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## In Search of Lapita and Polynesian Plainware Settlements in Vava'u, Kingdom of Tonga

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### Introduction

The Vava'u group in the Kingdom of Tonga includes 71 islands with a total land area of 143 km<sup>2</sup> (Crane 1992:86) (Figure 1). These consist of a mixture of raised coral limestone formations and sand cays, with the largest and most dominating being 'Uta Vava'u (89 km<sup>2</sup>). 'Uta Vava'u is a hilly and relatively high-island formation rising to cliffed shorelines on the north and west with respective heights of 179 m and 213 m. A friable tephra-based clay loam dominates Vava'u soils and supports a productive agricultural base. The majority of reefs and shoals with substantive biogenic productivity occur to the south and east as also do most of the sand cays. Respectively to the southwest and northwest of the coral limestone islands are Late and Fonualei. These are islands of the Tofua volcanic arc with active volcanism occurring within the past two centuries. The contemporary population of Vava'u is centred on the coral limestone islands.

The islands of Vava'u are positioned along the southwest to northeast chain of forearc islands atop the Tongan platform. Seasonal southeast trade winds facilitate maritime travel along this chain from Tongatapu in the south, to Ha'apai in central Tonga, to Vava'u, and subsequently on to Niuaotupapu and Samoa (Figure 1). The presence of this sailing corridor, the richness of agricultural soils throughout Vava'u, and the sizeable area of land available for settlement lead to an expectation of both early settlement and a sizeable population in prehistory. Previous archaeological surveys however (Burley 1996; Davidson 1971), failed to find more than a marginal presence of peoples in the initial Lapita settlement period and later Polynesian Plainware phase. This scarcity of ceramic period sites seemed not only anomalous but in direct contrast to the high density of such sites in the Ha'apai and Tongatapu island groups, particularly in the Polynesian Plainware phase (Burley 1998; Burley *et al.* 1999, 2001).

Archaeological studies were carried out in Vava'u between 2003 and 2005 to resolve the question of ceramic period occupation, to document first settlement by Lapita peoples and to record subsequent transformations in the Polynesian Plainware phase. Initial survey in 2003 included a systematic survey of habitable raised coral limestone islands, a brief reconnaissance of the volcanic island of Late, and test excavations

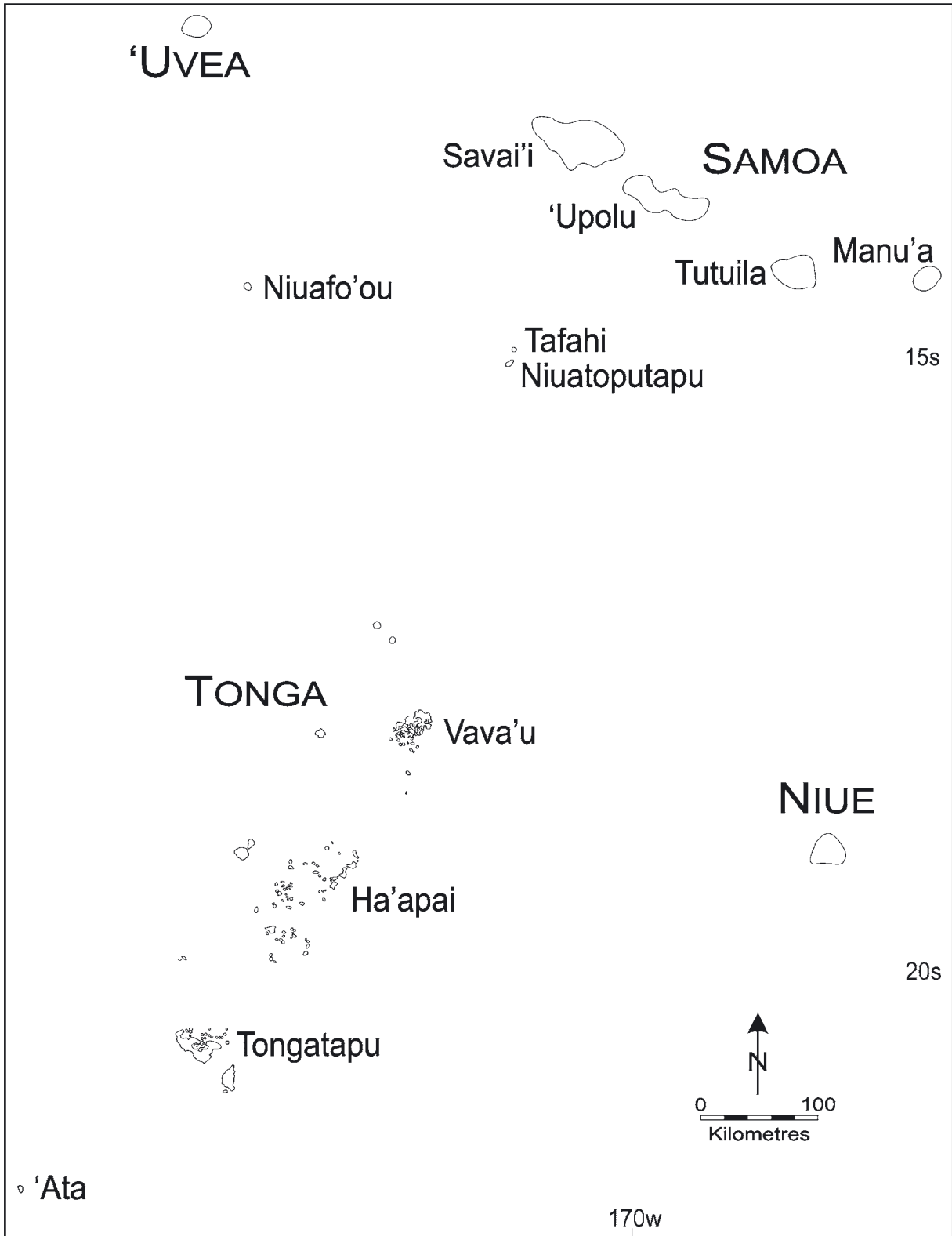


Figure 1. Map illustrating location of Vava'u relative to other islands along the Tongan/Samoan travel corridor.

at ceramic period sites where potential appeared to be present for larger scale excavation. Excavations were conducted in 2004 and 2005 at four sites, each having Lapita and Polynesian Plainware phase occupation strata. In the following paper, I present results of the survey and consequential interpretations for early settlement processes and patterns in Tongan prehistory. The excavation results provide a settlement chronology and inform interpretation but are not reported upon in any degree of detail. These data only now are being analysed. The findings of the Vava'u project are important beyond the understanding of Tongan settlement progression. They document and reflect upon the processes of Lapita expansion as it moved northward into Niuatoputapu and Samoa, with important implications for population distributions in the initial half millennium of the Polynesian Plainware phase in west Polynesia.

## Previous Research and Strategising a Survey Approach

In 1920/1921, William McKern (1929) of the Bayard Dominick Expedition to Tonga reported 15 archaeological sites in Vava'u, most being earthen mounds or platforms. None of these included ceramic sherds, nor did McKern document "kitchen middens" as were present on Tongatapu. Janet Davidson, then of the Auckland Institute and Museum, undertook the first expansive archaeological survey of Vava'u almost a half century later in 1969. This was predicated on the "dearth of knowledge" of this "large and fertile area" (Davidson 1971:29), especially in light of work previously carried out on Tongatapu (Groube 1971; Poulsen 1987). Davidson (1971:29) established three goals for the project - 1) to identify the major categories of field monuments in Vava'u; 2) to investigate the occurrence of the "distinctive pottery characteristic of Tongatapu"; and 3) to assess the potential for excavation and settlement pattern survey. Her coverage included both the main island of 'Uta Vava'u as well as other principal islands in the group. With respect to Davidson's second goal focusing upon ceramic period sites, the results were tentative. Ceramics were found "in most of the areas searched" but the vast majority consisted of "weathered plain body sherds .... sufficient only to indicate that at some time in the past pottery was in use somewhere in the general vicinity" (Davidson 1971:37-38). Davidson nevertheless concluded that a next step "must be the excavation of various sorts of site in Vava'u" and that several "pottery-bearing sites offer good prospects for the investigation of earlier periods" (Davidson 1971:37-38).

From 1990 to the present, I have carried out a study of Lapita colonisation and its transformation into the Polynesian Plainware phase in southern and central Tonga. This has involved survey and excavations throughout the Ha'apai islands (1990-1992, 1995-1997) as well as on Tongatapu (1998-1999). This project provides an abundance of new data, and it has refined understanding of Lapita/Plainware settlement chronology, settlement pattern, subsistence economy, anthropogenic impacts on island landscapes and other issues (Burley 1998; Burley *et al.* 1995, 1999, 2001). Occasional visits to and limited survey in Vava'u for comparative purpose found little beyond Davidson's observations of widely dispersed weathered sherds (Burley 1996). Vava'u, at least from the observations of Davidson and myself, had far fewer ceramic period sites than on Tongatapu or the islands of Ha'apai, and this implied a more restricted occupation and population size during the Lapita and Polynesian Plainware phases. Alternatively, it might be argued that ceramic sites in Vava'u are deeply buried or destroyed as a consequence of regional geomorphological processes. This is proposed for Samoa (Clark 1996; Green 2002) where earlier ceramic sites similarly are limited. Resolution of this problem was considered critical for the longer-term study of first Tongan settlement and its aftermath throughout the archipelago.

The importance of coastal geomorphological processes and sea levels in Tonga was recognised early on during archaeological survey in Ha'apai. Geologist William Dickinson was invited to address these issues, and his findings became essential for site discovery as well as interpretation of site location on island landscapes (Dickinson *et al.* 1994, 1999). Relative sea level in Tonga at the time of first Lapita occupation was

as much as 2 m higher than present, resulting from a mid-Holocene hydro-isostatic highstand throughout the central South Pacific region. Sea levels then fell over the next millennium, ultimately stabilising during the late Polynesian Plainware phase. The impact of declining sea levels for shoreline progradation in Tonga, however, is regionally varied. The Tongan archipelago is cross cut by transverse geological faults that define a series of discrete structural blocks. Each block is independent, subsiding or emerging at different rates, and this serves to amplify or negate the effects of sea level fall for island shorelines. For example, the Lapita-age palaeoshoreline in the Hahake block of northern Ha'apai is elevated and far inland of the present shore; that in the Nomuka block further to the south is now submerged as a result of subsidence. Extension of Dickinson's palaeoshoreline surveys to Vava'u in the 1990s led to a hypothesis that the Vava'u block subsides at a rate equivalent to sea level decline since mid-Holocene times (Dickinson *et al.* 1999:695). Lapita-age shorelines in Vava'u, then, are consistent with or close to modern shorelines throughout the group today. This hypothesis was proven robust in 2003 through the discovery of Lapita and Polynesian Plainware sites in contemporary back-beach settings on multiple islands in the group (Dickinson and Burley 2007).

Dickinson's hypothesis on the concurrence of Lapita-age and contemporary shorelines was central to the development of the 2003 Vava'u survey strategy. Island coastlines could be quickly reconnoitered by boat with high potential areas identified for further examination. A combination of three factors determined areas to have high potential. First there had to be ease of access to the beach for Lapita sailing canoes. Second, an adjacent reef flat for subsistence foraging was considered important. And third, a back-beach sand flat or coastal strip had to be sufficiently large and protected to accommodate settlement. Not surprisingly this combination of features on a majority of islands is coincident with a present day village. Shorelines on 'Uta Vava'u predominantly are cliffed, steeply sloped or otherwise inaccessible to watercraft. Survey here focused first along lower-lying coastal margins regardless of access, and then in upland villages. On both 'Uta Vava'u and other islands, survey methods incorporated examination of subsurface exposures for ceramics or midden-related deposits, auger testing where subsurface exposures were limited, and in a smaller number of cases controlled test excavations in shell midden deposits where ceramics were not present on the surface. Recently ploughed or planted gardens outside of villages occasionally were examined to extend survey coverage and, where possible, back beaches on exposed windward coasts also were surveyed. Finally, village residents were interviewed for site knowledge, particularly for the location of *kolo motua* (old villages).

## Survey Results

The Vava'u survey examined 24 islands in 2003, including 'Uta Vava'u and Late, with varying degrees of coverage (Table 1). Of these islands, 11 are without contemporary villages. In a few cases where an island was considered to have a high potential for early settlement, but where a site was not located (Ovaka, Euakafa), re-examination was carried out in subsequent field seasons. In the case of Fua'amotu in far southern Vava'u, vegetation of the coastal fringe and back beach was impenetrable, and survey was abandoned. The volcanic island of Late is approximately 60 km distant from western Vava'u with shore access made difficult by the absence of a protective fringing reef. Survey here was limited to but a few hours of time, the principal goal being to collect samples of andesitic basalt beach cobbles for source identification.

Notwithstanding cases such as Fua'amotu and Late, overall survey coverage was comprehensive, and all major islands of the Vava'u group have been inspected. It is conceivable that deeply buried sites have been missed, and that numerous scatters of surface ceramics have gone unrecorded in inland areas, especially on 'Uta Vava'u. I believe, nevertheless, that the survey results reasonably represent both settlement distribution and population for Lapita and Polynesian Plainware phases in Vava'u. Survey results (Table 1)(Figures 2 and

Table 1. Islands upon which archaeological survey in Vava'u was conducted and the results. Plainware midden refers to sites with in situ buried deposits. The table does not include the high volcanic island of Late.

	Island Size	Present Villages	Lapita Site	Plainware midden	Plainware scatters
<b>North</b>					
'Uta Vava'u	89 km <sup>2</sup>	17	0	2	3
<b>Southeast</b>					
Koloa	2 km <sup>2</sup>	2	0	1	1
Faioa	< 1 km <sup>2</sup>	0	0	0	0
'Umuna	< 1 km <sup>2</sup>	0	0	1	0
Kenutu	< 1 km <sup>2</sup>	0	0	0	1
Okoa	< 1 km <sup>2</sup>	1	0	0	1
'Olo'ua	< 1 km <sup>2</sup>	1	0	0	1
Mafana	< 1 km <sup>2</sup>	0	1	0	0
Ofu	1.2 km <sup>2</sup>	1	1	1	1
<b>Southcentral</b>					
Pangaimotu	8.8 km <sup>2</sup>	1	1	2	4
Tapana	< 1 km <sup>2</sup>	0	0	1	0
Fua'amotu	< 1 km <sup>2</sup>	0	0	0	0
'Utungake	< 1 km <sup>2</sup>	2	0	0	2
Kapa	6 km <sup>2</sup>	3	2	3	2
Taunga	< 1 km <sup>2</sup>	1	0	1	1
Euakafa	1 km <sup>2</sup>	0	0	0	0
'Euaiki	< 1 km <sup>2</sup>	0	0	0	0
<b>Southwest</b>					
Lape	< 1 km <sup>2</sup>	1	0	0	0
Avalau	< 1 km <sup>2</sup>	0	0	0	0
Nuapapu	2.7 km <sup>2</sup>	2	0	0	1
Vaka'eitu	1 km <sup>2</sup>	0	0	0	1
Ovaka	1.3 km <sup>2</sup>	1	0	0	0
Hunga	5 km <sup>2</sup>	1	0	0	1
<b>Total</b>		<b>34</b>	<b>5</b>	<b>12</b>	<b>20</b>

3) include the discovery of five settlement locales with decorated Lapita ceramics and 12 sites with buried Polynesian Plainware occupations. Of the latter, four overlay the previously noted Lapita phase components. Twenty ceramic scatters associated with the Polynesian Plainware phase were also documented. All Lapita phase sites were test excavated to establish integrity, depth, stratigraphy and excavation potential. Four of these were excavated more fully in 2004 and 2005, each including an overlying Polynesian Plainware phase component (Table 2). Three Polynesian Plainware sites also were tested in 2003.

## Lapita Phase Settlement in Vava'u

Prior to the 2003 survey, the only documented Lapita ceramics from Vava'u were two surface finds from the village of 'Otea on Kapa Island by Davidson (1971:38; pers. comm.). Survey, auger testing and test excavations located five sites with buried Lapita components on Mafana, Ofu, Pangaimotu (Vuna site)

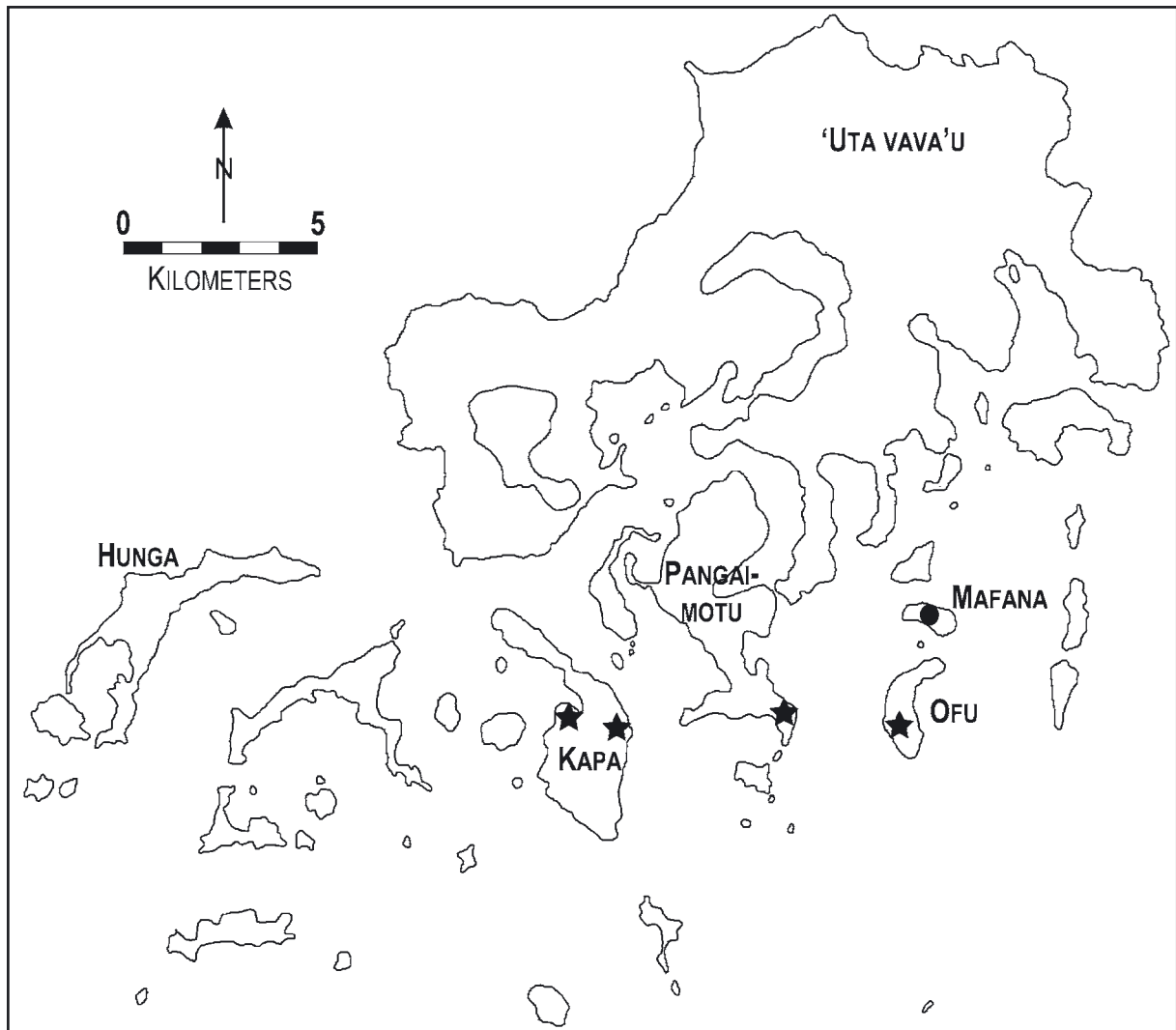


Figure 2. Map of Lapita site locations in Vava'u. Stars represent excavated sites.

and Kapa ('Otea and Falevai sites) islands. With the exception of Mafana, these sites are characteristically positioned on back beach sand flats or dunes, they face or are close to a collecting reef, and they have easy access for sailing canoes. They also include long-term continuity of occupation with substantial Polynesian Plainware phase components overlying the Lapita settlement. Mafana is unique in that it has

Table 2. Summary information for Lapita/Polynesian Plainware phase site excavations in Vava'u, 2004-2005.

	Ofu	Vuna	Otea	Falevai
Island	Ofu	Pangaimotu	Kapa	Kapa
Depth	1.0 m	1.6 m	2.5 m	2.0 m
Size	1500 m <sup>2</sup>	1500 m <sup>2</sup>	800 m <sup>2</sup>	600 m <sup>2</sup>
Excavation	22 m <sup>2</sup>	26 m <sup>2</sup>	16 m <sup>2</sup>	13 m <sup>2</sup>
C14 dates	2	3	3	3
Total ceramics	13118	23143	18414	10195
Decorated	702	743	557	61
Non ceramic	189	290	155	70
Year	2005	2004	2004	2004

no Plainware component and it is less than 400 m<sup>2</sup> in overall size. It is back from the shore of a very small bay with decorated Lapita sherds scattered through a clay loam agricultural soil rather than a back beach sand. Given its close proximity to the Ofu site, Mafana most likely is a special-use locale or a short-lived outlier of that settlement. The only other notable variation in the five Lapita sites occurs at Falevai on Kapa Island. Here first settlement occurred at the end of the Lapita period in

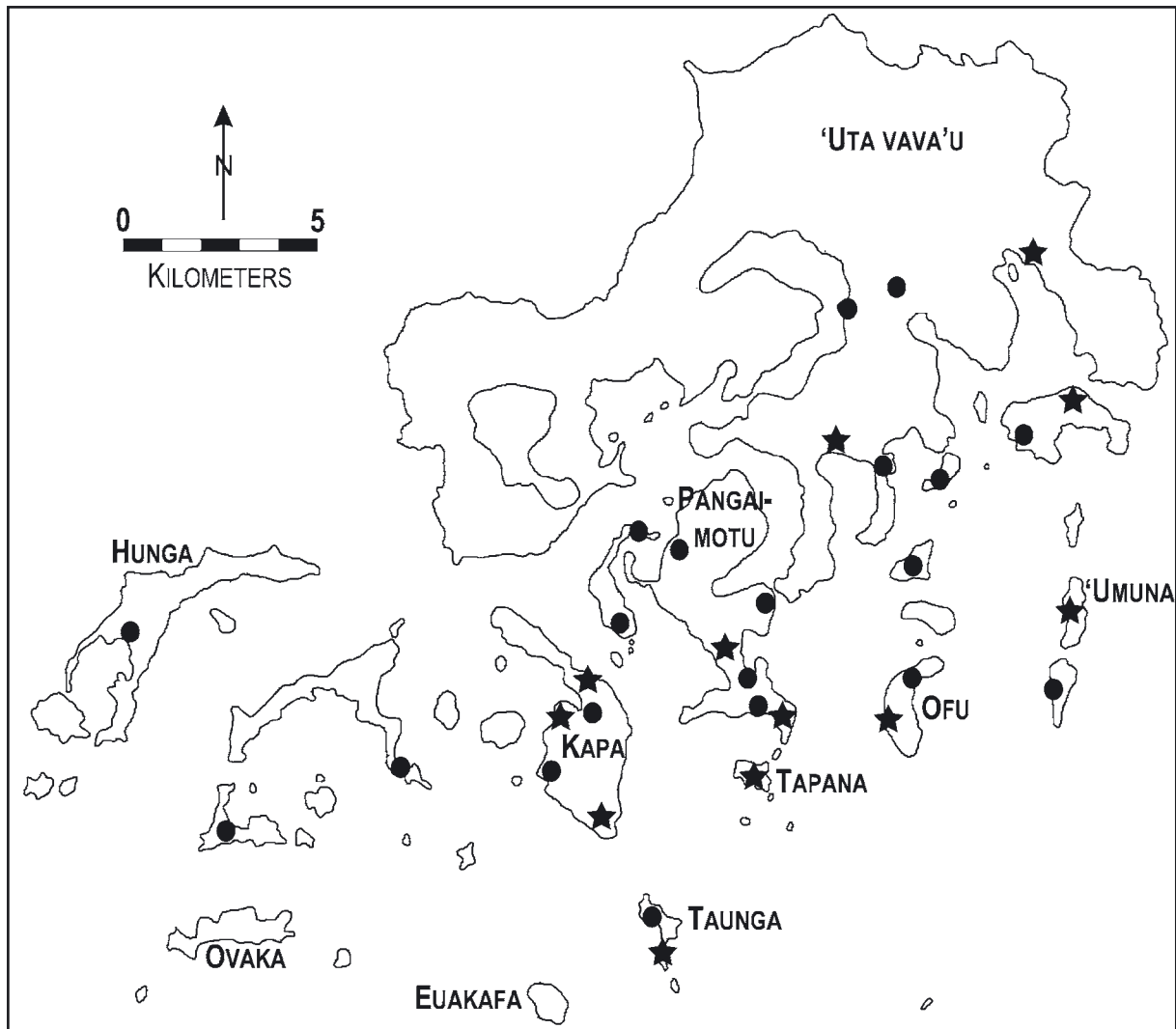


Figure 3. Map of Polynesian Plainware phase sites in Vava'u. Stars represent sites with *in situ* buried deposits while dots are surface scatters.

Vava'u, and only a very small assemblage of decorated Lapita ceramics occurs in the site's lowest level (Connaughton, this volume)

From 2004/2005 excavations at the Ofu, Vuna, 'Otea and Falevai sites, 11 AMS radiocarbon dates were acquired and these provide a coherent chronology for the initial Lapita occupation of Vava'u as well as its transition to the Polynesian Plainware phase (Burley and Connaughton in press) (Table 3). The earliest radiocarbon date comes from Ofu and documents first landfall by 2800 cal BP or slightly earlier. Circumstantial support for Ofu as a first settlement also is present through an abundant presence of indigenous birds and turtle in the Lapita deposit, and in preliminary impressions of the decorated ceramic assemblage. Significantly, however, Lapita strata radiocarbon dates from each of the four sites substantially overlap at 2- $\sigma$  and it seems certain that all were simultaneously occupied sometime between 2800 and 2750 BP. Also significant, and as described by Connaughton (this volume), radiocarbon dates from Falevai indicate the disappearance of decorated Lapita pottery and the beginning of the Polynesian Plainware phase within a century of first Lapita presence in Vava'u.

The occurrence of but five Lapita sites in Vava'u with only three (Vuna, Ofu and 'Otea) having substance is informative. First, it supports a hypothesis that the Lapita population of Vava'u was small during the initial settlement phase of Tonga. Second, the location of the three sites and their contexts illustrate a settlement pattern that is identical to that in Ha'apai (Burley *et al.* 1999). That is, settlement locales were

Table 3. Radiocarbon dates for Lapita/Polynesian Plainware site excavations in Vava'u, 2004-2005. Calibrations were undertaken using the CALIB 5.1 program (Stuiver and Reimer 2005) and the southern hemisphere calibration curve SHCal04 (McCormac *et al.* 2004).

Site	CAMS Ref	Date BP	Cal 1 $\sigma$ BP	d 13C	Phase
Ofu	119699	2626 $\pm$ 35	2755-2545 BP	-25.9	Lapita
Ofu	119700	2765 $\pm$ 35	2854-2769 BP	-26.9	Lapita
Otea	119697	1615 $\pm$ 35	1516-1407 BP	-28.8	Plainware
Otea	119698	2505 $\pm$ 30	2693-2363 BP	-24.0	Lapita
Otea	119701	2705 $\pm$ 35	2790-2740 BP	-28.9	Lapita
Vuna	111659	2650 $\pm$ 35	2762-2621 BP	-24.6	Lapita
Vuna	111661	2480 $\pm$ 30	2668-2358 BP	-25.5	Lapita
Vuna	111662	2715 $\pm$ 35	2837-2744 BP	-25.8	Lapita
Falevai	119694	2500 $\pm$ 35	2685-2362 BP	-27.9	Plainware
Falevai	119695	2645 $\pm$ 35	2760-2620 BP	-28.2	Plainware
Falevai	119696	2685 $\pm$ 35	2779-2733 BP	-27.9	Lapita

chosen on each of Ofu, Pangaimotu and Kapa islands for their access to open water, their position relative to a foraging reef, and for the presence of a back beach setting in which to establish a hamlet. And third, Lapita settlement was concentrated in the south of Vava'u in immediate proximity to a direct sailing corridor back to a homeland in Ha'apai or Tongatapu.

As is characteristic of the Lapita phase in other areas of Tonga, the archaeological record in Vava'u illustrates foraging to have both been productive and a substantive component of subsistence activities. Roy (1997:170) has noted that "low nutrient levels or other water quality factors" have led to low biogenic productivity in western Vava'u as compared to the east. This helps to explain the absence of Lapita sites on western islands, not the least including Ovaka, an island with optimal settlement potential that was unsuccessfully surveyed on a number of occasions. I suggest elsewhere that Lapita agricultural activity in Tonga may have been limited to "a low-energy swidden-type cultivation system" and it was secondary to foraging in relative importance for settlement location (Burley 1998:355). Lapita sites in Vava'u potentially contradict this characterisation. All five incorporate a settlement feature that speaks, at least circumstantially, to early horticultural practice as part of the colonizing process. Each is immediately adjacent or to the front of a small inland swale where *Colocasia* and/or *Cyrtosperma* taro could be grown with reasonable success (Kirch 1997:211).

## Polynesian Plainware Phase Occupation in Vava'u

The Polynesian Plainware phase of central and southern Tonga occurs between c. 2600 and 1550 BP. It is marked by the complete loss of decorated Lapita ceramics, by a reduction in diversity of ceramic vessel types, by an expansion of population and settlement to inland and offshore locations, and by a transition in economy where agricultural intensification occurs, and where agricultural production becomes the centre of subsistence activities (Burley 1998:350-365). I have estimated that even a small population of between 500 and 600 individuals at the end of the Lapita phase in Tonga would lead to full land capacity in the interval 2150 to 1750 BP based on an exponential growth rate of 0.005 - 0.008 (Burley in press). The archaeological records of Tongatapu and Ha'apai clearly support this projection with widespread and dense distributions of Plainware sites in even marginal areas. In some cases the spatial extent of the Polynesian Plainware site indicates substantial growth over time to form a village-sized complex. As Groube (1971:291) described, pottery became so abundant along the shore of Fanga'Uta Lagoon on Tongatapu that Tongans today consider it part of the soil itself. He also noted:

Rubbish dumps, wells, latrines, agricultural activities, house-building, earth-oven construction and the myriad destructive acts of everyday living are constantly stirring the deposits and shattering the fragments of pottery into ever smaller pieces. It is impossible in these areas today to dig a ditch or earth oven, fill in a hole or build a house platform without uncovering potsherds.

The results of the 2003 archaeological survey identify Vava'u as a significant exception to this description. Polynesian Plainware sites in Vava'u are only marginally more abundant than those of the Lapita period unless one counts scatters of surface sherds. And most of the latter include no more than a handful of specimens which, as Davidson concluded, serves only to say that pottery was used somewhere in the vicinity.

Polynesian Plainware ceramic sites in Vava'u again are concentrated in the southeast and south central islands following the pattern established in Lapita times, particularly on the islands of Pangaimotu and Kapa. This includes not only continuity of occupation at earlier Lapita sites, but expanded numbers of settlements on these larger islands. More ephemeral hamlets also appear on the smaller islands of Koloa, 'Umuna, Tapanā and Taunga as well as on 'Uta Vava'u in two locales. Reduced biogenic productivity in western Vava'u, arguably, continued to be a factor for settlement distribution. Preliminary observation of ceramic rim forms suggests most of the ephemeral hamlets on small islands, as well as surface scatters, are associated with the last half of the Polynesian Plainware phase from c. 1950 BP onward. If this is true, then the limited population present in the Lapita period continued to be small throughout the first half of the Polynesian Plainware phase. A substantial rise in population densities on Tongatapu and Ha'apai, and the possibilities for in-migration from both, may have fueled population expansion in Vava'u at or near the end of the Plainware period.

Excavation of Polynesian Plainware sites was limited to strata superimposed over Lapita levels at Ofu, Vuna, 'Otea and Falevai. Each, however, includes a Polynesian Plainware occupation extending through a full extent of the phase. Analyses of these assemblages, once complete, provide detailed information on stylistic and other change in ceramics and non-ceramic artifacts. Importantly, all excavated Polynesian Plainware phase occupations incorporate flakes of volcanic glass. Similar flakes in assemblages from Ha'apai are geochemically sourced to Tafahi, an island immediately north of Niuatoputapu (Sheppard pers. comm.). Tafahi origins are expected for the Vava'u materials indicating inter-island voyaging northward if not formalised exchange (Kirch 1988). Collection of andesitic-basalt beach cobbles from the volcanic outlier of Late provides secure samples for geochemical characterisation. Unexpectedly, Late basalt was found distinguishable from other Tongan basalts on the basis of colour, ranging from a darker blue/black with greenish hue to a lighter gray-green. A Late basalt adze was excavated from an upper Polynesian Plainware level at 'Otea, and several other specimens were recovered from Falevai. Settlement of the high volcanic island of Late, then, can be hypothesised no later than the Plainware phase.

## Matters Arising

Without detailed analysis of the excavated assemblages, including fauna, a definitive interpretation of the Lapita and Polynesian Plainware phase occupation in Vava'u is not feasible at this stage. At the same time, knowledge of site distributions, contexts, and radiocarbon dates provide new and significant insight into the processes of settlement. They also raise questions with significant implications for Tongan prehistory specifically, and settlement in West Polynesia in general. As a conclusion to this paper, these insights, and the matters arising are briefly examined.

Radiocarbon dates for first Lapita settlement in Vava'u suggest an initial occupation on the island of Ofu by c. 2800 BP but with expansion to Pangaimotu and Kapa islands shortly thereafter. In relative comparison to radiocarbon dates from Tongatapu and Ha'apai, Vava'u dates are not appreciably later. Rather, the calibrated

2- $\sigma$  range for Lapita dates throughout Tonga sufficiently overlaps to make them indistinguishable. Ceramic types of Western Lapita aspect at the site of Nukuleka on Tongatapu, combined with slightly earlier radiocarbon dates, indicate the southern island was colonized first (Burley and Dickinson 2001; Burley and Connaughton in press). Northern exploration and expansion into Ha'apai, Vava'u, Niuaotupapu, Samoa and possibly Uvea and Futuna would have taken place within a half century time span, no doubt facilitated by seasonal southeast tradewinds and a natural sailing corridor on a southwest to northeast axis.

None of the Vava'u Lapita sites exceed 1500 m<sup>2</sup> in areal extent, indicating small hamlet-sized communities. The exclusive location of these sites on southeast and south central coral limestone islands is argued to be a consequence of reduced biogenic productivity in the western islands. While this is not surprising given the importance of reef foraging to Lapita settlement pattern on Tongatapu and Ha'apai, the fact that it continued to influence site distribution through at least the first half of the Polynesian Plainware phase does seem noteworthy. That some degree of horticulture was practiced from the Lapita phase onward also is evident. The presence of a small inland swale at all Lapita sites suggests this terrain feature was being sought out for wet taro production. Unfortunately the data at hand do not provide insight into external relations and the position of Vava'u within the Eastern Lapita province. The sites on Ofu, Pangaimotu and Kapa islands are positioned at the southern entry to Vava'u, and in close proximity to open water and the sailing corridor back to Ha'apai and Tongatapu. This hints at Vava'u being a frontier periphery, a characterisation supported by the limited population size that is assumed to be present.

Radiocarbon dates from the Falevai site on Kapa Island illustrate an immediate loss of decorated ceramics shortly after Lapita expansion into Vava'u. Estimated to fall in the interval 2750-2700 BP (Burley and Connaughton in press), this is approximately 100 to 150 years earlier than is projected for Ha'apai and Tongatapu (Burley 1998). Why this would be the case is difficult to determine with any degree of certainty. Speculatively, geographic isolation and the effective number of potters are factors likely to be involved. Both Clark (1993) and Kirch (1993) associate Polynesian Plainware ceramics with early radiocarbon dates and the earliest settlement phase in Samoa. The Vava'u pattern, then, may not be in isolation, and possibly indicative of a trend found in northward expansion to Samoa. Intermediate between Vava'u and Samoa is Niuaotupapu where a single early Eastern Lapita site occurs. Unfortunately "precise beginning and end dates" for the period of dentate stamped ceramics cannot "be fixed give the nature of the <sup>14</sup>C corpus" (Kirch 1988:241, italics in original). For Uvea, Sand (1996) documents a Lapita presence at the site of 'Utuleve almost identical in age and site features to those on Vava'u. He (1996:108) further opines that the limited presence of Lapita sites on Uvea suggests "the production of dentate-stamped Lapita pottery was limited to a few generations". The only potential conflict with claims for an early northern transition to the Polynesian Plainware phase occurs on Futuna. Eastern Lapita dentate stamped ceramics occur there in a somewhat later context, one potentially dating to the interval 2650-2350 BP (Sand 1990:130-131).

Survey results in Vava'u are striking for the lack of success in finding abundant and extensive occupation of the islands during both Lapita and Polynesian Plainware times. Davidson's survey in 1969 clearly forecast this result. This failure is not the consequence of destructive geomorphological processes or sea level change. Rather, with island emergence in tandem with sea level fall, Lapita-age paleoshorelines remain consistent with those present today. Admittedly additional ceramic period sites will be discovered in future years and added to the Vava'u inventory. Expansive surveys by Davidson and the one reported here, nevertheless, securely document a distribution pattern at odds with settlement and demographic processes in Ha'apai and on Tongatapu. In Vava'u, a small founding population in Lapita times did not grow substantially for the next several hundred years while populations on Tongatapu and Ha'apai were significantly on the rise. On the shores of Fanga'Uta Lagoon, for example, the founding site of Nukuleka expanded to no less than 17 other settlements during the Lapita phase alone, providing a settlement aggregation potentially larger than that of the Polynesian Plainware phase in Vava'u over a several hundred year time span.

The Lapita/Polynesian Plainware settlement of Vava'u, or lack thereof, finds intriguing parallels in Samoa. It has potential importance, therefore, for explaining or reflecting upon the Samoan case. In Samoa there is but a single site with decorated Lapita ceramics reported on 'Upolu, and only a very small number of other sites predating 2250 BP. Green (2002:131) explains this distribution as a result of geological processes that have destroyed, deeply buried, capped or submerged the early settlement landscape. Among these processes are coastal subsidence on 'Upolu and Savai'i, active volcanism on Savai'i, colluvial infilling of valley floors on Tutuila, and progradation of the coastal plain on Ofu in the Manu'a group. These processes and their potential impact on the Samoan archaeological record cannot be denied. At the same time one cannot ignore the failure of archaeologists to find such sites on coastal landforms that have not been affected. This is especially so in American Samoa where cultural resource management programs have required intensive survey, test excavations and excavation projects over the past two decades. The lack of early ceramic sites in American Samoa, and concerns for a claim of early Polynesian Plainware occupation at A'oa on Tutuila, lead Addison (pers. comm.) to a similar conclusion. Indeed, he now believes the absence of early ceramic sites in Samoa speaks not only to a highly restricted pre-2250 BP population but possibly even abandonment after initial Lapita exploration. That Samoa was not totally abandoned in the early Polynesian Plainware phase is documented at the site of To'aga on Ofu island in American Samoa (Kirch and Hunt 1993). Similarly, earlier Plainware phase occupations are present on Niuaotupapu (Kirch 1988) and Uvea (Sand 1996). How dense a population these sites represent during the initial half of the Polynesian Plainware phase cannot be determined however. A hypothesis that Vava'u and islands further to the north including Samoa were part of a low population density frontier remains plausible for the period up to c. 2250 BP.

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