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Stuart Bedford, Christophe Sand and David Burley (eds), *Fifty Years in the  
Field: Essays in Honour and Celebration of Richard Shutler Jr's  
Archaeological Career***

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FIFTY YEARS IN THE FIELD. ESSAYS IN  
HONOUR  
AND CELEBRATION OF RICHARD SHUTLER JR'S  
ARCHAEOLOGICAL CAREER

Edited by Stuart Bedford, Christophe Sand and David  
Burley

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NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION  
MONOGRAPH

# ON THE DEFINITION AND IMPLICATIONS OF EASTERN LAPITA CERAMICS IN TONGA

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## INTRODUCTION

While conducting archaeological survey for monumental architectural of the late Tongan chiefdom on the northern Ha`apai Island group in 1990, Burley found it hard to ignore the many occurrences of surface pottery scattered along the leeward coast of virtually all of the islands. It became even harder when, late in that field season, the Faleloa Lapita site was discovered in the yard of a small house in the northernmost village on Foa Island. As a neophyte to Oceanic ceramic complexes, and with alternative interests at the time, he invited Richard Shutler Jr. to participate in 1991 fieldwork, and to help fill in a settlement record for the early millennia of Ha`apai prehistory. In that task Richard has proven an invaluable collaborator, colleague and friend (see Shutler *et al.* 1994). Since those initial forays, and with a variety of other colleagues, we have gone on to discover and excavate additional Lapita and Polynesian Plainware sites in Ha`apai and on Tongatapu (Burley *et al.* 2001). These data have been used to clarify and address concerns of Lapita chronology, colonisation and adaptation as they apply to the 400km long archipelago.

Our decade-long study notwithstanding, a synthesis of the large volume of ceramics unearthed by these investigations has yet to be presented. The quantity has been daunting, and the learning curve in curating and analysing the collections has been great and continues to be so. This failure has deprived other researchers of the data necessary for direct comparison on a regional and pan-Oceanic scale. Our overall objective in the following paper is to rectify this situation, at least in some small way. Here we present quantified data and related observations on decorated ceramics recovered from seven Lapita sites that we have been involved with during the past ten years. This includes an examination of vessel forms, decorative application, and design motif and structure. More than just a presentation of numbers, we also are concerned with the relationship of these data to existing conceptual frameworks for the Eastern Lapita ceramic series as a whole. Our second objective, therefore, is to use derivative insight and data to evaluate interpretations of the Eastern

Lapita province, especially as these may clarify and expand upon its definition. And finally, through ceramics, we examine the origins of Eastern Lapita settlement and its implications for the founding populations of Fiji, Tonga and Samoa. The latter inferences are not as securely grounded as we would like them to be, but they do pose questions and problems for closer scrutiny in future research endeavours.

## THE CONTEXT FOR ANALYSIS

Beginning with the pioneering research of William McKern (1929) in 1920 and continuing through to our most recent surveys in 2001, numerous projects have recorded or excavated archaeological sites in Tonga having decorated Lapita ceramics (see Burley 1998; Burley *et al.* 2001). Recovered data now provide a general understanding of the timing for and processes through which the archipelago was first discovered and colonised. The earliest evidence for Lapita presence occurs in the village of Nukuleka at the entrance to Fanga `Uta Lagoon on the island of Tongatapu (Burley *et al.* 2001). Radiocarbon dates verify an initial settlement by no later than 900 cal. B.C., and this is further supported by a comparatively high proportion of decorated to non-decorated sherds, as well as a small number of Western style Lapita ceramic motifs. At the time of first arrival, sea levels were 1.5 to 1.8m higher than present and Fanga `Uta Lagoon was an expansive embayment with dense populations of the bivalve species *Anadara* and *Gafrarium* (Burley *et al.* 2001; Spennemann 1987). Archaeological evidence indicates that these resources were critical to early adaptation on Tongatapu and, within a matter of decades, settlements were widely dispersed around the lagoon shore. At the same time, Lapita peoples rapidly explored and settled the central island group of Ha`apai (Burley *et al.* 1999), the northern group of Vava`u (Davidson 1971), and the far northern outlier of Niuatoputapu (Kirch 1988)(Figure 1). By 850 cal. B.C., most of the habitable islands of Tonga were occupied by people making decorated Lapita pottery.

With such a lengthy history of research, Tongan decorated ceramics have long influenced perceptions of the Lapita ceramic form. Most important in this respect is Jens Poulsen's (1967, 1987) mid-1960s analysis of collections from several Lapita sites on Fanga 'Uta Lagoon. This study gave Oceanic archaeologists one of the first in-depth and quantified treatments of Lapita vessel form, decorative applications and design motifs. When these data were compared even cursorily with pottery from sites in Fiji, New Caledonia and others further to the west, they provided strong affirmation of a single ancestral ceramic tradition with common underlying structure in form and decoration (Kirch 1997). Yet, at the same time, archaeologists could easily differentiate Lapita ceramics from Tonga and Fiji with others in Melanesia. Decorative application on the former seemed to be a highly simplified subset which Green (1974, 1978, 1979) defined as the Eastern Lapita style. Using both qualitative and quantitative analyses, Green (1979:40) went on to illustrate differences between Eastern and Western assemblages in "vessel shapes, in motifs, in the style and frequency of decoration, and by divergent trends in ceramic change". With the notable exception of Best (1984), more recent attempts to quantify or further define distinguishing traits for the Eastern Lapita series are few. Additional research and continued study of Lapita ceramics to the west, however, allows delineation of Far Western, Western, and Southern Lapita types (Anson 1986; Kirch 1997; Sand 2000; Summerhayes 2001a).

#### TOWARDS A DEFINITION OF EASTERN LAPITA CERAMICS IN TONGA

Our analysis for this paper is centred exclusively on decorated ceramics from southern and central Tongan sites (Table 1). These assemblages were recovered from block or closely spaced excavations ranging in size from 11m<sup>2</sup> to 17.5m<sup>2</sup>. One exception, a sample of 6m<sup>2</sup> from Nukuleka, was

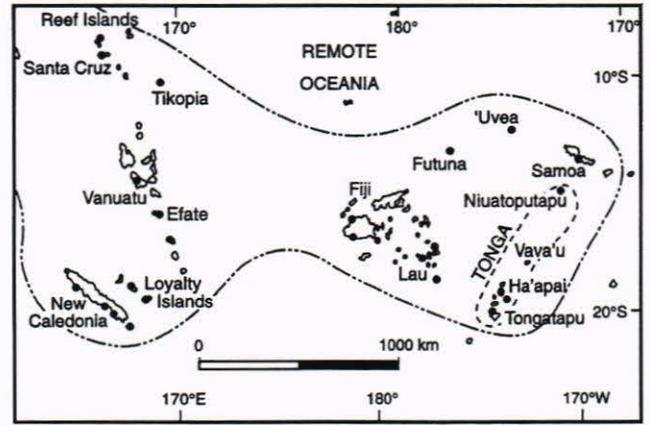


FIGURE 1. Distribution of principal Lapita sites in Remote Oceania as adapted from Kirch (1997). The open water gap between Vanuatu and Fiji serves as the traditional boundary between Western and Eastern Lapita style areas.

derived from widely spaced test units where the goal was to assess spatial extent of a site previously excavated by Poulsen (Burley *et al.* 2001). Summary information on stratigraphy, context, and recovered data for each of the sites is provided in other publications (Burley *et al.* 1999; Burley *et al.* 2001; Shutler *et al.* 1994). Suffice it to say that these sites are highly similar, originally having been located on leeward back beach sand flats facing a lagoon or reef. All of the sites incorporate a Polynesian Plainware component overlying the Lapita stratum and post-dating it by no more than 200 years (Burley *et al.* 1999). This stratigraphy is significant for the sand stratum matrix in which Lapita materials predominantly occur has a high degree of overall turbation. Fine-grained analysis of spatial distributions within this stratum eventually may allow some chronological ordering of Lapita sherd collections, but it is unlikely that temporally discrete horizons (after Poulsen 1987;

Name	Island	Site Size	Excav. Size	No of Decor. Sherds	No. of dates	Principal Reference
Pukotala	Ha'ano	1750m <sup>2</sup>	14m <sup>2</sup>	648	6	Burley <i>et al.</i> 1999; Shutler <i>et al.</i> 1994
Faleloa	Foa	750m <sup>2</sup>	17m <sup>2</sup>	971	5	Burley <i>et al.</i> 1999; Shutler <i>et al.</i> 1994,
Tongoleleka	Lifuka	1500m <sup>2</sup>	11m <sup>2</sup>	1370	8	Burley <i>et al.</i> 1999
Vaipuna	'Uiha	400m <sup>2</sup>	17.5m <sup>2</sup>	707	5	Burley <i>et al.</i> 1999
Mele Havea	Ha'afeva	900m <sup>2</sup>	11m <sup>2</sup>	451	4	Burley <i>et al.</i> 1999
Ha'ateiho	Tongatapu	3750m <sup>2</sup>	12.25m <sup>2</sup>	276	4	Burley <i>et al.</i> 2001
Nukuleka	Tongatapu	7500m <sup>2</sup>	6m <sup>2</sup>	448	2	Burley <i>et al.</i> 2001; Burley and Dickinson 2001

TABLE 1. Site data from which Eastern Lapita ceramic assemblages have been collected since 1991 in central and southern Tonga. This table does not incorporate previous excavations and data of Dye (1988) at Tongoleleka, nor Poulsen (1987) at Ha'ateiho and Nukuleka.

		Rim	Rim to Neck	Rim to Shld	Neck	Neck to Shld	Shld	Body	Other	Total
Pukotala	n	105	39	1	137	4	76	281	5	648
	%	16.2	6.0	0.2	21.1	0.6	11.7	43.4	0.8	100
Faleloa	n	117	100	0	183	13	85	472	1	971
	%	12.1	10.3	0	18.9	1.3	8.8	48.6	0.1	100.1
Tongoleleka	n	168	80	3	223	27	199	663	7	1370
	%	12.3	5.8	0.2	16.3	2.0	14.5	48.4	0.5	100
Vaipuna	n	118	33	1	184	6	107	256	2	707
	%	16.7	4.7	0.1	26.0	0.9	15.1	36.2	0.3	100
Mele Havea	n	87	36	1	89	5	45	188	0	451
	%	19.3	8.0	0.2	19.7	1.1	10.0	41.7	0	100
Ha'ateiho	n	21	21	0	69	4	37	124	0	276
	%	7.6	7.6	0	25.0	1.5	13.4	44.9	0	100
Nukuleka	n	41	21	0	69	0	42	275	0	448
	%	9.2	4.7	0	15.4	0	9.4	61.4	0	100.1
Total	n	657	330	6	954	59	591	2259	15	4871
	%	13.5	6.8	0.1	19.6	1.2	12.1	46.4	0.3	99.0

TABLE 2. Decorated sherd types from Eastern Lapita sites in Tonga. Shld. refers to shoulder.

Spennemann and Head 1997) for Eastern Lapita ceramics will be discerned easily. Here we treat our decorated ceramic collections as a single archaeological aspect, and feel justified in doing so given overlapping radiocarbon dates for the different components, as well as the approximate two century time depth with which we are dealing.

The decorated sherd assemblage incorporates all pieces where an intentional decorative application is present. This includes dentate stamping, incising, notching, shell impression, appliqué modeling, lime paste infilling and application of a slip. We have not included wiped or scratched sherds or those with ill-defined paddle impressions that have resulted from the manufacturing process itself. Sherd sizes range from extremely small fragments with but a small number of dentate stamped tooth impressions, to large pieces with multiple motifs and from which secure vessel form identifications can be made. Overall, the collection is highly fragmentary with the vast majority of pieces having a diameter of 5cm or less. The total decorated assemblage recovered during our excavations in Ha'apai and on Tongatapu amounts to 4,871 specimens. Table 2 identifies site distributions and the segment of the pot from which the sherds derive.

Our focus here is on the presentation of decorated ceramic data from Lapita sites in Tonga. We also are concerned with an assessment of these data in light of existing knowledge for the Eastern Lapita ceramic series specifically. Green (1979:40) characterises the distinctiveness of Eastern Lapita ceramic style through

three principal features - 1) vessel form, 2) style and frequency of decoration and 3) motifs. These features are the dimensions of variation upon which our data analysis is centred.

#### *Decorated Vessel Forms*

Vessel form identification of highly fragmented ceramic assemblages is an extremely difficult task. Definitive vessel form interpretation minimally requires enough of the sherd or group of cross-mended sherds to define rim, neck, shoulder, basal contours and associated features. Within our collections only a very small number of sherds are sufficiently intact to meet this standard in full (also see Poulsen 1987:114). In reality, most archaeologists rely on rim form as an identification key for vessel shape, taking into consideration the full range of diagnostic neck, shoulder and base sherds within the assemblage. This may not give a fully accurate reconstruction of vessel form and assemblage variability, but it provides an approximation with which to work. Vessel form identification is restricted here to rim sherds where a secure orientation and at least the upper portion of neck contour can be established. As a result, it was possible to assign a proximate vessel shape to 84.4 percent (n=838) of the rim sherd collection (Table 3).

Our vessel form typology incorporates six generic types including cups/small bowls, everted to straight rim bowls, inverted rim bowl, short-necked jar, everted rim jar and collared rim jar (Figure 2). With the exception of cups/small bowls that are defined by an inside rim

diameter of 12cm or less, size differences are not given further consideration. This, obviously, reduces typological variation present in the assemblage with rim diameter ranges continuous from cups up to 40cm or more across. Equally problematic for the present typology is the everted rim jar. It is problematic for, without a well-developed neck/shoulder profile, it too potentially characterises a large number of jar or even bowl types (Figure 2). Finally, short-necked jars may seem arbitrarily defined in that they have a range of rim orientations from everted to slightly inverted. The vessel type is identified through the presence of a squat neck and sharply out turned shoulder. It has, in the words of students who have worked with specimens, a distinctively “gold fish bowl” appearance.

Actual and relative distributions of vessel form types for each site are provided in Table 3. An average relative profile for the collection as a whole has also been calculated. Though some variability exists from assemblage to assemblage in the percentage of individual vessel forms, there exists strong overall patterning. Everted rim jars, for example, dominate all assemblages ranging from a low of 32.6 percent of the vessel forms at Nukuleka to a high of 55.4 percent at Faleloa. Whether this jar form was used for cooking, for storage, or potentially for presentation cannot be inferred from collection attributes. The range of sizes and different degrees of decorative elaboration may indicate all three. Bowls with everted/straight rims and inverted rims respectively represent the second and third most dominant

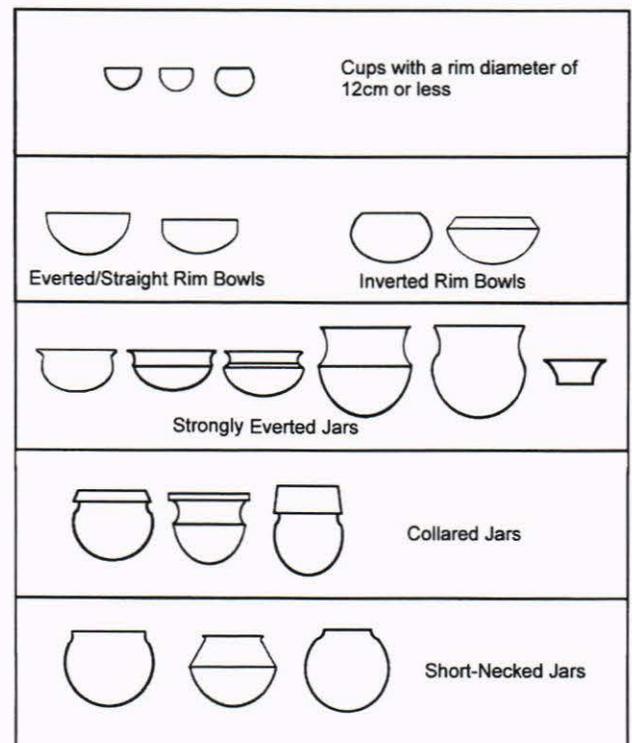


FIGURE 2. Vessel form typology characteristic of Eastern Lapita ceramics from sites in southern and central Tonga. The type strongly everted jar is based on rim form only. As illustrated, it may also represent strongly everted bowls.

		Vessel Forms					Total	
		Cup	Bowl Evert	Bowl Invert	Jar Short	Jar Evert		Jar Collar
Pukotala	n	9	37	23	22	51	1	143
	%	6.3	25.6	16.0	15.3	36.1	0.7	100
Faleloa	n	10	38	15	17	102	2	184
	%	5.4	20.7	8.2	9.2	55.4	1.1	100
Tongoleleka	n	8	32	15	37	76	16	184
	%	3.9	17.4	8.1	20.1	41.3	8.7	99.5
Vaipuna	n	25	28	25	8	51	4	141
	%	17.7	19.9	17.7	5.7	36.2	2.8	100
Mele Havea	n	3	32	26	7	39	1	108
	%	2.8	29.6	24.1	6.5	36.1	0.9	100
Ha'ateiho	n	0	6	3	6	16	3	34
	%	0	17.7	8.8	17.7	47.1	8.8	100.1
Nukuleka	n	2	9	13	5	14	0	43
	%	4.7	20.9	30.2	11.6	32.6	0	100
Total	n	57	182	120	102	350	27	838
	%	6.8	21.7	14.3	12.2	41.8	3.2	100

TABLE 3. Decorated vessel forms based on rim sherd profiles. See Figure 2 for illustration of vessel form shapes for each category.

		Bowls	Jars	Total	Carinated	Rounded	Total
Pukotala	n	69	75	144	43	38	81
	%	47.9	52.1	100	53.1	46.9	100
Faleloa	n	63	121	184	30	68	98
	%	34.3	65.7	100	30.6	69.4	100
Tongoleleka	n	55	129	184	100	129	229
	%	29.9	70.1	100	43.7	56.3	100
Vaipuna	n	78	63	141	69	45	114
	%	55.3	44.7	100	60.5	39.5	100
Mele Havea	n	61	47	108	16	35	51
	%	57.5	43.5	101	31.4	68.6	100
Ha'ateiho	n	9	25	34	30	11	41
	%	26.5	73.6	100.1	73.2	26.8	100
Nukuleka	n	24	19	43	18	24	42
	%	55.8	44.2	100	42.9	57.1	100
Total	n	359	479	838	306	350	656
	%	42.8	57.2	100	46.6	53.4	100

TABLE 4. Left - bowls versus jar vessel forms within the decorated ceramic assemblage of Eastern Lapita sites in Tonga. Right - carinated versus rounded shoulder distribution within the decorated ceramic assemblage of Eastern Lapita sites in Tonga.

vessel forms in the overall profile. Together they account for between 25 percent and 54 percent of all vessel forms at individual sites. In fact when the three cup/bowl forms and the three jar forms respectively are grouped and compared (Table 4), it is found that bowls and cups represent a significant proportion of the assemblage, accounting for 42.8 percent of the identified vessel forms. At the same time there exists notable differences between sites, where jar forms are highly dominant at some, others where the majority of vessels are bowls, and one where there is an almost equal distribution.

We again emphasise that our typology cannot be considered more than a general approximation and that an extremely high degree of variation in vessel form exists in the Tongan decorated ceramic assemblage overall. Because vessel type was given to rim sherds only, some of the more elaborately decorated Lapita forms are not incorporated in the typology. One of the more important ones is a flaring rim carinated bowl with shallow base that has been identified by Kirch (1988:162, Vessel 5b) at Niuatoputapu and illustrated by Green (1979:42) as diagnostic for early Eastern Lapita as a whole. This bowl form is probably present but it cannot be differentiated from jars based on rim/neck form alone. Another of the types not represented in the existing typology is a flat bottom dish with strongly everted rim, and with decoration extending from the rim to the base. Though rare, a small number of base/shoulder pieces indicate its presence in at least two of the examined sites. Perhaps most notably, our typology has not differentiated between carinated and

rounded shoulder vessel forms, a critical feature in Lapita ceramic typology elsewhere (for example Kirch 1988; Summerhayes 2001b). The percentage of sharp angled shoulder sherds (Table 4) illustrates carination to be an important and in some cases dominating aspect of decorated Tongan vessels. High numbers of carinated vessels also are reported by Poulsen (1987: Table 48) and Kirch (1988: Table 21). Carination occurs on both bowls and jars, but the shoulder sherd assemblage suggests it is a more prevalent feature on the jars.

Beyond quantification of individual forms, our observations on decorated Lapita vessel types are similar to those discussed and illustrated by Green (1979), Poulsen (1987), Kirch (1988) and Sand (1992). In this we emphasise that virtually all of the types described within the Lapita pottery suite as a whole occur in Tonga. The notable exceptions are elaborately decorated pedestal stands and ring footed vessels. Even here, the presence of a decorated pot stand and at least one example of a decorated leg potentially illustrate functional if not direct stylistic continuity.

#### *Decorative Application*

There is little doubt that the Tongan decorated ceramic wares are a subset or variant of Lapita decorative design as a whole. The abundant use of dentate stamping, the division of the vessel surface into well structured design fields, and the organisation and types of motifs elucidate that affinity. That being said, it also is apparent that, unlike

		Dentate	Incise	Shell	Appliqué	Notch	Lime In-fill	Total Sherds
Pukotala	n	600	42	2	73	93	9	648
	%	92.6	6.5	0.3	6.5	11.3	1.4	
Faleloa	n	767	59	9	91	134	7	971
	%	79.0	6.1	0.9	9.4	13.8	0.7	
Tongoleleka	n	1145	77	20	101	98	37	1370
	%	83.6	6.7	1.5	7.4	7.2	2.7	
Vaipuna	n	595	63	14	62	47	2	707
	%	84.2	8.9	2	8.8	6.7	0.3	
Mele Havea	n	408	19	1	34	31	10	451
	%	90.5	4.2	0.2	7.5	6.7	2.2	
Ha'ateiho	n	167	45	13	58	41	1	276
	%	60.5	16.3	4.7	21	14.9	0.4	
Nukuleka	n	371	33	5	62	75	3	448
	%	82.8	7.4	1.1	13.8	16.7	0.7	
Total	n	4053	338	64	481	519	69	4871
	%	83.2	6.9	1.3	9.9	10.7	1.4	

TABLE 5. Decorative applications applied to Eastern Lapita ceramics from sites in Tonga. These are individual counts per sherd. Where multiple applications are present on a sherd, they are counted within each category. The percentiles are based on the number of occurrences in relation to the total number of decorated sherds at individual sites as tallied in the column on the far right.

vessel form, the decorative series is a highly distinct variation. Visual observation of a sherd collection by even the most untrained eye can differentiate most Tongan Lapita sherds from Western, Far Western or Southern types. It is difficult to quantify this in an explicit sense, since a majority of the attributes that allow this to happen are of a qualitative nature. Suffice it to say, as Green (1979:40), Kirch (1997:157) and Clark and Anderson (2001a:79) have illustrated, that there is an overall simplification in geometric and rectilinear motifs, as well as an openness or explosion in motif application. According to Sand (2001:70), and we agree fully, it is as much "the way the patterns are put on specific pot forms", as the patterns themselves.

We have recorded the different types of decoration applied to individual sherds to try and measure relative frequencies of applications (Table 5). Not surprising, dentate stamping is the principal means by which motifs are applied, having a mean occurrence within the assemblage of 83.1 percent. Incising, on the other hand, averages just seven percent while shell impression is only present in small amounts, except within the assemblage at Ha'ateiho. With respect to incising or shell impression, two observations are important to make. First, unless associated with early Western style sherds from Nukuleka, these techniques are used most frequently to apply the same suite of motifs as dentate stamping. Second, incision, shell impression and/or dentate stamping occur in combination on the same vessel in several cases.

Sand (2001:69) highlights three-dimensional appliqué modeling as a diagnostic feature specific to the Eastern Lapita ceramic style. In Tonga this occurs as raised horizontal bands, as vertical bars, or as nubbins. Some variation exists in the frequency of appliqué modeling between sites, but it is found at the majority on less than ten percent of the sherds (Table 5). Horizontal bars frequently occur as a circular band or zone marker to define the limits of a design field either on the inside of the rim, on the neck, or on the shoulder. Vertical bars tend to be discontinuous and integrated into the structure of the motif itself. Nubbins can occur as part of a motif structure, but also are applied in a linear pattern along or just above the shoulder.

Vessels with rim or shoulder notching and/or other types of decoration restricted to the rim course are the primary characteristic of what is believed to be a late Eastern Lapita phase (Green 1979; Kirch 1988). This phase was originally defined through the recovery of a series of complete vessels from the Sigatoka Sand Dune site on the west coast of Viti Levu, Fiji, dating to c.550 cal. B.C. (Birks 1973; Dickinson *et al.* 1998). Similar assemblages, however, are recorded at other sites throughout Fiji (Clark and Anderson 2001a) and on Niuaotupapu (Kirch 1988). In southern and central Tonga, ceramic vessels with notching on the lip of the pot and/or on the outer shoulder angle are not uncommon, both with and without other types of decoration (Table 5). Here, however, they occur in the earlier period in association

		No. of Motif Fields			1mm	Size of Dentate Stamp		Multiple
		1	2	3+		1-2mm	2+mm	
Pukotala	n	502	83	10	58	502	27	13
	%	84.3	14.0	1.7	9.7	83.7	4.5	2.2
Faleloa	n	744	74	9	65	664	28	10
	%	90	8.9	1.1	8.5	86.6	3.7	1.3
Tongoleleka	n	1076	139	15	217	673	130	125
	%	87.5	11.3	1.2	19.0	58.8	11.4	10.9
Vaipuna	n	581	72	10	102	421	36	36
	%	87.6	10.9	1.5	17.1	70.8	6.1	6.1
Mele Havea	n	367	57	6	52	336	12	8
	%	85.4	13.3	1.3	12.8	82.4	2.9	1.9
Ha'ateiho	n	157	58	0	22	140	2	3
	%	73.0	27.0	0	13.2	83.8	1.2	1.8
Nukuleka	n	384	23	1	17	343	9	2
	%	94.1	5.6	0.3	4.6	92.5	2.4	0.5
Total	n	3811	506	51	533	3079	244	197
	%	87.3	11.6	1.2	13.2	76.0	6.0	4.9

TABLE 6. Left -Number of motif fields in which a complete or partial motif is present on decorated sherds from Eastern Lapita sites in Tonga. Right - Tooth size for dentate stamp tools from Eastern Lapita sherds in Tonga. Multiple refers to sherds where more than one tooth size/stamp is present.

with other Lapita forms, and it is uncertain whether detailed stratigraphic analysis ultimately will be able to delineate a discrete late Lapita phase.

There are three decorative features that can be considered characteristic of the stylistic elaboration of Lapita wares in the far west, west and south. These are the use of fine-toothed and closely spaced dentate stamp tools, the application of a red slip to the surface of the pot, and the in-filling of impressed designs with white coral lime (Ambrose 1999; Kirch 1997; Sand 2000). The first allows for a high density of stamped impressions and facilitates application of complex motifs (Anson 1983). The latter serves to highlight and draw attention to the vessel's decorative design. Measurement of dentate stamp tooth impressions (Table 6) indicate that a vast majority of stamps in Tonga had teeth ranging from 1 to 2mm in size, but very fine-tooth stamps under 1mm also were employed. Only rarely are stamped impressions closely spaced, and elaborate composite designs are the exception rather than the norm. Concomitant with a lack of complexity, in-filling with lime is rare, and the application of a slip occurs in only a very small number of cases.

Sand (2000, 2001) describes Lapita motif application and construction throughout most of Island Melanesia as incorporating a wide and complex central frieze or panel, above and/or below which occur a series of secondary, thin, and densely decorated bands. The supplementary

bands are for the most part regular repetitions of the same design element or motif with the central frieze providing the design field for artistic and symbolic expression. Occurring within the latter are different face and anthropomorphic representations, complex geometric and curvilinear motifs, and other abstract applications (see Kirch 1997; Spriggs 1990). There is repetition of design, but it is not the same methodical application of a single or limited series of motifs as found on the supplementary friezes. In the Eastern Lapita design system, in Sand's (2001:69) view, there has been a "profound evolution", for the central frieze is no longer present, and the supplementary bands have become the exclusive focal point for the decorative system. Accordingly the bands are widened and motif size is expanded in relative proportion. This provides the open or explosive appearance that has been noted. We also believe that the number of friezes is greatly reduced. Though calculations are no doubt skewed by sherd size, less than two percent of the sherds in each of the Tongan assemblages has more than two design fields with motifs present (Table 6).

#### *Design Motifs*

Poulsen's (1967, 1972) pioneering research on Tongan ceramics involved a detailed attribute analysis of over 3,300 decorated pieces. Within this collection is a large range of motifs which he grouped into 17 categories with numerous variations (Poulsen 1987:58). Green (1990:34)

and others have found Poulsen's motif inventory systematic, but describe it as arbitrary in its assignment of designs to motif categories. Alternative analytic strategies for decorative analysis of Lapita assemblages were developed subsequently by Mead (Mead *et al.* 1975), Anson (1983), Sharp (1988) and Siorat (1990). Mead's system, as expanded upon by Sharp, is the one commonly championed by Green (1990) and Kirch (1988, 1997). It applies a semiotic methodology, giving ultimate insight into the underlying structure and rules of Lapita design as well as creating an inter-regional motif inventory (Mead *et al.* 1975; Sharp 1988). The system, unfortunately, relegates many of Poulsen's elementary motifs to zone marker or design element status. Unless one treats these as equivalents to Mead's motifs or motif alloforms (as per Best 1984:622), comparative analyses will ignore one of the most critical and defining aspects of Tongan Lapita design – its simplicity. In our view, and with recognition of its arbitrary groupings, Poulsen's concern with the

identification of individual designs and partial designs is appropriate if not necessary for the characterisation and illustration of Lapita decorative application in Tonga. It is a system that we apply and expand upon in our analyses. In many respects it parallels the fine-grained motif description developed and promoted by Anson (1983, 1998).

A fully detailed account of the Tongan ceramic motif inventory is far beyond the limits of the present paper. It can be stated that Poulsen's 17 groups incorporate the vast majority of identified designs in the seven collections examined here. This is not overly surprising for all of the Tongan Lapita sites roughly date to the same period of time, and the two Tongatapu sites examined by us are ones also studied by Poulsen. To accommodate additional variability, we have found it necessary to expand the number of motifs within groups. In some cases we also re-categorise motifs into more consistent themes based on degree of design complexity. Our analyses consequentially increase the Tongan inventory to over 230 designs or partial designs categorized into 25 themes. This degree of variability in motif application in the Tongan Lapita material is an important feature, in so far as many of the motifs are representative of the Lapita complex as a whole (see Green 1979, 1990; Summerhayes 2001a). At the same time, when the frequency of designs is calculated at sites individually, only a very small number are dominant. In point of fact, six themes cumulatively account for over 70 percent of motif applications in the assemblage as a whole (Table 7, Figure 3). These themes are basic curvilinear or rectilinear patterns that could be applied with simple curved or straight dentate stamp tools. As motifs, they occur singularly, in combination, or can be repeated in separate design fields on individual vessels. They also occur externally and on the inside rim course of everted flaring rim vessels.

Past comparison of Tongan designs with Lapita motifs further to the west have tended to focus on the broader range of shared and unique patterns, with a number of overlapping motifs taken as a measure of similarity or "genetic distance" (Best 1984; Kirch 1988). Yet if one wants to define the Lapita ceramic series in Tonga specifically, it is not the unique patterns that are important, but the recurrent application of the fundamental motif series outlined here. It also is noteworthy that these motifs are not overly simplified versions of Western, Far Western or Southern Lapita designs as many of the other Tongan motifs may be, and as is implied in previous accounts of the Eastern Lapita system. Rather, they occur in all Lapita regions, frequently as the decorative in-fill that has been methodically applied on supplementary friezes (for example, see ceramic illustrations in Kirch 1997 or Sand 2000). As these friezes became transformed into the central design fields of Eastern Lapita style, the associated decorative patterns were

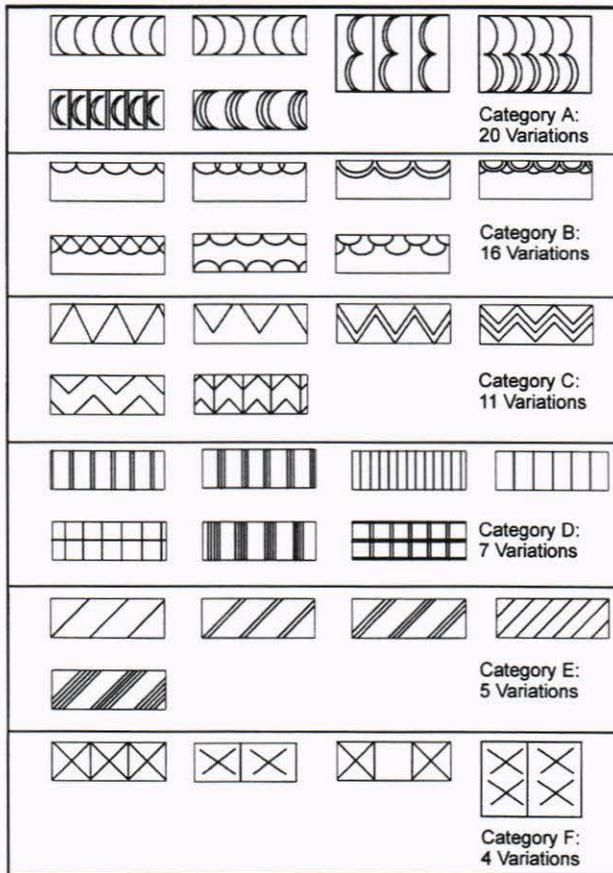


FIGURE 3. Motif categories cumulatively accounting for over 70 percent of decorative motif application in Eastern Lapita sites in central and southern Tonga. Refer to Table 7 for site specific distributions.

		MOTIF CATEGORIES							
		A	B	C	D	E	F	Others	Total
Pukotala	n	165	41	16	19	19	9	60	329
	%	50.2	12.5	4.9	5.8	5.8	2.7	18.2	100.1
Faleloa	n	129	29	29	31	17	8	152	395
	%	32.7	7.3	7.3	7.8	4.3	2.0	38.5	99.9
Tongoleleka	n	194	39	84	66	18	32	156	589
	%	32.9	6.6	14.3	11.2	3.1	5.4	26.5	100
Vaipuna	n	147	34	28	33	23	13	103	381
	%	38.6	8.9	7.3	8.7	6	3.4	27	99.9
Mele Havea	n	57	12	12	59	15	6	74	235
	%	24.3	5.1	5.1	25.1	6.4	2.5	31.5	100
Ha'ateiho	n	49	5	7	10	5	28	57	161
	%	30.4	3.1	4.3	6.2	3.1	17.4	35.4	99.9
Nukuleka	n	47	10	13	8	21	3	42	144
	%	32.6	6.9	9	5.6	14.6	2.1	29.2	100
Total	n	788	170	189	226	118	99	644	2234
	%	35.3	7.6	8.5	10.1	5.3	4.4	28.8	100

TABLE 7. Motif occurrences by general category. See Figure 3 for illustration of motif groups A to F.

maintained. The principal difference is that the motifs are enlarged and opened in partial response to the widening of the frieze itself.

#### ON THE ORIGINS OF EASTERN LAPITA CERAMICS AND RELATED ISSUES

To this stage, we have tried to characterise and describe decorated ceramic collections from seven sites excavated over the past decade in the Kingdom of Tonga. Despite the fact that these assemblages come from dispersed locations on Tongatapu and five islands of the Ha`apai group, strong patterning is present in vessel form, in decorative application, and in design motif occurrence. On this basis alone, we would argue that settlement from a common source was rapid, and that the assemblages most likely represent an interrelated community of potters. Yet the question remains as to whether this community extends throughout the Fiji/Tonga/Samoa region as a whole, the area typically defined as an Eastern Lapita province. And as a sequel to this query, we must ask of the origins for this style, and its implications for understanding settlement process and culture history on the Eastern fringe of the Lapita world.

The orthodox view for Lapita colonisation of Tonga and Samoa typically portrays Fiji as the open end of a funnel through which it was accomplished (Clark and Anderson 2001a:84). Fiji is an archipelago of over 18,000km<sup>2</sup>, and its mountainous large islands of Viti Levu and Vanua Levu are highly visible targets for discovery as

well as effective screens for the multitude of smaller islands and archipelagoes occurring to the east (see Figure 1). In keeping with this view, Kirch (2000:157) estimates that sometime between 1200 and 1000 cal. B.C., a small group of explorers made their way across the wide open ocean gap separating Fiji from central Island Melanesia. This discovery provided a genetic core, first for the settlement of west Fiji, and then in clinal and progressive fashion, Lau, Tonga, Niuaotupapu and ultimately Samoa (Best 1984; Kirch 1997, 2000). The original group brought with them a variant of the Western Lapita ceramic style as has been found in west Fijian sites such as Yanuca, Natunuku and Naigani (see Clark and Anderson 2001a for a summary). Quickly this changed to the simplified subset referred to as Eastern Lapita (Sand 2001:69). To account for the transformation, Green (1979: 42) and others (Kirch 1997, 2000) speak of a west-to-east "distance decay" created in part by "founder effect" (Green 1990:37) and in part by stylistic degradation of the design series over time (Summerhayes 2001a). In the orthodox view, Eastern Lapita in Fiji/West Polynesia represents a comparatively homogeneous province that, at least initially, developed in relative isolation from island archipelagoes further to the west.

The clinal down-the-line model of Eastern Lapita settlement has been most effectively argued by Best (1984). His comparative analysis of decorated ceramics from Lau rightly illustrates a west to east divide in the Lapita occupation of Fiji. Sites with earlier appearing Western style ceramics are clustered on the main Western islands

while Lapita sites to the east, in Lau, are more closely related to the Eastern Lapita style found throughout Tonga and in Samoa. This boundary, in Best's (1984:649) view, is "time related", with Lau/Tonga/Samoa settled later than Western Fiji. The temporal divide further parallels a linguistic split between Western and Eastern Fijian dialects proposed by Geraghty (1983). Most recently, Clark and Anderson (2001a) again illustrate the west/east split in the Lapita occupation of Fiji. If this is to be explained by a clinal settlement model, they emphasise that expansion must have taken place rapidly, perhaps over no more than a century, based on existing radiocarbon chronologies. Clark and Anderson (2001a:85) also state that "the apparent support for a west-to-east colonisation front .... is not unequivocal and can be challenged on both theoretical and empirical grounds". In fact two other models, a multiple origins model, and a leap-frog model are proposed and examined against available data. Clark and Anderson (2001a:87) inevitably conclude that "the colonisation of Fiji appears far more complicated than any of the three simple models proposed".

Recognition of a west/east divide in Fijian Lapita sites is of critical importance for an understanding of Eastern Lapita ceramic origins as well as settlement process in the Fiji/West Polynesian region. In spite of excavations at several west Fijian sites, none have produced in quantity the type of decorated ceramic assemblage prototypical of Eastern Lapita sites in Lau, Tonga or Samoa. West Fijian collections invariably are related to Western Lapita style in general, or they are the late Lapita variant where decoration is restricted to notching, shell impression or incising on the rim or shoulder (Clark and Anderson 2001a:80). Where radiocarbon dates exist for the assemblages with Western Lapita ceramic types, associated measurements also tend to be only slightly earlier or contemporaneous with Lapita sites further to the east. A recent review of acceptable radiocarbon dates for first settlement of Fiji by Anderson and Clark (1999) even presented a possibility that Tonga might have been discovered earlier when chronological comparisons were drawn (for example, Summerhayes 2001a:129). West Fijian Lapita sites are poorly dated and we acknowledge that the latter scenario is unlikely (also Clark and Anderson 2001b). The probability exists, nevertheless, that quite separate ceramic suites characterize west Fiji and the Lau/Tonga/Samoa regions. The Eastern Lapita ceramic complex, as it is defined in earlier presentation, applies only to the latter. In west Fiji, stylistic change in ceramics seems more in keeping with central island Melanesia, but with its own peculiar differences, including the application of three dimensional design elements (Sand 2001).

If Eastern Lapita ceramic origins in Tonga are not the consequence of stylistic change over time or distance decay

as settlement proceeded through Fiji and Lau, where then does the complex originate? Recent excavation (Burley *et al.* 2001) and re-examination of Poulsen's (1987) data from the Nukuleka site (To 2) at the entrance to Fanga 'Uta Lagoon on Tongatapu provides provocative possibilities. It already has been stated that radiocarbon dates from Nukuleka distinguish it as the earliest Lapita site yet recorded in Tonga, and this is supported by a comparatively high proportion of decorated ceramics as well as a small collection of Western style Lapita sherds. We believe that Nukuleka forms the portal for settlement of the archipelago. Petrographic analysis of ceramic tempers in a small collection of Nukuleka sherds with exotic appearing pastes, including some with Western style motifs, identify an origin source that is foreign to Tonga (Burley and Dickinson 2001). As a founding settlement, this should not be overly surprising. What is surprising is that the tempers do not match any yet identified in Fiji, again calling into question the clinal settlement model for Fiji/West Polynesia as it has been proposed. The only documented sherd with comparable temper thus far known is from Nendo in the Santa Cruz Islands. As a consequence, Burley and Dickinson (2001:11830) speculate that Nukuleka may have been founded by a group directly emanating from central Island Melanesia, possibly at the same time other groups were colonising the Western main islands of Fiji. The regional settlement process for Fiji/West Polynesia in this view is one based on multiple origins and so called leap-frogging, not a single genetic core and clinal exploration.

The Nukuleka site is heavily disturbed by construction of a late prehistoric burial mound over much of its surface, and by day to day activities within a contemporary village (Burley *et al.* 2001; Poulsen 1987). Nukuleka decorated sherds are among the most fragmented and degraded in the Tongan collections, and a large percentage of this material originates in secondary deposits of burial mound fill. Assemblage integrity and temporal relationships are difficult to argue as a result. Yet having stated that qualification, it remains noteworthy that in relative proportions of decorative motifs, the Nukuleka assemblage is identical to other Eastern Lapita sites examined here. The six motif themes that cumulatively occur in over 70 percent of Lapita ceramic decoration in Tongan sites accounts for 70.8 percent of the Nukuleka motif suite specifically (Table 7). With limited exception, vessel form types and decorative application are similarly uniform (Tables 3 and 5). If one accepts the characteristic features of Eastern Lapita ceramics as portrayed, Nukuleka falls squarely in that definition, despite its unique sherds of Western aspect and origin, its higher proportion of decorated sherds, and its earlier radiocarbon dates.

We believe that the earliest Nukuleka potters provided the basic template of vessel forms and motif application upon

which the Eastern Lapita ceramic series was built. Arriving at Nukuleka from a yet unknown locale, they brought with them or immediately developed a simplified subset of the Western Lapita ceramic style (Burley *et al.* 2001:101). Why a simplification process took place is beyond our present concern, and its resolution must await a better understanding of ceramic chronology in the larger area of Western Remote Oceania itself (see Sand 2001:72-73). The apparent loss of large elaborate vessel types with central frieze seems telling nevertheless. It widely is believed that these forms represent a highly specialised assemblage employed for ceremonial feasting, ritual exchange, or other non-utilitarian purpose (Kirch 1997; Sand 2001; Summerhayes 2001b). That a small founding community such as Nukuleka may not have had a population sufficient in size or in social diversity to require these rituals is one possibility. Still another is that the small group of potters who first came ashore may not have had the specialised knowledge or skill for the production of these wares. What we can say with certainty is that this “founder effect” did take place. Its consequence, in the end, is that the ceramic histories for west Fiji and those in Tonga, Samoa and Lau diverged. We also can speculate that a degree of isolation continued for some time after, as is amply indicated in the dialect chain break between Western-central Fijian and Tokalau-Fijian-Polynesian languages (Geraghty 1983).

## CONCLUSION

It has been a half century since Edward Gifford and Richard Shutler excavated decorated Lapita wares at Site WKO 13a, on the Foué Peninsula of New Caledonia. Oceanic archaeologists have gained considerable insight into the relationships of these wares as they occur across the Pacific in the duration. Comparative analysis of decorative application, design structure and design motifs clearly show strong affinities within a Lapita ceramic tradition. At the same time they highlight regional and temporal distinctions. Our objective in writing this paper has been to contribute new data and associated observations on one of these variations, the Eastern Lapita ceramic suite of southern and central Tonga. First distinguished by Green (1979), Eastern Lapita ceramics have been defined as a simplified subset positioned on the spatial and temporal end of the Lapita phenomenon. Our data provide insight into the transformative changes occurring within Eastern Lapita ceramic design. They also lead us to question existing interpretations of the origin and distribution of this form with implications for longstanding assumptions on settlement process and direction in Fiji/west Polynesia.

Analyses of seven collections of decorated Lapita sherds from Tongan sites illustrate a large degree of variation within the assemblages. When one ignores the unique or rare cases, and the focus is shifted to a quantified

assemblage profile, a consistent pattern is discerned. It is this pattern, we argue, that defines the Eastern Lapita ceramic type. Four distinguishing features are highlighted:

1) *Variability in Decorated Vessel Forms.* Decorative application in the Tongan assemblages is not restricted to a limited number of vessel types, while other types are left plain. It is applied across the assemblage as a whole to the full range of jar and bowl forms. We have not been able to refine our vessel form typology to incorporate shoulder shape, but can state that abruptly carinated shoulders are an important attribute, occurring on almost half of the decorated shoulder sherd assemblage.

2) *Preponderance of Dentate Stamping as a Decorative Application.* Frequency counts for individual decorative applications within the sherd assemblages illustrate a considerable dominance in the use of simple dentate stamp tools with a tooth size of 1-2mm. Lesser frequencies of incision, three dimensional appliqué modeling and notching are present, with shell impression, application of slips, and lime paste infill having a limited presence.

3) *Consistent Use of a Limited Number of Simplified Motif Themes.* The application of motifs to Tongan vessel surfaces is limited in numbers and is restricted in range. That is to say, a large number of motifs are present in the inventory, and some of these can be quite complex, but over 70 percent of motif applications are based on six very simple rectilinear and curvilinear themes. In Mead's (Mead *et al.* 1975) motif recording strategy, the majority of these are categorised as design elements rather than motifs *per se*. Motifs also appear to be applied sparingly.

4) *Selective Transformations in the Application of Design Fields.* The large central frieze characteristic of Southern, Western and Far Western Lapita design seems to have been abandoned in the Eastern Lapita designs of Tonga. Rather, the principal design fields tend to be open and expanded versions of supplementary decorative bands found elsewhere.

Explanation for the development of an Eastern Lapita ceramic style typically has focused on founder effect, combined with spatial and temporal distance decay as Lapita exploration and settlement progressed from Fiji into Tonga and thence northward. This has been supported in the past by a distinction drawn between Lapita ceramic motifs in west Fijian sites in comparison to those further to the east. We do not question the ceramic relationships as proposed. Equivalent radiocarbon chronologies in the west and east, nevertheless, indicate too limited a time span for a clinal settlement progression with consequential stylistic change. Rather data from the Nukuleka site in southern Tonga supports the idea of a roughly contemporaneous and quite separate colonisation event, one with speculative

links to central Island Melanesia. Since the overall ceramic assemblage for Nukuleka is compatible with the definition of Eastern Lapita as given, then the template for this ceramic style was not so much developed in the east, as it was transported largely intact.

We freely admit that a component of our argument for the origins of Eastern Lapita settlement in Tonga is based as much on the lack of evidence for a progression across Fiji, as it is on concrete data in the ceramic assemblages themselves. This, no doubt, will raise the ire of at least some of our colleagues who support a more traditional model for west to east exploration. Yet if our conjectures do nothing else, we can hope that they will serve as specious propositions for others to test. In this, we believe, Richard Shutler Jr. would give his support. There is still much to learn in the Lapita archaeology of Remote Oceania, and existing data provide no more than a beginning point for the writing of this story.

#### ACKNOWLEDGEMENTS

In the introduction, we have acknowledged the significant contribution that Richard Shutler Jr. has made to our fieldwork in Tonga and in the laboratory. If this paper were not written in his honour, he most definitely would be one of its authors. The question of Lapita ceramic relationships, chronology and settlement process are issues to which Richard has devoted a considerable portion of his career. Through this presentation we hope only that we live up to his standards of analyses and interpretation in these regards.

Many different colleagues, students and local residents have participated in our research programs in Tonga. Though far too many to list here, the geoarchaeological contributions of William R. Dickinson are outstanding. Without his work in modeling sea levels in the region, and in his petrographic studies of temper sands of Lapita ceramics from across the Pacific, our understanding of Tongan prehistory would be considerably poorer. The decade long field program and subsequent analyses have been supported by grants to Burley from the Social Sciences and Humanities Research Council of Canada. For these we are grateful.

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