,000 BP. Between 20 and 25 cm, that is about one-quarter of the way down the profile, charcoal sample ANU 9452 gave a date of 6463–6194 cal. BP. These three samples are quite convincing from an age/depth perspective. However, at 55–60 cm, there is a date for charcoal sample ANU 9451 of only 1691–986 cal. BP, but in this case secondary movement downwards of the charcoal seems to be the likely explanation. Essentially, the whole of Layer 1 offers a similar cultural sequence to Layer 1 in Tanjung Pinang; that is, mainly preceramic (in this case c. 16,000 to c. 3000 cal. BP), with a thin veneer of ceramic period burial activity on the top.

From Table 3.3, it can be seen that densities are greatest for all materials, except pottery and human bone, between about 10 and 70 cm. Shells continue into culturally sterile Layer 2, as in Tanjung Pinang, and show a similar distribution in that the strandline species of *Pythia* disappears downwards towards the Last Glacial Maximum, whereas the *Obba* land snails continued to enter the deposits, albeit in smaller numbers below the appearance of humans. The small numbers of marine shells below 90 cm depth are perhaps of secondary derivation from the occupation levels above. The explanation that they have fallen naturally from the cave roof, acceptable for Tanjung Pinang, seems to be less likely (but certainly not impossible) for Daeo 2 since the rock here is much more coherent and less crumbly. If there truly was human occupation at 140 cm depth, it could only have been extremely ephemeral.

Not surprisingly, the preservation of animal bone in Layer 1 was found to improve markedly towards the protected interior of the cave in the E4–6 trench line. Bone was almost absent in F4–6, doubtless due to fluctuating dampness close to the drip-line. A similar circumstance was noted at Tanjung Pinang. However, in both shelters (and in all limestone sites excavated in Maluku) pHs were very strongly alkaline throughout.

Burnt coral pieces also occurred in Layer 1, resulting perhaps from cooking. The only *Canarium* anvil found in Daeo 2 came from quite high in the profile, in E4 at 25–30 cm depth, possibly from a late preceramic context. Human bone, mainly single teeth and small bone fragments, and potsherds have the same distribution as in Tanjung Pinang, both being concentrated at the top of Layer 1, but with the human bone having a slightly lower centre of gravity than pottery. As at Tanjung Pinang, this is perhaps because bones were placed in shallow pits scooped in the cave floor whereas pots might have been put on the cave floor itself. It is worthy of note here that an upside-down skull cap was excavated at 25–30 cm in F6 with phalanges inside; a similar situation occurred at Tanjung Pinang where one skull cap was buried upside-down and another had ribs placed inside it. It is clear that the burials in Daeo 2 and Tanjung Pinang were made by the same cultural group, perhaps at the same time and certainly within the past 2500 years. However, Daeo 2 had far less bone than Tanjung Pinang overall, and no complete skulls.

Table 3.3 Distribution of the contents of Daeo 2 by depth in cm.

Depths cm below surface	C14 cal. BP	Animal bone gm*	Manuports and cooking stones gm*	Total shell wt in gm*	*Obba* land snails, total no.*	*Pythia* land snails, total no.*	(Potentially) artefactual stone, gm	Pottery (no. of sherds)	Bone points	Human bone gm
0–10 cm		0	100	715	90	28	18	21		300
10–20		62	1300	2300	126	97	90	15		356
20–30	6463–6194 charcoal	159	2200	6375	101	34	91 + 1x400 gm *Canarium* anvil	1		343
30–40		204	3000	3100	205	82	135	1	1 bipoint	230
40–50		95	1650	1900	59	7	490	1	1 (?)	
50–60**	1691–986 charcoal 13,065–12,731 (*Canarium* charcoal)	42	1325	1500	68	13	570			
60–70	16,767–15,889 (8 *Turbo* opercula)	20	215	1000	40	2	370			
70–80		16	70	560	148	11	15			
80–90		6	20	170	31	3				
90–100		0	20	85	24	0				
100–110		1		95	21	1				
110–120		2		30	17	0				
120–130				25	10	0				
130–140				5	4	0				

* Below 90 cm only one-third of the excavation area was continued, into Layer 2. Actual statistics could therefore be multiplied by three from levels below 90 cm to make the data comparable in volumetric terms, although this has not been done in this table since the interface between Layers 1 and 2 was not totally flat and such action could introduce unwanted distortion of the data.

** Fragments of charred *Canarium* nut shell were identified to this depth, but not below.

Details of C14 dates are listed in Table 1.1.

Source: Peter Bellwood.

Daeo 1

Daeo cave 1 is larger than Daeo 2, being about 8 m from drip-line to back wall and about 5 m wide (Fig. 3.6). However, the rear of the cave is virtually filled with stalagmite, and the actual habitable area would only have been about 5x4 m, towards the front of the cave. The roof rises to a maximum of about 1.6 m above the present floor, only slightly higher than Daeo 2. Of course, both caves would have been high enough to stand up in when human occupation first began.

Daeo 1 only has one layer, cultural throughout. This is a totally dry and very loose soil, the same dark brown clayey soil as Layer 1 in Daeo 2. In Daeo 1 it sits directly on limestone bedrock at a maximum depth of 45 cm, and there is no underlying sterile clay layer. Clearly, the cave floor was bare rock when occupation began.

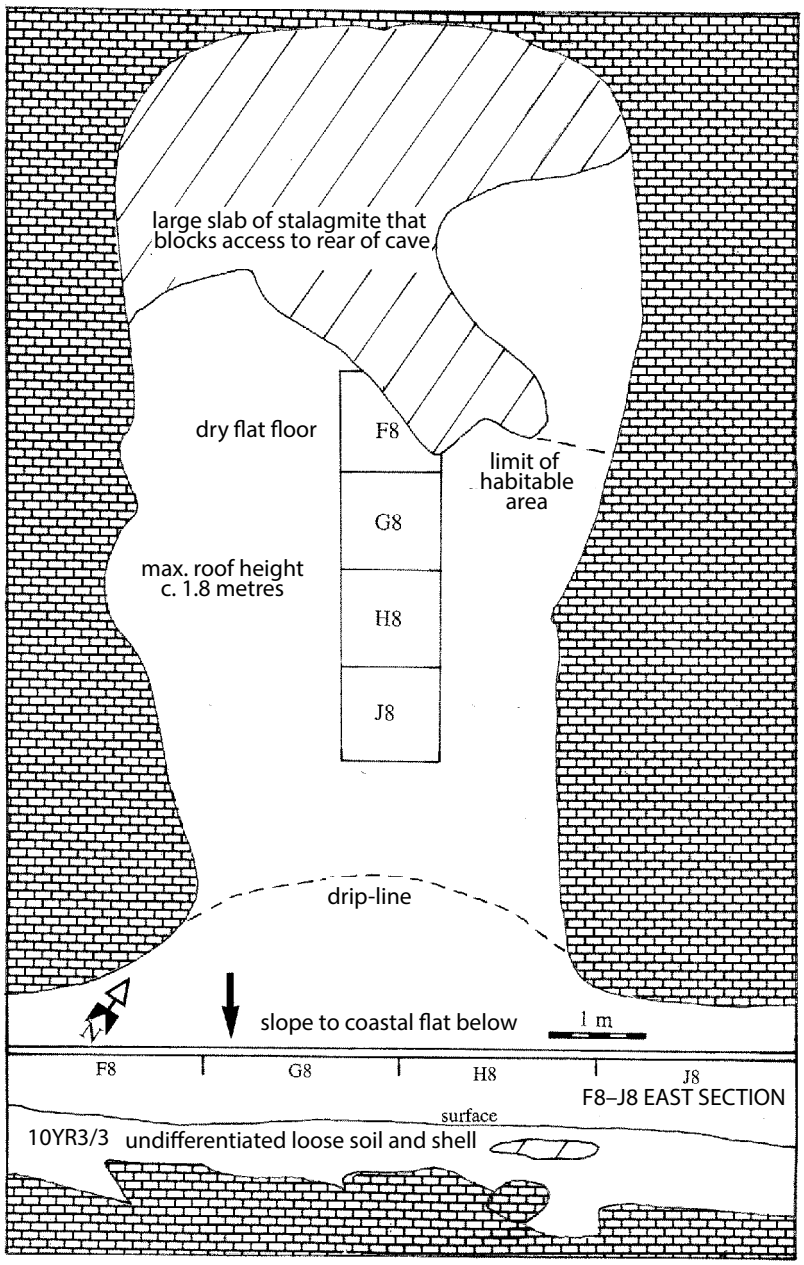

Figure 3.6 Daeo 1: plan.

Source: Peter Bellwood.

Table 3.4 Distribution of the contents of Daeo 1 by depth in cm.

Depth in cm, all squares	Human bone (gm)	Shell (gm)	Cooking stones and unmodified pebbles (no./wt gm)	Pottery sherd no.
0–5	158	5375	7/380	12
5–10	45	8975	17/1570	10
10–15	100	10,620	15/1005	1
15–20	76	7875	22/710	1
20–25	47	6230	15/960	1
25–30	26	3125	6/115	1
30–35	13	1400	4/40	
35–40		600	3/25	
40–45		350	1/450	

Source: Peter Bellwood.

A line of four 1x1 m squares was laid out from the mouth of the cave back to the stalagmite, which virtually fills the rear of the cave. As in Daeo 2, the soil was dug in 5 cm spits and sieved through a 2.5 mm mesh. The vertical distribution of cultural elements in the cave is less coherent than in Daeo 2 (Table 3.4), perhaps because Daeo 1 is totally dry within and scuffing would have been extremely easy. The greatest density of marine shell occurs at 10–15 cm, but densities do not vary greatly from top to bottom. Fewer shells occurred below 30 cm because the volume of soil is less from this depth—the bedrock rises irregularly into the cultural deposit. Cooking stones and unmodified pebbles have a similar distribution to shells. Burnt coral and burnt shells occur in small quantities throughout the deposit, and there is also some ochre. Stone tools were not found in this site. Pottery and human bone is present in only very small amounts, but in this case to quite deep within the deposit, a circumstance that suggests definite disturbance (given that both materials only occurred near the surface in Tanjung Pinang and Daeo 1). Because of the obvious potential for disturbance in Daeo 1, no C14 samples were submitted for dating. Even without the disturbance factor, Daeo 1 clearly contains little that is not represented much more clearly in Daeo 2 and Tanjung Pinang.

Tanjung Tulang

This cave is located within the coral headland, which limits the sandy beach of Daeo to the west of the village. It lies much closer to the sea than the caves of Daeo 1 and 2, and is also at a lower altitude, its floor being only between 3.5 and 4.5 m above high tide level. The cultural deposit within the cave is a loose dry humic-stained beach sand with coral pebbles, only 30 cm thick at the maximum. This cultural deposit grades into a clean beach sand of black volcanic and white coral composition, identical to that which forms the modern beach. This clean sand in turn lies on top of coral bedrock. The whole deposit is thus basically beach sand and carries an air of chronological recency, although the sea seems not to have entered the cave within living memory.

Table 3.5 Distribution of the contents of Tanjung Tulang by depth in cm.

Tanjung Tulang; Squares L5 to N5	Human bone (gm)	Shell (gm)	Pottery sherd no.
0–5	40	550	119
5–10	44	350	47
10–15	170	350	20
15–20	177	200	2
20–25	162	100	
25–30	bedrock		

Source: Peter Bellwood.

The Tanjung Tulang cave is quite large: about 15 cm long by 7 m across. The roof is about 2 m high at the front and slopes down to the back of the cave. When discovered in 1991, this cave seemed to have potential, but when excavated in 1994 the results turned out to be disappointing. A total of 4 m^2 was excavated, comprising a 3x1 m trench near the front of the cave and a 1x1 m square towards the rear. The cultural deposit appears to lack internal differentiation and comprises only pottery of the type found at the open site of Sabatai Tua and very fragmented human bone (Table 3.5). Possibly, as at Tanjung Pinang, secondary burials were placed in scoops within the cave floor with pottery placed above. Human bone fragments and pottery of Sabatai Tua type were also seen in at least three niches in the limestone of the headland in the vicinity of the cave. The marine shells within Tanjung Tulang could be from casual visits.

Sabatai Tua

The open archaeological site at Sabatai Tua occupies the top and seaward-facing slope of a small hill, which lies east of the modern village of Sabatai Tua. The modern village lies to the west of the Sabatai River, but the site lies across the river, on its eastern bank and immediately inland from the coastal road. Facing seawards from the site one looks down into the mouth of the Sabatai River with its flanking sand spit. This site was sketch-planned and test-pitted in 1991, but no proper survey has been carried out. The precise extent of the site is now hard to judge; it appears that no stratified deposits remain on the top of the hill and most artefacts now lie strewn around the sides of the hill as a result of soil erosion caused by gardening activities.

Informants told us that the top of the hill, a gently rounded area of about 50x40 m, is called Musi after a Tobelo man who planted coconuts here about 60 years ago. A 1x1 m test pit dug in this upper area only revealed thin disturbed soil deposits 15 cm deep sitting on sterile substrate, with no artefacts; the latter seem for the most part to have migrated downslope. About halfway down the eastern side of the hill, facing the Sabatai river mouth, lies a terrace about 80 m long by about 15 m wide, which looks as if it could be of human origin. A test pit here again yielded no definitely *in situ* archaeological materials, the few sherds recovered probably having descended down the hill from above. This terrace is called Tibi, after another Tobelo coconut planter (the inhabitants of Sabatai Tua village state that they are of mixed Tobelo and Galela descent).

The surface finds collected from Sabatai Tua comprise lots of marine shells, potsherds (including Portuguese-influenced *forna* stoves for baking sago cakes, mortars and imported glazed ceramics), and cooking stones. The earthenwares are described in more detail in Chapter 8. It may be presumed that there was once a settlement here, on the hilltop and on the lower terrace. The whole assemblage is related to that from Tanjung Pinang, Tanjung Tulang, and from surface collections made in open sites in southern Morotai.

Sambiki Tua

During a visit to Sambiki Tua village in January 1991, the team was shown a number of polished stone adzes, stated to have been found near the mosque in the village. Two more adzes were also stated to have been found somewhere in the vicinity of the Tanjung Pinang rockshelter, although no stone adzes were found during the excavations in this site. These adzes are all of untanged varieties, single-bevelled (i.e. true adzes), with rectangular or trapezoidal cross-sections. They are thus quite different from the adze kit found in association with the red-slipped pottery of the first millennium BCE in the excavations at Uattamdi on Kayoa Island (see Chapter 5). Presumably, the Morotai adzes are younger than those from Uattamdi.

On visiting the village mosque, potsherds were observed eroding out from the ground all around the building, especially where rain drips from the roof were causing soil to be washed away. The precise extent of the site could not be ascertained, but was judged to be at least 30x30 m. A 1x1 m test pit was excavated immediately behind the mosque, on its western side away from the road. This square was dug in 5 cm spits, but the soil proved too clayey and sticky for sieving and was simply hand-searched. The archaeological layer comprised the upper 40 cm of the profile; this being a pale red to light reddish-brown soil (2.5YR 6/2 and 6/4), which contained a high density of clay nodules. Some of these nodules appeared large enough to be debris resulting from pottery making on site. The sherdage in the site, mostly quite small, perhaps due to past cultivation activities, was distributed as shown in Table 3.6.

Table 3.6 Potsherd distributions by depth in cm in the Sambiki Tua site.

	0–5	5–10	10–15	15–20	20–25	25–30	30–35
Pulau Mare sherds	1						
European sherds		1	1				
Plain and red-slipped sherds	114	65	194	284	146	148	94
Incised sherds	2	2	8	1	1		
Ribbed sherds				2			
Total	117	68	201	287	147	148	94

Source: Peter Bellwood.

For now, it is only necessary to state that the Sambiki Tua pottery is a predominantly red-slipped ware that bears some resemblance to that excavated from Tanjung Pinang, but it is certainly not identical. The assemblage seems to be essentially late prehistoric, a dating confirmed by a C14 date of 1054–325 cal. BP (ANU 7784) on charcoal collected from the 15–20 cm spit. At about 30 cm a number of small postholes appeared, suggesting that the sherd disposal might have taken place within structures or beneath house floors.

This text is taken from *The Spice Islands in Prehistory: Archaeology in the Northern Moluccas, Indonesia*, edited by Peter Bellwood, published 2019 by ANU Press, The Australian National University, Canberra, Australia.

doi.org/10.22459/TA50.2019.03