

The Colonisation of Palau: preliminary results from Angaur and Ulong

Introduction

The prehistory of Palau and other parts of western Micronesia has recently become important to debates about the colonisation and pattern of cultural development in the west Pacific. The main reason for this has been the suggestion that the antiquity of human occupation there might be much earlier than has been thought (e.g. Masse 1990), and well before the dispersal of Lapita culture from the Bismarck Archipelago to Samoa, between 3300 and 2850 BP (Specht and Gosden 1998; Anderson and Clark 1999). Estimates for the settlement of the Marianas now start about 4800 years BP, with Palau occupied at 4500 BP and Yap probably before 3200 BP (Dodson and Intoh 1999; Wickler 2001). These older than anticipated dates (e.g. Masse 1990) are significant because they coincide approximately with the spread of a Neolithic cultural complex in island South East Asia characterised by use of rice, pig and dog, manufacture of red-slipped or paddle-impressed ceramics, along with other distinctive portable artefacts that do not occur in pre-ceramic assemblages of the region (Bellwood 2001). Direct evidence for the earliest settlement of the Marianas, Palau and Yap is, however, scarce, and has been largely inferred from the analysis of sediment cores which indicates anthropogenic activity earlier than the archaeological record. In Palau these include the presence of charcoal particles, pollen from food plants like the giant swamp taro (*Cyrtosperma chamissonis*), and an increase in savannah plants at the expense of forest growth before 4000 BP (Athens and Ward 2001; Welch 2001). While the palaeoenvironmental results have furnished useful alternate colonisation chronologies there is a striking absence of early sites that allow us to identify either the origin and pattern of settlement in west Micronesia, or to investigate the colonisers' connection to early Austronesian movements in Island South East Asia and the Lapita dispersal in Near and Remote Oceania. This paper summarises recent investigations undertaken on the islands of Angaur and Ulong (Fig. 1) aimed at recovering early cultural materials from Palau's sequence to clarify the archipelago's colonisation history. The earliest securely dated and adequately reported cultural deposits from Palau date to ca. 2300 BP (Welch 2001), and several reasons for an absence of sites older than 2500 BP have been proposed.

Why no early sites?

Takayama (1981) proposed that a eustatic sea-level rise after 2000 BP had drowned the oldest archaeological sites, but Masse (1990) pointed to geological work which suggested that tectonic activity had actually elevated the Palau archipelago at slightly higher rates than eustatic sea-level rise. Recently Athens and Ward (2001) and Wickler (2001) have suggested that patterns of sediment deposition in cores might indicate uplift of up to two metres between 4000 and 3000 BP. They note that the magnitude of the uplift might have caused a major erosional episode on Babeldoab that buried early coastal and lowland sites under thick sediment deposits. In a recently published paper, however, Japanese researchers (Kayenne *et al.* 2002) estimate that tectonic activity in Palau probably caused archipelago subsidence at a rate of -0.1m/1000 years.

Whatever the magnitude and direction of tectonic movements, significant inland erosion on the main island has likely degraded much of the early colonisation phase landscape by embayment infilling and subsequent mangrove expansion. Estimates put 80% of Babeldoab's coastline in dense mangrove, including many of the sheltered bays on the west side of the island where early sites might be expected to exist (Wickler 2001: 192). Along with Wickler's suggestion that the small size of colonising populations and the likely ephemeral nature of their sites has reduced site visibility to levels below detectability, another significant factor on Babeldoab is the acidic soils which can chemically erode archaeological remains. For these reasons our search for early sites focused on the limestone islands of Angaur and Ulong to the south of Babeldoab.

Angaur Island

Angaur has an area of about 10 square km, and is composed of uplifted Miocene limestone surrounded by raised reef complexes of Pleistocene age. On the coast are low lying deposits of accretionary gravels and beach sands, except in the south where they comprise the main geomorphic unit. The scarcity of beach deposits and coastal rock shelters permitted testing of main areas where early settlement could be expected.

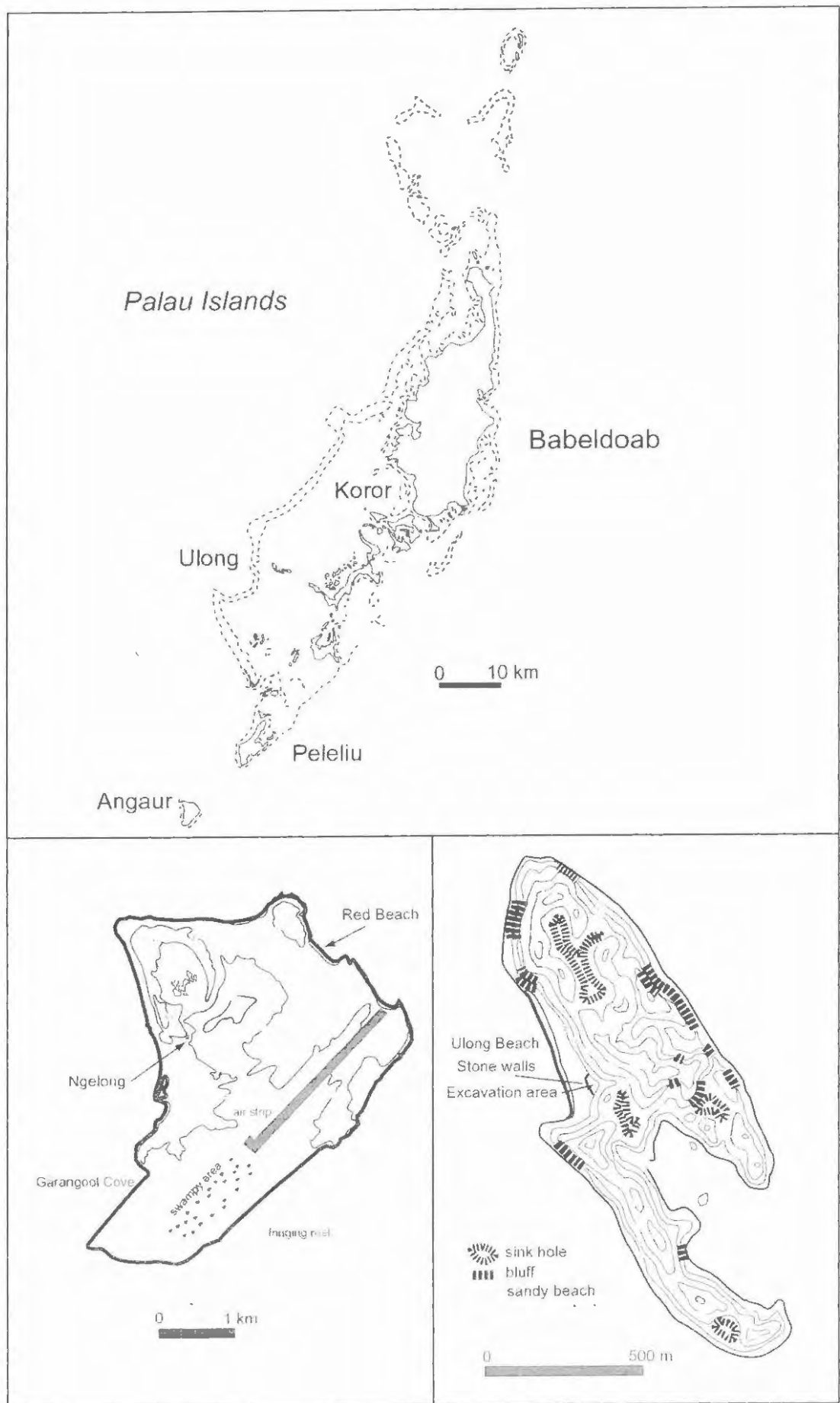


FIGURE 1. Map of the Palau Islands and Angaur and Ulong showing research locations.

Offsetting this advantage was the potential for large-scale phosphate mining and World War II activities to have destroyed or modified prehistoric sites as the island saw brief but heavy fighting between American and Japanese forces in September 1944, and subsequent occupation by American forces.

Previous investigations on Angaur include Kramer's ethnographic survey of traditional sites during 1908-1910, the major survey and excavation carried out by Douglas Osborne (1966, 1979), surface collections and site visits made by Takayama and others (Takayama *et al.* 1980), Olsudong and Blaiyok's (1996) overview of Angaur archaeological sites, and recent contract archaeology investigations (e.g. Beardsley 1996). Our excavations were carried out at Red Beach in the north, Garangool Cove in the south and Ngelong in the west (Fig. 1). Many other locations were subject to brief tests and walk-over survey, but discussion here is confined to excavated areas.

Red Beach (Elechol ra Uchul a Kerekar)

Red Beach consists of three small coastal flats divided by limestone outcrops. Fifteen metres northwest of the entry road was the blocked entrance to a small limestone rock shelter. Excavations were placed within the rock shelter and on each of the two coastal flats. Red Beach was used as an invasion beach by American forces in September 1944 and evidence of military activity in the area is extensive.

The Red Beach rock shelter had a partially filled in entrance 10 m wide, and was more than 15 m deep, with a sandy floor extending back about 11 m before deposits of flow stone reduce the floor-ceiling height to a crawl space (Fig. 2). It is feasible that an old occupation might lie beneath the flowstone, but this was unable to be tested with the equipment employed. As on Angaur generally the impact of World War II on the shelter deposits was substantial and the stratigraphy was highly disturbed. The disturbance was mainly due to the cave being used by Japanese defenders, who had evidently dug out parts of the cave and protected the position by constructing defensive walls apparently constructed of soil-filled bags. The shelter deposits contained caches of unexploded Japanese hand grenades and rifle/machine gun bullets as well as disarticulated and partially articulated human remains associated with Japanese artefacts such as coins, a mess tin, a small metal container, and glass medicine bottles. All human bone was reburied in the cave after excavation with details reported to the Palau Division of Cultural Affairs (Clark and Wright 2002).

Excavation and Stratigraphy

Four 1 m² test pits labelled TP. 1-4 were excavated in the rock shelter. TP. 1 and TP. 2 were excavated as separate units while TP. 3 and TP. 4 were outlined as a

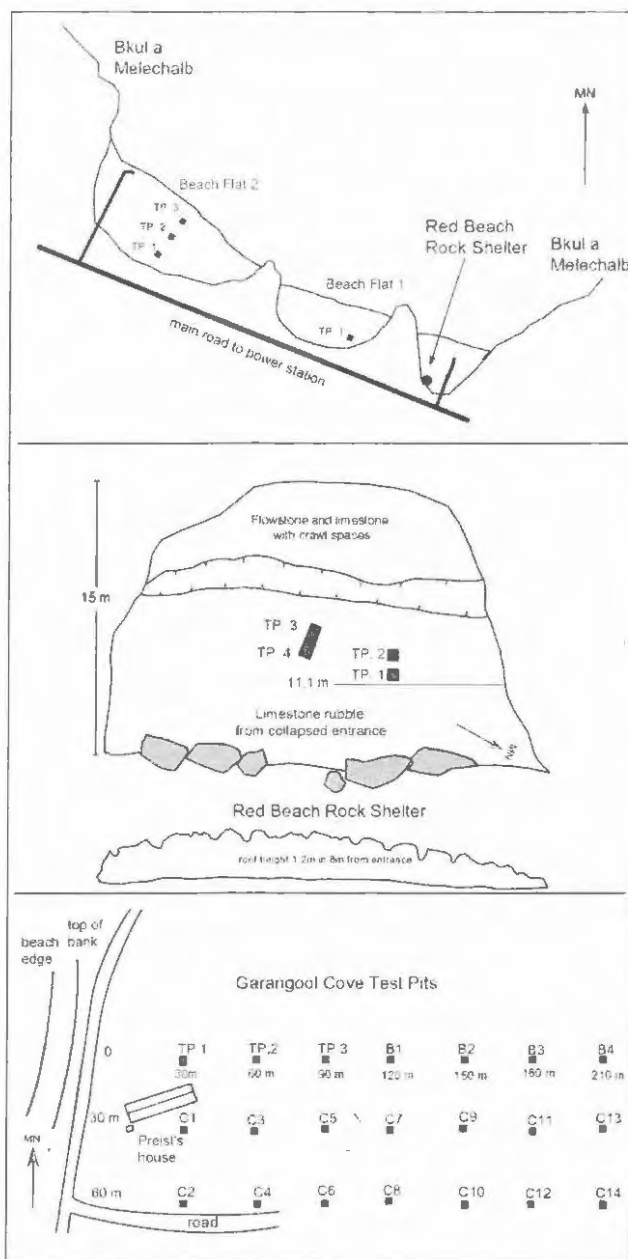


FIGURE 2. Location of Red Beach rock shelter (sketch map, top), plan of the shelter excavations (middle) and Garangool Cove test pits (bottom).

1 m by 2 m unit. A cache of hand grenades was reached in TP. 3 at 40-50 cm causing its abandonment. TP. 4 also had extensive disturbance in its upper levels. The less-disturbed stratigraphy of TP. 2 is described below.

- Layer 1: 0-110 cm. The upper part of Layer 1 was a very loose mottled grey-brown moderately coarse calcareous sand, containing fragments of human bone, pieces of metal, pottery, pumice and limestone roof fall. Below 70 cm the sand was a clean pale-yellow colour with pottery apparently more abundant above 70 cm and declining thereafter. Small amounts of fish bone and fragments of charcoal continued to the layer base with a possible lens of pumice at 80-90 cm.

- Layer 2: 110-200 cm. Below 110 cm was a coarse calcareous sand with rounded coral boulders varying from 15-30 cm in greatest length at 120-140 cm depth. These might result from a storm event during a period of higher sea level as the shelter floor is approximately eight metres above current sea level. Below this the coarse beach sand continued with occasional coral boulders and a few fragments of fish bone and crab.

Pottery and Shell Artefacts

The ceramics from the rock shelter included a few pieces typical of late-prehistoric Palaun assemblages, but the main pottery type belonged to a thin-walled vessel with a slightly outcurving rim. Late prehistoric ceramics and artefacts were found on the slopes outside the rock shelter and east and west of it, but examples of the thin-walled pottery only occurred within the shelter. Those sherds found in upper levels had cemented deposits of clean sand adhering to them indicating displacement from lower levels.

Variation in rim eversion of the thin-walled pottery was large with some having direct or slightly everted orientations, but a few had eversion angles of *ca.* 50 degrees. Rim diameters ranged from 20-40 cm, with most between 20-30 cm. Lips were flat and some had a small channel along the middle of the lip. Vessel shape appears to have been globular-to-oval. Sectioned rims had black cores flanked by outer red or orange surfaces, indicating the use of a carbonaceous clay that was not sufficiently fired to oxidise organics entrained in the clay (Rice 1987: 334, 345). It is worth noting that deposits of lignite containing plant cuticles, resins, pollen, spores, epidermis and sclerotia, are interbedded with clays of the Airai formation in the south and southwest of Babeldoab (Corwin *et al.* 1956: 52-54). Particles of ceramic sherd (grog) were noted in broken sherd sections.

Three fragments of shell ring and a piece of pointed marine shell were recovered. Two *Trochus* sp. rings of 10 cm and 5 cm diameter were found in TP. 4 (60-70 cm) and TP. 2 (40-50 cm), while a section of eroded *Trochus* sp. ring in TP. 2 (160-170 cm) could result from the redeposition of an older cultural deposit or was perhaps introduced from upper levels by wall collapse. A piece of worked *Trochus* sp. with a ground point, possibly a lure point or fish-hook fragment, occurred in TP. 1 at 120-140 cm. The 'point' was smudged with charcoal suggesting an origin from upper levels as no charcoal was recovered from the 120-140 cm levels.

Test pits 1 m² in area were also placed at the back of the two coastal flats west of the rock shelter, but apart from a single volcanic sand-tempered rim sherd from deep in one pit, the artefactual remains came from upper levels and were both sparse and consistent with late-prehistoric activity.

Garangool Cove

An area east of Garangool Cove was targeted for intensive investigations to test claims of mid-Holocene occupation suggested in palaeoenvironmental results from Babeldoab. In this area a contact between the raised Pleistocene reef flat and accretionary sediment of Holocene age runs from the west coast eastward to a swampy zone once used for growing taro. The eastern edge of the swamp is bordered by a spit-like gravel beach ridge. William Dickinson (pers. comm.) suggested that in mid-Holocene times the swamp behind the beach ridge was probably a sheltered lagoon with the area from Garangool Cove east to the swamp edge forming a potentially attractive area for early settlement. The surface was searched for evidence of prehistoric occupation and 21 test pits (1 m²) were laid out in a 30 m grid starting just north of the abandoned Catholic priest's house covering an area 210 m long by 60 m wide (Fig. 2). Excavation failed to uncover any evidence of either an early or a late prehistoric occupation. Typical sequences contained an upper layer of fine humic calcareous sand between 0-80 cm, with eroded pumice, pieces of coral, tree roots and crab holes. Below were bands of coarse and fine pale-yellow sands varying in thickness, and with lenses of coral rubble down to 180 cm. The base was a fine orange-purple silt above the lagoon floor which varied in depth from 180-240 cm below surface.

Ngelong (B: NG-1)

Ngelong is one of the better reported late-prehistoric sites on Angaur and was excavated by Osborne in the 1950s and 1960s. Takayama and others (Takayama *et al.* 1980) later visited the site and made surface collections of artefacts and pottery. Our main purpose in excavating Ngelong was to determine whether there was any evidence of older deposits below the relatively shallow layer of late-prehistoric cultural materials excavated by Osborne. Heavy surface scatters of marine shell and pottery cover numerous small clearings in the dissected limestone which together comprise the B: NG-1 site.

A 1 m by 2 m unit was placed in a small passage connected to the main clearing where shell and pottery were especially concentrated. The floor of the passage was flat and in contrast to the main clearing the evidence of land crab disturbance did not appear to be as extensive. The stratigraphy consisted of two main layers. The first was a black-brown silty clay rich in organics containing abundant midden material down to 60 cm. Below this the deposits contained increasing amounts of phosphatic oolite.

Ceramics, Shell and Bone

The Ngelong pottery collection is comparable with Osborne's (1979) record of a bowl assemblage. The bowls are generally large, thick-walled vessels and rims

Ngelong (1m ² sample)	Shell weight (g)	Shell NISP	Bone weight (g)	Bone NISP	Sherd weight (g)	Sherd number
0-20 cm	320	43	134	153	3860	213
20-40 cm	288	34	56	103	1644	82
40-60 cm	286	39	50	33	2522	138
60-80 cm	12	8	36	45	186	16
80-100 cm	12	14	30	30	78	8
Total	918	138	306	364	8290	457

TABLE 1. Distribution of bone, shell and pottery at Ngelong.

had slightly inverted orientations with flanged rim vessels common. There were also a few examples of direct and everted bowl rims although these types were much less frequent. The pottery is well fired and appears to be entirely grog-tempered with no evidence of significant stylistic variation in the assemblage. Pottery slip and other kinds of surface decoration were entirely absent from this collection, but Osborne identified red slipped and incised pottery in his much larger excavations. One sherd from 0-20 cm had a mat impression, possibly obtained from placing a pot to dry on a *Pandanus* mat. The pottery depth distribution suggests that 60 cm was the basal level of a relatively intensive occupation of short duration as indicated by the stylistic homogeneity of the ceramics. A quantity of shell and stone artefacts were found at the site and will be reported elsewhere.

At Ngelong the most common shell fish species is *Atactodea striata*, a gregarious species that can be taken in reasonable numbers and which contains a relatively large amount of meat relative to shell weight. Other targeted species include the reef dwelling *Turbo* and the sand/mud dwelling *Nerita plicata*. The mean size for each species was in the medium-to-large size range. Frequently, remains of gastropods such as *Lambis lambis* and *Cypraea* sp. have hump and dorsal margins exhibiting signs of breakage consistent with meat extraction.

The bone weight is high in the first 10 cm, but then decreases with almost no bone present below 60 cm (Table 1). Fish bone dominates the collection, particularly Lutjanidae, Nemipteridae and Scaridae. The former are largely caught in the littoral and supra-littoral zones within the islands fringing reef structure. They are omnivores and hook, lures or baited traps were probably used in their capture. Scarids are reef browsing and commonly occur in shallow water. The large number of Scarid remains suggest capture with nets or spears. Establishing the size of individuals was difficult to determine due to the fragmentation of most remains, but variation was significant with a few very large individuals from lower cultural levels. Other species present were turtle, bird and possible fruit bat, with one *Rattus* bone below 40 cm depth. Many of the animal bones had been burned.

Ulong Island

Ulong Island is a small raised limestone island 0.54 km² in area. It is the western most of the Chelbacheb group of 'Rock Islands' and like other Rock Islands it has a steep and eroded topography with the uppermost parts of the island about 100 m above sea level. A beach flat, one of the largest in the Rock Islands, lies on the west side of the island and on it are numerous archaeological features including limestone platforms, walls and surface rubble, pottery and marine shell, particularly at the southern end of the beach.

Osborne excavated in the south at a site called Aulong 1 (Wall Test), but now coded as B: OR-15-5, recording a basal ceramic assemblage which appeared similar to the Angaur pottery found in the Red Beach rock shelter. He placed the Wall Test ceramics into four strata (Strata I-IV), but the illustrated rim cross-sections show that two main assemblages were present. The upper contained flanged rim forms from inverted bowls typical of late-prehistoric Palauan ceramics which probably date to 450-750 BP (Masse 1990). These rim forms occurred in Strata I-III. The Strata IV ceramics, which mainly derive from a depth of 60-90 cm, were different. Rim orientation included direct and inverted, but outward curving or everted (called by Osborne 'backcurve') furnished the main rim type. In addition sherd thickness was noticeably less in the Strata IV pottery, although both assemblages were grog tempered. Pot sherds from the Wall Tests excavations were radiocarbon dated but gave inconsistent and unreliable results (Phear *et al.* 2003; Masse 1990: 216). From his extensive experience of Palau's archaeology Osborne (1979: 75) identified the everted rim type in the Strata IV assemblage as "an ancient form".

The approximate position of the 1968 Wall Test excavation was located (see Osborne 1979: Fig. 38), and a 1 m² test pit, called TP. 1 was placed immediately east of it to determine where the intact deposits began. East of TP. 1, two 1 m by 2 m units were placed at the east and west ends of a 11 m transect. Unit 1 was the eastern unit and Unit 3 the western unit. Five layers were identified in Unit 3.

Unit 3 Stratigraphy

- Layer 1: 0-35 cm. Dark brown silty clay with abundant pottery, marine shell, fish bone and charcoal. Pottery was of the large flange rim type with a few rim sherds from thin-walled vessels with everted rims and flat lips.
- Layer 2: 35-80 cm. Light grey sandy soil. Below 60 cm pottery was dominated by everted rim vessels with thin walls and grog temper. Some pig bone was recovered from Layers 1 and 2 along with bones from a species of *Rattus* which was larger than *Rattus exulans*. The larger rat may be the Asian rat (*Rattus tanezumi*) which has been identified in archaeological sites excavated by Masse (1989).
- Layer 3: 80-93/115 cm. Reddish-brown silty sand with marine shells and pottery. Most ceramics were similar to the Layer 2 material, but a few sherds of different ceramic characterised by sherds with volcanic sand and calcareous grains rather than grog temper were noted.
- Layer 4: 95-135 cm. Dark grey sand with pockets of darker soil possibly indicating crab burrowing from above or tree root penetration. Cultural material declined with depth and relatively few pot sherds or marine shells were found at the layer base. Charcoal, whether in small pieces or dispersed fragments was more common at the interface between Layer 3 and Layer 4 (90-110 cm). Some sherds with carbonised residues adhering to the interior vessel surface were recovered and two small stone adzes and a small basalt blade, along with a few chert flakes were also recovered.
- Layer 5: 135-220 cm. The upper part of Layer 5 was a coarse grey-yellow calcareous sand which changes to a grey-yellow fine sand around 200 cm. The base of the deposit was reached by augering down to the limestone floor with a sand bit reaching base at 325 cm. A discontinuous lens of large marine shells (*Tridacna*, *Lambis*, *Trochus*) and rounded coral rocks occurred at 140-160 cm. Within this lay a deposit of pot sherds, with sherd number greater in Unit 1 than in Unit 3. Many of the pot sherds below 160 cm depth had eroded surface suggesting deposition of the sherds in the inter-tidal zone or perhaps from the reworking of beach deposits due to subsidence or sea-level change. Charcoal was rare in this deposit and occurred as small dispersed fragments or occasionally as carbonised residues on pot sherds. Fish bone and non-pottery artefacts were also rather sparse, and like the pottery the mouth parts of Scaridae showed rounding of projecting bone facets consistent with some deposit reworking. Some large sherds were found in fine sand below 220 cm, but a shovel probe in the east end of Unit 3 did not recover any sherds beneath ca. 250 cm.

Ulong Pottery

Upper Assemblage. Figure 3 shows a selection of rim cross-sections from the Upper ceramic assemblage at Ulong. Rims are typically from large vessels and the average external lip diameter from a sample of 34 rims was 36 cm (range 18-50 cm). Rims were moderately-to-highly inverted with angles of 30-60 degrees from the vertical axis not uncommon. In addition to the inverted 'flange' rims typical of late-prehistoric ceramics in Palau, bowls with direct or slight eversion or inversion rim angles were present.

Decoration consisted of incised chevrons below the rim of a flanged-rim vessel and finger-nail impressing at the same location on another flange rim. Sectioned sherds appeared to have dense paste with particles of broken pottery (grog) visible under low magnification. Paste colour was variable but generally consisted of a dark black core that extended to the outer surface or which was sandwiched between thin outer layers orange-red in colour.

Middle Assemblage. The Middle ceramic assemblage was mainly concentrated between 70 and 100 cm depth in all excavation units, with occasional rim sherds down to 120-130 cm. The assemblage is comparable to the Stratum IV pottery collected by Osborne (1979: Fig. 58), and is notable for the diversity of its rim forms. A selection is shown in Figure 3 which illustrates the variability in rim-lip attribute combinations. A sample of 38 rim sherds had an average rim diameter of 27 cm, much less than the mean value of 36 cm obtained from the Upper assemblage. Sectioned sherds had an entirely black fabric or a grey-black core between orange, grey or red layers. Grog particles were again noted in the dense paste but no calcareous or other mineral grains were noted under low-power magnification.

Other rim forms associated with the Middle pottery assemblage included a bowl rim with a lug or handle below the lip and rims with an external groove below the lip, which Liston (pers. comm.) has termed the 'Nagaraard notch' because of its frequency in pottery collections in northern Babeldaob. Elsewhere in Palau lugs are relatively rare but have been recorded from a red painted bowl (Osborne 1979: 290).

Also present were two sherds from inverted bowls with a carination or inflection point on the body. Decoration was difficult to identify but some of the sherds appeared to have been painted or coated with a red or possibly white slip. However, a white 'slip' on the surface of sherds in the 60-90 cm deposit might represent calcium-carbonate deposition rather than a decorative coating.

Basal Assemblage. Evidence for a ceramic assemblage underlying the Middle pottery was found in Units 1 and 3 but was less evident in TP. 1. Rim sherds were from everted jars with tapering, pointed or

rounded lips, and contained different temper inclusions from those of Upper and Middle assemblages (Fig. 3). A few of these sherds were recovered in association with the Middle pottery, but the majority were found below 130 cm. Rims appear to be moderate-to-highly everted. Orifice diameters appeared to range from 16-34 cm while eversion angles varied from *ca.* 25 to 70 degrees. The range of vessel forms was limited, with two possible bowl rims amongst a rim collection belonging to everted jars with a gradual rim-body contour.

Decorated sherds were rare in the assemblage, but many vessels could have had a surface slip or burnish that was eroded. At least one decorated rim sherd displayed definite evidence of a red slip and burnish. Simple linear incision was also recorded on interior rim and vessel shoulder sherds. Several body sherds had converging incised lines with possible evidence of lime infilling. One rim had a series of small punctate markings along the lip made with a multiple or single-toothed tool, and two probable neck sherds displayed uneven modelled grooves.

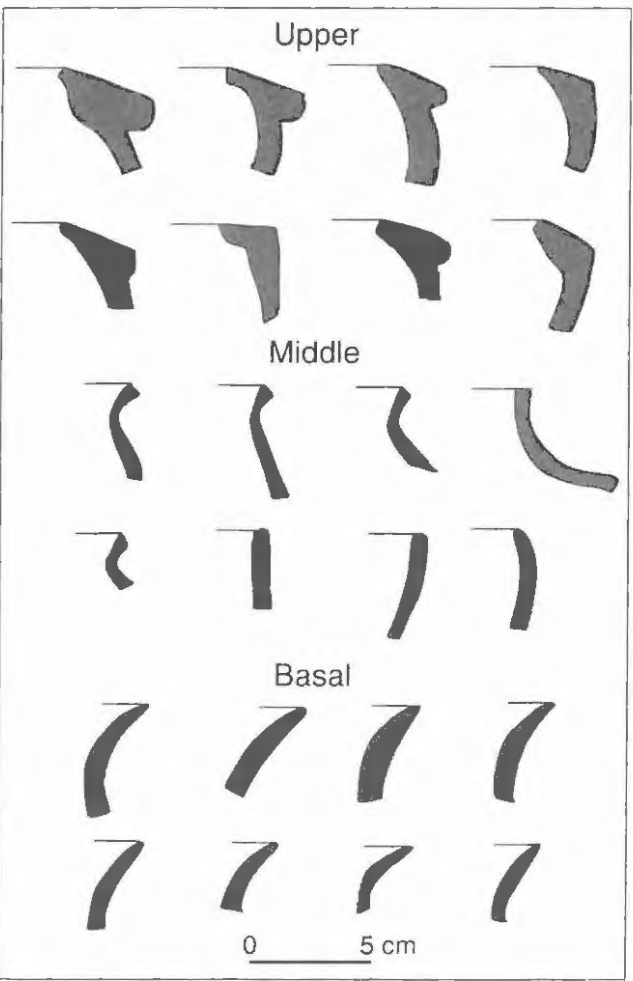


FIGURE 3. Ulong rim forms from Upper, Middle and Basal ceramic assemblages.

Apart from the clear stylistic differences between Basal and Middle pottery, the fabric of the Basal ceramics also supports assemblage differentiation. Dark volcanic grains were visible in sectioned rims and many had small to abundant calcareous grains which reacted strongly with 10% HCl (hydrochloric acid). The paste was less dense than that of Upper and Middle pottery and particles of grog were not noted under low magnification. The Basal ceramics are the first assemblage recovered from Palau that is not dominated by, or includes, a grog-temper. Previously excavated Palauan pottery collections contain grog temper which has been thought to be a trait that arrived with the first colonists. The Ulong sequence suggests instead that there was a transition from the use of volcanic beach-sand tempers to grog tempers, possibly as a result of environmental change brought about by the impact of anthropogenic sediment deposition on coastal landscapes.

Faunal Remains

The faunal assemblage from the Ulong site is still undergoing analysis, with specimens that cannot be identified with the Osteology collection at the ANU sent to relevant experts. The following comments are therefore based on initial observations made while cleaning and sorting material.

The majority of the bone remains came from fish. In TP. 1 the largest amounts of fish bone occur in the 0-50 cm spits, with relatively little in the spits below 80 cm. At 150-180 cm there is again a slight increase in the amount of fish bone, and this general pattern also appears to hold for Units 1 and 3. Mouth parts of Scaridae, Labridae and Nemipteridae (cf. *Monotaxis* sp.) were noted. These are all reef species and are likely to reflect fish capture from areas close to Ulong Island. In TP. 1 teeth from small sharks were recovered along with a sting ray spine, possibly used as an artefact (ie. Kirch and Yen 1982: 270). Like fish remains those of turtle were most abundant in the upper 70 cm of deposit with a second smaller concentration at 120-140 cm in Unit 1. Most turtle bone consists of fragmented carapace with a few limb bone fragments.

Mammal bone tentatively identified as pig (*Sus scrofa*) and a rat much larger than the widely distributed Pacific rat (*Rattus exulans*) was found in the upper layers at Ulong, in association with the late prehistoric flange-rim pottery and limestone wall and platform constructions. According to Keate's (1789) account pigs were not apparently introduced to Ulong from the *Antelope* in 1783, but rats might have been. Alternatively, a more recent introduction of rats might explain their remains through burrowing or some other process leading to accidental burial. In 1783 Ulong was uninhabited and there is no record of it having been reoccupied after the arrival of the English, nor any

stratigraphic indication of an occupation hiatus. It is therefore likely that the pig bone represents a genuine prehistoric introduction, as is also suggested by the recovery of pig bone from late-prehistoric sites in the Rock Islands and Babeldoab (Masse 1990; Wickler *et al.* 1998: 122).

In the upper layers shell fish species included univalves such as *Strombus*, *Lambis lambis*, *Cypraea* sp. and *Trochus*, and the bivalves *Tridacna* sp., *Hippopus hippopus*, *Anadara* and *Vasticardium*. Concentrations of *Tridacna* and *Hippopus* valves were noted at the interface between Layer 3 and 4 in Unit 3, and in all units at ca. 140-160 cm in association with very large individuals of *Lambis lambis* and pieces of rounded coral.

Artefacts

The majority of the 21 artefacts were from Unit 3 and TP 1, and 62% (13) were found between 80 and 120 cm. Stone tools include a large plano-convex and two small oval-rectangular adzes, and a small blade with a triangular cross section. Petrographic examination of one adze identified the material as a volcanic breccia containing fragments of pale glass and olivine consistent with an origin in Palau (John Chappell pers. comm.). Three pieces of volcanic tuff used as abraders also appear to be local imports to Ulong, as tuffs are a relatively common component of Babeldoab's geology (Corwin *et al.* 1956). Similarly, pieces of ironstone with grooves and surface striations consistent with having been abraded to obtain red iron-rich ochre must also have come from one of the volcanic islands. A few pieces of chert as small flakes and cortex debitage were also found. Shell artefacts were surprisingly less abundant than stone items, with only three pieces of worked shell. They were a thin *Conus* sp. disk, a small bead probably of *Terebra* sp. and a drilled and worked fragment of *Tridacna* sp., and all came from the 100-110 cm level.

Radiocarbon Dates

Three radiocarbon dates on marine shell have been obtained and a series of AMS dates on charcoal are currently being processed by the Radiocarbon Dating Laboratory at the Australian National University. The oldest determination from the base of the site is 3210 ± 50 BP on *Lambis lambis* (Unit 3, ANU-11766). From 150-160 cm a *Tridacna* shell returned a date of 2950 ± 50 BP (Unit 3, ANU-11769), while a *Tridacna* sample from the level above it dated to 2890 ± 50 BP (Unit 3, ANU-11768). The dates are in stratigraphic order, but as in the Marianas and Yap an appropriate marine reservoir value for Palau has not been determined (Bonhomme and Craib 1987). The association of the marine shell with the lowest pottery needs to be clarified by AMS determinations on charcoal. Nevertheless, the clear stylistic and temper differences between the Basal and Middle ceramics, along with the marine shell

determinations suggest the lowest Ulong assemblage dates to ca. 2500 cal BP or older.

Summary and Conclusion

Taken together, the results from Angaur and Ulong, preliminary as they are, represent significant new additions to knowledge of Palau's past. Perhaps most important is that despite a variety of reasons for the small amount of evidence for prehistoric occupation predating 2300 BP, such sites do exist, and when a number are finally excavated they will allow a better understanding of Palau's settlement and how it relates to events elsewhere in western Micronesia and island South East Asia. In this regard the recovery of an intact pottery sequence from Ulong, and its links with ceramics found on Angaur, is significant because it shows that attempts to pinpoint the origin of Palau's colonists (e.g. Osborne 1979) has been made using ceramic assemblages that are not the oldest in the archipelago, and which likely stem from a significant period of local development. While the Basal Ulong pottery might not be the earliest in Palau the stylistic affinities of its jar assemblage is still clearly compatible with the concept of a separate movement of people from island South East Asia to that responsible for the occupation of the Marianas, since decoration and vessel forms in the two areas still differ from one another (Butler 1994; Craib 1993; Wickler 2001). The oldest ceramic previously described from Palau is a thin-black ware dated from 2500 to 1700 BP (Welch 2001). Although this assemblage has yet to be published in detail, it is interesting to speculate that one of its key markers – the presence of a black fabric – might derive from the use of carbonaceous clays containing lignite particles that were insufficiently oxidised during firing.

As Kirch and others have noted there is significant disparity between palaeoenvironmental and archaeological ages for the colonisation of west Micronesia (Kirch 2000: 172; Athens and Ward 2001; Wickler 2001). In contrast to Lapita colonisation whose numerous and well dated sites are distributed from the Bismarck Archipelago to Samoa, establishing the age, sequence and direction of west Micronesia's colonisation is problematic using current archaeological and palaeoenvironmental data sets. For instance, if the anthropogenic indicators of pre-4000 BP settlement in Palau are too old then it will be difficult for archaeological work to ever fully confirm or refute the hypothesis of an early human occupation that is suggested to have left only sparse and equivocal sets of prehistoric remains. Conversely, the degree of prehistoric landscape change in Palau suggests that extracting a set of early sites that could be used to investigate the colonisation process in a manner analogous to the Lapita cultural complex will be difficult.

The crucial issue for combining both kinds of information hinges on the earliest evidence for potential

human settlement in the palaeoecological record which is acknowledged to require confirmation from the recovery of similarly old anthropogenic indicators in other cores (Athens and Ward 2001). Although there are tentative indicators of an early human presence that could date to before 4000 BP in Palau's palaeoenvironmental record, there is a much stronger and abrupt anthropogenic signal dating to about 3000 BP, which is especially evident in the Ngerchau core. It shows an increase in charcoal particles, rapid rates of sediment deposition and expansion of inland grasslands around 3000-2700 BP (Athens and Ward 2001: Figure 4). The timing of this change is coincident with the majority of radiocarbon ages on charcoal from redeposited sediments (Phear *et al.* 2003), and with two AMS dates on human bone from limestone burial contexts which have calibrated medians ranging from about 2900 to 2550 cal BP (Reith and Liston 2001; Fitzpatrick in press). With an area of 458 sq. km Palau is a relatively small archipelago, and significant human impact on its environment could be expected to occur within 100-300 years of successful colonisation, as is the case on much larger island groups such as Fiji, New Caledonia and New Zealand (Clark and Hope 2001; Stevenson 1999; McGlone and Wilmshurst 1999).

Along with the Ulong dates which suggest initial arrival at *ca.* 3000 BP and the negative results of a cultural assemblage pre-dating the earliest Ulong ceramics in the extensive test-pitting program on Angaur, there is now emerging congruence between some palaeoenvironmental results and archaeological data for the settlement of Palau around 3000 BP. Whether this extends even further back or settles around the time that Lapita was developing in the Bismarck Archipelago needs to be examined by future research.

Geoffrey Clark and Duncan Wright
Archaeology and Anthropology
Australian National University
Canberra, Australia

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