Early human burials in the western Pacific: evidence for a c.3000 year old occupation on Palau

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The author reports the oldest human skeletal assemblage found so far in the Pacific Islands: at the site of Chelechol Ra Orrak on Palau, western Micronesia.

Keywords: Micronesia, Palau, burials

Introduction

Archaeological research in western Micronesia (Figure 1) during the past several decades has pushed back the earliest date of human settlement (Takayama 1982; Intoh 1997; Liston et al., 1998a, 1998b, 1998c; Wickler et al. 1998; Dodson & Intoh 1999; Fitzpatrick 2002; Wickler 2001). But while Kurashina et al. (1983, 1984) demonstrated that the settlement of Guam occurred by at least 3500 BP (see Craib 1999 for a more recent review), the earliest

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Figure 1. Map of western Micronesia with inset of the Palau Islands.

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dates from Yap (Gifford & Gifford 1959:159; Takayama 1982:107; Hunter-Anderson 1983:88) and Palau (Masse 1989, 1990; Masse et al. 1984) were around 2000 BP even after twenty years of investigation.

The contrast in dates from south to north led Masse (1989, 1990) to suggest that these island groups were settled independently and not in the 'stepping stone' fashion advocated by Osborne (1979). Osborne, despite not finding firm evidence for the settlement of Palau before 2000 BP, suggested that peoples probably moved through the Western Carolines on their way to the Marianas chain 4000 years ago. Masse (1989, 1990) later disputed this claim, noting at the time that no accepted C\(^{14}\) dates were available to support Osborne's hypothesis and so he instead argued for a human settlement date of roughly AD 1 (Masse et al. 1984; Masse 1989, 1990).

Recent discoveries from Yap (Intoh 1997:28; Dodson & Intoh 1999) and extensive archaeological data recovered as part of the Compact Road project on the large volcanic island of Babedaoab in Palau have pushed the date of settlement of these islands back to 3300-3400 BP, but the evidence is admittedly sparse (Liston et al. 1998a, 1998c; Wickler et al. 1998). Paleoenvironmental evidence collected by Athens and Ward (1999) provides a proxy indicator of an even earlier human presence in Palau around 4500 BP although this has not been firmly established due to a dearth of archaeological evidence and reliable radiocarbon chronologies.

During the summer of 2000, twenty-six burials were discovered in deposits over a metre deep at the Chelechol ra Orrak site in Palau. A suite of 19 radiocarbon dates from the site provides archaeological evidence for human occupation c.3000 years ago, and perhaps earlier. This makes these burials the earliest evidence of a human presence in the limestone islands of the archipelago, and the oldest skeletal assemblage known thus far in the Pacific Islands outside of Melanesia.

Excavation

Palau is located roughly 7 degrees north of the equator along the western edge of the Caroline Islands in Micronesia (Figure 1). The Palauan archipelago is comprised of several hundred islands that range from volcanic (e.g. Arakebesang, Babedaoab and much of Koror and Malakal) to raised limestone (e.g. Peleliu, Angaur, Chelechabh), and atolls (e.g. Kayangel). Most of the islands are coralline and locally referred to as the "Rock Islands." These islands are geologically distinct from ones that lie along the southern and western reefs (e.g. Peleliu, Ngemelis) which tend to have less dramatic karst topography and less consolidated reef formations.

The Chelechol ra Orrak ("beach of Orrak") site is located along the southern edge of Orrak Island in a small cluster of Rock Islands 1 km east of Babedaoab's south-eastern tip (Figure 1 inset). The island is connected to Babedaoab by a prehistoric causeway constructed of coral rubble now covered in mangrove vegetation. The site was originally identified as a Yápean stone money quarry (Fitzpatrick 2001, 2003a) by Blaiyok (1993) and consists of several caves and small overhangs that stretch for about 200 metres just behind the shoreline (Figure 2).

Four test units were opened (two - 1.0 x 1.0 m [units 1 and 2]; two - 0.5 x 1.0 m [units 3 and 4 lie adjacent to each other]), three of which were excavated to 90 cm or more (units 1, 3 and 4). Soils in the upper 50 cm were typically a mixture of calcareous sand and silty loam
Early human burials in the western Pacific.

with large quantities of shellfish and fish bone. Soils below 50 cm were mostly calcareous sand deposits intermixed with spotty loam inclusions and a dramatic decrease in faunal remains. Sediments were water screened through 1/8-inch mesh to ensure the recovery of smaller site constituents. A diverse faunal assemblage was recovered including crustacea, echinoderms, elasmobranchs, turtle, nearly a hundred different shellfish taxa, and at least 20 fish taxa. Artefacts recovered included pottery, glass beads, pearl shell tools, Tridacna adzes, a stone adze, shell ornaments (including Trochus sp. rings and Conus shell beads and pendants), pottery, a drilled turtle plastron fragment and a bone needle.

Human remains, most of which were found in Test Units 1 and 4, were also discovered in each of the test units, usually below 50 cm in Layers 7-10. The remains were disarticulated and consisted of over 400 skeletal fragments and teeth in both primary and secondary burial contexts. Determination of the minimum number of individuals (MNI) was made through analysis and correlation of dental and skeletal element count, dental wear, skeletal and dental age, and element size.

At least 13 of the estimated 26 individuals found at the site were from stratified deposits in Test Unit 1 (Nelson & Fitzpatrick n.d.), although only two were discovered in situ. These were located a metre apart in different depositional contexts (the burial in Layer 9 truncated that of Layer 8; Figure 3) and arranged in a supine position along the very northern and southern edges of the unit. Only a portion of the burial in Layer 9 (the lower leg bones and left femur) was recovered because of danger from tidal influx when discovery took place. The rest of this

Figure 2. Chelechol ra Orrak site map, with inset of Orrak Island.

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individual and the burial from Layer 8 (of which only the lower half was visible), were left unexcavated and carefully reburied. Unassociated skeletal remains including parts of four crania, five partial innomates, and other post-cranial elements were found in Test Unit 4 (MNI = 7). These were not in anatomical arrangement and probably represent a secondary interment. Skeletal remains recovered from Test Units 2 (MNI = 2) and 3 (MNI = 4) were isolated and comparatively few in number.

Overall, the burials consisted of both male and female adults (MNI = 26; Male = 2, Female = 8, undetermined = 16) and sub-adults (including prenatals and neonates; MNI = 9; Table 1). Several pathologies including osteophytic lipping on vertebrae, degenerative joint disease in the feet, and osteoarthritis of the hands were noted on various individuals. Betel nut chewing was evident on 100 per cent of the antemortem dentition (excluding juveniles who are rarely known to chew) as evidenced by reddish-black stains on the teeth, indicating that this was an important cultigen and habitual practice for both sexes (Fitzpatrick et al. in press).

Interestingly, the only obvious grave goods found were three pearl shell (Pinctada margaritifera) scraper/grater tools in association with the in situ female burial from Test Unit 1, Layer 8. These artifacts were traditionally considered women’s money (chesiuch), suggesting they are gender and status markers (Fitzpatrick & Boyle 2003). Most human remains in Palau have been discovered in either stone platforms within traditional village sites, terrace complexes, or caves (Liston et al. 1998c; Rieth & Liston 2001). Palauan burials found in caves are located exclusively

<table>
<thead>
<tr>
<th>Test Unit</th>
<th>MNI</th>
<th>Age</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>5 Sub-adult</td>
<td>3 Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 Adult</td>
<td>1 Male</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1 Sub-adult</td>
<td>1 Female (?)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Adult</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>1 Sub-adult</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Adult</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>2 Sub-adult</td>
<td>4 Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Adult</td>
<td>1 Male</td>
</tr>
<tr>
<td>Site total</td>
<td>26</td>
<td>9 Sub-adult</td>
<td>8 Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17 Adult</td>
<td>2 Male</td>
</tr>
</tbody>
</table>
in the Rock Islands or limestone outcrops within Koror and Babeldaob (Beardsley 1998; Rieth & Liston 2001). However, no burials had been located in deep stratified deposits, found in good preservation, and radiocarbon dated. So, numerous samples were selected to determine the antiquity of the burials and dates of subsequent occupation.

**Dating**

The 19 radiocarbon dates presented here are from each of the four test units with a majority of the dates (12 of 19; 63 per cent) coming from Test Unit 1. This unit had deep stratified deposits, contained the majority of skeletal fragments (n=350+), and had the highest number of individuals. Specimens were collected from nearly all stratigraphic layers down to a depth of 110 cms.

Additional samples were selected from burial deposits in other test units to determine whether burial activity differed temporally or spatially at the site. Samples of bone, charcoal, and shell were submitted to two different labs for AMS radiocarbon dating – the University of Arizona AMS facility and the National Ocean Sciences Accelerator Mass Spectrometry (NOSAMS) Facility at Woods Hole in Massachusetts. All samples were calibrated using CALIB 4.3 after Stuiver and Reimer (1993).

One of the difficulties in dating human skeletal remains is that porous bone can absorb calcium carbonate from a surrounding limestone environment and skew the resulting age if standard radiocarbon techniques are used. Pretreatment procedures must therefore be employed to ensure an accurate age assessment of bone specimens (see Taylor 1987:54-61). Pretreatments are generally used to isolate protein or a specific amino acid such as hydroxyproline known to occur almost exclusively in bone collagen (Van Klinken & Mook 1990). For this research, AMS radiocarbon analysis was used so pretreatment procedures could isolate one or more of the organic constituents indigenous to the original sample.

The bone samples were first demineralized in 0.6M HCl with heat, rinsed to a neutral pH, and the remaining liquid evaporated. The sample was then put back into solution with dilute ammonium hydroxide, run through a cation exchange resin, and freeze-dried to recover bone collagen. The collagen was then combusted under vacuum and the resulting gas converted to graphite for AMS analysis. Charcoal and shell specimens were prepared using standard methods that will not be repeated here, but are described on the NOSAMS web site <www.nosams.whoi.edu>.

At the request of the Palau Bureau of Arts and Culture, a human cranial fragment from layer 9 (AA-40957) was submitted for AMS radiocarbon dating as a preliminary test to determine the age of burials found within the lower deposits of Test Unit 1. A calibrated date of 2800 cal BP (Fitzpatrick 2002) made this the oldest date for any Rock Island site (see Masse 1989, 1990 for previous research in the Rock Islands). Although this date was within the range predicted by other researchers (Osborne 1979; Athens & Ward 1999; Wickler 2001), 18 additional samples were submitted to test the validity of this date and to place burials at the site within a more detailed chronological sequence. Altogether, AMS Radiocarbon dating was conducted on 10 bone (nine human and one burned pelagic fish), five charcoal, and four shell samples (Table 2).
Table 2. Radiocarbon dates from Chelechol ra Orrak. Human bone calibrated as 50 per cent marine and 50 per cent terrestrial to better reflect a mixed diet of fish, shellfish, and aroids common in the region (see Hunter-Anderson 1991; Weisler 1999, 2000). Ambrose et al. (1997) suggest that marine protein may have comprised 20-50 per cent of the diet in ancient Chamorro populations (Marianas); recalibrating the Palau human bone dates using these figures would make them slightly older.

<table>
<thead>
<tr>
<th>Lab No.</th>
<th>Material</th>
<th>Species</th>
<th>Unit</th>
<th>Stratum</th>
<th>Level</th>
<th>$^{13}$C/$^{12}$C ratio</th>
<th>Measured $^{14}$C age</th>
<th>Calibrated Age Range (cal BP)</th>
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<tbody>
<tr>
<td>AA-43047</td>
<td>charcoal</td>
<td>—</td>
<td>1</td>
<td>2</td>
<td>0-20</td>
<td>-26.5</td>
<td>96±33</td>
<td>historic</td>
</tr>
<tr>
<td>AA-43051</td>
<td>shell</td>
<td><em>Anadara</em> sp.</td>
<td>1</td>
<td>4</td>
<td>20-30</td>
<td>1.57</td>
<td>1245±54</td>
<td>870 (780) 720</td>
</tr>
<tr>
<td>AA-43048</td>
<td>charcoal</td>
<td>—</td>
<td>1</td>
<td>4</td>
<td>30-40</td>
<td>-25.4</td>
<td>1306±36</td>
<td>1290 (1260) 1180</td>
</tr>
<tr>
<td>AA-43049</td>
<td>charcoal</td>
<td>—</td>
<td>1</td>
<td>6</td>
<td>40-50</td>
<td>-25.8</td>
<td>1253±36</td>
<td>1260 (1210) 1150</td>
</tr>
<tr>
<td>AA-43052</td>
<td>shell</td>
<td><em>Conus litteratus</em></td>
<td>1</td>
<td>7</td>
<td>60-70</td>
<td>3.02</td>
<td>2881±43</td>
<td>2720 (2700) 2650</td>
</tr>
<tr>
<td>AA-43053</td>
<td>bone</td>
<td>human</td>
<td>1</td>
<td>8</td>
<td>80-90</td>
<td>-17.1</td>
<td>3860±360</td>
<td>4530 (4030) 3570</td>
</tr>
<tr>
<td>OS-33568</td>
<td>charcoal</td>
<td>—</td>
<td>1</td>
<td>8</td>
<td>100-110</td>
<td>-25.9</td>
<td>2770±30</td>
<td>2920 (2850) 2790</td>
</tr>
<tr>
<td>AA-45890</td>
<td>bone (rib)</td>
<td>human</td>
<td>1</td>
<td>8</td>
<td>—</td>
<td>-15.4</td>
<td>2641±49</td>
<td>2700 (2500) 2450</td>
</tr>
<tr>
<td>AA-43054</td>
<td>bone</td>
<td>human</td>
<td>1</td>
<td>9</td>
<td>80-90</td>
<td>-15.4</td>
<td>2028±44</td>
<td>1860 (1810) 1720</td>
</tr>
<tr>
<td>AA-40957</td>
<td>bone (cranial)</td>
<td>human</td>
<td>1</td>
<td>9</td>
<td>90-100</td>
<td>-15.7</td>
<td>2678±41</td>
<td>2720 (2700) 2500</td>
</tr>
<tr>
<td>AA-43050</td>
<td>bone</td>
<td>inder. pelagic fish</td>
<td>1</td>
<td>9</td>
<td>100-110</td>
<td>-12.6</td>
<td>2220±43</td>
<td>2060 (2000) 1950</td>
</tr>
<tr>
<td>OS-33447</td>
<td>shell</td>
<td><em>Pinctada</em> sp.</td>
<td>1</td>
<td>9</td>
<td>—</td>
<td>0.36</td>
<td>2140±50</td>
<td>1800 (1720) 1680</td>
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<tr>
<td>AA-43058</td>
<td>bone</td>
<td>human</td>
<td>2</td>
<td>4</td>
<td>30-40</td>
<td>-15.3</td>
<td>2735±48</td>
<td>2770 (2720) 2700</td>
</tr>
<tr>
<td>AA-43060</td>
<td>shell</td>
<td><em>Macra</em> sp.</td>
<td>3</td>
<td>10</td>
<td>60-70</td>
<td>2.11</td>
<td>2737±46</td>
<td>2490 (2420) 2340</td>
</tr>
<tr>
<td>AA-43063</td>
<td>bone (L. iliac crest frag.)</td>
<td>human</td>
<td>4</td>
<td>10</td>
<td>60-70</td>
<td>-15.7</td>
<td>2607±46</td>
<td>2680 (2420) 2360</td>
</tr>
<tr>
<td>AA-43062</td>
<td>bone (L. 3rd cuneiform)</td>
<td>human</td>
<td>4</td>
<td>10</td>
<td>70-80</td>
<td>-16.5</td>
<td>3164±51</td>
<td>3260 (3200) 3090</td>
</tr>
<tr>
<td>AA-43061</td>
<td>bone (L. vert. - C7)</td>
<td>human</td>
<td>4</td>
<td>10</td>
<td>80-90</td>
<td>-16.5</td>
<td>3658±65</td>
<td>3840 (3760) 3680</td>
</tr>
<tr>
<td>OS-34566</td>
<td>charcoal</td>
<td>—</td>
<td>4</td>
<td>10</td>
<td>80-90</td>
<td>-25.9</td>
<td>2650±35</td>
<td>2780 (2760) 2750</td>
</tr>
<tr>
<td>AA-45891</td>
<td>bone</td>
<td>human</td>
<td>4</td>
<td>10</td>
<td>—</td>
<td>—</td>
<td>2522±48</td>
<td>2360 (2350) 2330</td>
</tr>
</tbody>
</table>

1 A local ΔR for Palau has not yet been determined so the mean global reservoir correction was used (Sruver et al. 1998). See Kenneit et al. (1997), Phelan (1999), Guilderson et al. (2000), Kuzmin et al. (2001), Yoneda et al. (2001), and Hideshima et al. (2001) for recent attempts to determine ΔR correction values in other parts of the Pacific.

2 Perchey and Higham (2000) suggest that fish bone (barracouta - *Thyrisites atuia*) may be reliably radiocarbon dated if the reservoir conditions of fish are similar to those of locally collected shellfish. However, this has not yet been tested in Palau.
Results from Test Unit 1

Of samples selected from Test Unit 1, three were from Layer 8, the earliest deposit recorded, four from Layer 9, and five from Layers 7 or above (Figure 4). A distal phalanx from Layer 8 (AA-43053) was dated to 4030 cal BP, but had a large standard error and may represent a statistical outlier. Charcoal from the same layer dated to 2850 cal BP (OS-33568), suggesting the older date may be in error.

A fragment from a pearl shell (P. margaretifera) scraper/grater, three of which were found above the proximal end of the left femur from burial 2 (Layer 9) and which represent the only grave goods found, dated to 1720 cal BP (Fitzpatrick & Boyle 2003). Similar tools were associated with burials at Ngermereumes Ridge dating to roughly the same age (1720 ± 40 BP [CAMS-65958]; 2480 ± 40 BP [CAMS-65957]; Rieth & Liston 2001:44). Four other dates, all bone, dated from 1810 - 2700 cal BP. Although one of these dates (AA-40957) is slightly older than the adjacent deposit (Layer 8), it seems curious that in situ burials from Layers 8 and 9 are closely arranged, but separated by over a thousand years, especially if the Pinctada sp. tool date is directly associated with the burial in Layer 9. Part of this problem may stem from lack of a local reservoir effect for dating shell and problems with bone contamination.

Given the heavy carbonate content of site deposits within a limestone environment, this is certainly a concern. Even if the four dates from Layer 9 are averaged, the burial deposit becomes only slightly older at 2060 cal BP, still separated by almost a thousand years.
Other dates from later deposits (Layers 7 and above) indicate subsequent periods of occupation over the next 2000 years or so including Yapese quarrying of stone money at the site (see Fitzpatrick 2001, 2003). Except for a shell date from Layer 7 (AA-43052), all of the later dates are stratigraphically correct. Several date reversals in the lower deposits (Layer 7-9) are not surprising given that these soils are predominantly sandy in nature. Smaller site constituents could move within and between sedimentary deposits in these deeper layers due to human reburial episodes. A human tooth in Layer 7 from a mandible in Layer 8 suggests this is occurring on at least a limited basis (Nelson & Fitzpatrick n.d.). It is also possible that these dates are not an artifact of contamination, but actually represent two different burial episodes. Except for the two supine burials, the skeletal assemblage overall is very fragmentary. Given the stratigraphic relationships, radiocarbon dates, and burial assemblages, I would argue that the skeletal fragments in Layers 8 and 9 represent early in situ burials that became highly mixed due to soil liquefaction and subsequent burial events over a long period of time.

**Test Units 2-4**

Seven specimens were selected for radiocarbon dating from Test Units 2-4. These samples were collected from human skeletal fragments or burial deposits (Layer 10) and included human bone (five), charcoal (one) and shell (two). The dates ranged from 2330 to 3840 cal BP. Two of the oldest dates (AA-43062; AA-43061) were from bone in secondary burials in Test Unit 4. A third associated bone date (AA-43063) from Test Unit 4 dated to 2420 cal BP, but statistically overlapped with a charcoal (OS-34566) date from the unit and bone (AA-43058) from Test Unit 2. These dates ranged in age from 2330 to 2780 cal BP. In addition, a shell date (AA-43060) from Test Unit 3 (Layer 10) fell within this range and dated to 2420 cal BP.

Radiocarbon dates from Test Units 2-4 indicate that burial activity at Chelechol ra Orrak took place from approximately 2300 to 3000 cal BP, and possibly earlier. This is similar to what was found in the sequence of dates recovered from Test Unit 1. All of the dates suggest that early burial activity was not restricted to a small area, but was fairly widespread throughout the rockshelter. The island-wide reconnaissance survey on Orrak that continued in 2002 revealed additional human remains tucked away in crevices near the site and in deep caves within the island, some of which were absorbed into the still growing flowstone and dripstone formations. Although undated, these newly discovered burials support the notion that the site, and the island as a whole, was used extensively for burying the deceased for thousands of years.

**Assessment**

Several specimens date to 3000 cal BP and range in age from 2920 to 4530 cal BP (Table 1). These dates fit within the palaeoenvironmental chronology proposed by Athens and Ward (1999), but the question remains as to whether the Chelechol ra Orrak dates are reliable considering that they are derived from human bone in a limestone environment where contamination can occur. Although pretreatment procedures were employed, the bone specimens dating to around 3000 BP are outside the range of charcoal and shell dates from
the same contexts. This implies that contamination may be occurring at some unknown level. It is important to note, however, that seven bone samples do overlap in age with other dates.

Given the nature of the burials which are predominantly fragmentary and secondary in sandy deposits, it is difficult to automatically assume that these dates are unreliable based on their age, especially since rigorous pretreatment procedures were enacted using AMS radiocarbon dating. It is equally plausible that these specimens do in fact represent even earlier burials, but were disarticulated over time due to continued burial activity at the site and natural soil movement. This, however, has not yet been tested and only additional radiocarbon dating of paired samples will help to resolve this question. Despite these issues, the radiocarbon suite suggests that the antiquity of burials at Chelechol ra Orrak extends back at least three millennia. This conclusion is supported by multiple dates on a variety of different materials (bone, charcoal and shell).

**Palauan burials in a Pacific Island context**

Burials in Palau have been documented from a variety of contexts and locations including stone platforms, terrace formations, and limestone caves. The placing of the deceased on stone platforms is widely known to have occurred since at least AD 1200 and postdates other burial practices (Rieth & Liston 2001:66). Burials have also been discovered in earthwork terraces in the Roi and Roisingang terrace complexes (Liston et al. 1998c). Despite the sheer number of stone platforms and terrace sites in Babeldaob, the ability to discover intact and well preserved burials is hampered by the island's acidic volcanic soil making discovery and interpretation of skeletal assemblages difficult.

Archaeological surveys in the limestone Rock Islands of Palau prior to this research identified at least ten cave burials throughout the archipelago. Several of these were recorded by Osborne (1979) and Blaiyok (1993), nearly all of which are located in and around Airai (southern Babeldaob) and Koror (see Rieth & Liston [2001:63-64] for a list of previously discovered burial cave sites). It should be noted that uncertainties remain about whether some of these burials are Japanese or Palauan (Beardsley 1998) and the actual minimum number of individuals (MNI) present.

Only two of these burial sites, Sngall Ridge (Beardsley 1998) and Ngermereues Ridge (Rieth & Liston 2001), have been dated. A sherd temper AMS date from pottery associated with burials at Sngall Ridge dated to 2630 BP. Because it is unknown whether the sample was actually organic temper or some other type of organic material that penetrated the sherd, this date should be considered questionable (Beardsley 1998; Rieth & Liston 2001:69). Rieth and Liston (2001:53) dated three bone samples from Ngermereues Ridge with AMS, the earliest of which was from a left tibia (Feature 2; CAMS-65957) dating to 2480 BP.

The Chelechol ra Orrak burials greatly contrast with most other human remains found in Palau in terms of the number of individuals present, stratigraphic position and depth, and temporal range. The skeletal assemblage includes the remains from at least 26 individuals comprised of prenates, neonates, adolescents and adults of both sexes which are predominantly female (Nelson & Fitzpatrick n.d.). This is the second largest MNI from any burial site in Palau (Ngermereues Ridge has 32; Rieth & Liston 2001), but is the only assemblage to include pre-adolescents. The dates from Orrak also show a sequence of occupation spanning
at least 3000 years. Excluding the extremely old dates (those prior to 3000 cal BP), eight are anywhere from 300-1500 years older than radiocarbon dates collected from Ngermerues Ridge, the next oldest burial site in Palau.

The earliest dates from burial deposits at Chelechol ra Orrak are also older than any known Pacific Island skeletal assemblages. Pietrusewsky (1996:344) noted that “[v]ery few human remains have been found directly associated with the Lapita cultural complex; the culture believed to represent ancestral Polynesians. The Lapita-associated remains are often incomplete and poorly preserved, and rarely represent more than a single individual.” He also goes on to say that “[a]lthough the dates for the Lapita cultural complex fall between 3600 and 2500 years BP, most of the Lapita-associated skeletons are from the terminal phases (e. 2500 years BP) of this cultural complex, while others post-date it” (Pietrusewsky 1996:344). A list of known Lapita-associated skeletons from Near and Remote Oceania (Pietrusewsky 1996:345) reveal only one fragmentary and incomplete skeleton from the St Mathias Group, New Ireland, dating to the mid first millennium BC (see Kirch et al. 1989). This date is roughly contemporaneous with the Orrak burial assemblage.

Conclusions

Radiocarbon dates of bone, charcoal, and shell collected from the Chelechol ra Orrak site in Palau provide a chronology of human presence spanning 3000 years or more. Although some of the radiocarbon dates presented here are quite early for Palau (c. 3200 – 4000 BP), they do fall within the range of settlement predicted by Irwin’s (1992) safe strategy voyaging against the wind, dentochronology (dating of teeth; Turner 1990:412), and paleoenvironmental evidence from Palau Athens and Ward (1999) and the Marianas (Athens & Ward 1995).

This research supports a settlement pattern of western Micronesia that took place much earlier than archaeological evidence had previously indicated. The question remains as to where similar sites are located in which to test hypotheses regarding early settlement to Palau. Wickler (2001:190) states that “[i]t is likely that initial settlement was focused along the coastal margins of the large volcanic island of Babeldao where resources would have been more abundant than on the raised limestone islands to the south or the small atolls.” But he also cautions that with possible tectonic uplift, “a majority of the early coastal sites may have been eroded away leaving minimal evidence of human occupation prior to the first millennium BC” (Wickler 2001:190). Wickler’s predictive model holds that early sites will be found in the coastal and lowland zones and that “there is much to be gained by focusing investigations on larger islands rather than concentrating excessively on smaller limestone islands and atolls. While site deposits may be richer on these islands, early human occupation was arguably of a more sporadic and peripheral nature, as exemplified by the rock islands in Palau” (Wickler 2001:194).

Given the nature of recently conducted archaeological and paleoenvironmental data on Babeldao (Liston 1998; Wickler 1998; Athens & Ward 1999), this would certainly appear to be the case. However, I argue that the limestone islands adjacent to Babeldao also hold great promise for finding deep stratified deposits with evidence of early human occupation and exploitation of abundant marine resources. Archaeological sites on many of these islands are well preserved and close to the bigger island for easy access to subsistence farming and non-marine resources. The results from Chelechol ra Orrak indicate that deep, stratified
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deposits with evidence for early settlement in Palau will be found in coastal areas, but not necessarily on Babeldao as predicted by Wickler (2001). Pregill and Steadman (2000) note that the best sources of data on prehistoric terrestrial vertebrates (and probably other faunal and archaeological assemblages), are sites in calcareous sands behind beaches. The same could be said for remnants of early human settlement. It is now clear that both the volcanic and limestone islands in Palau will provide new and important information about the antiquity and lifeways of early Micronesian settlers.

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