– ARTICLE –

Further Investigations at the Naigani Lapita site (VL 21/5), Fiji: Excavation, Radiocarbon Dating and Palaeofaunal Extinction

Geoffrey Irwin,[1] Trevor H. Worthy,[2] Simon Best,[3] Stuart Hawkins,[4] Jonathan Carpenter[5] & Sepeti Matararaba[6]

ABSTRACT

This paper brings up-to-date a report by S. Best of initial excavations at Naigani in 1981 (Best 1981). The results of subsequent fieldwork in 2000 include the excavation and dating of Lapita-age ovens associated with early settlement and extinct palaeofauna. These include the giant megapode (*Megavitiornis altirostris*), a species of *Ducula* pigeon, the giant iguana (*Lapitiguana impensa*), and probably the endemic crocodile (*Volia athollandersoni*). The Lapita site of VL 21/5 dates from 900 BC and represents an initial colonising settlement within the Fiji Islands. The period of occupation ended around 750 BC. The significance of Naigani is considered in terms of chronology, ceramic history, economy, extinctions, origins and interactions.

Keywords: Lapita, Naigani, Fiji, palaeofauna, extinctions

INTRODUCTION

The Lapita site of VL 21/5 on Naigani was discovered in 1980 during the construction of a resort on the island (Best 1981). Eileen Woodhouse, who was present at the time, realised its significance and contacted staff of the Fiji Museum and the University of Auckland. Excavations directed by S. Best took place during August and September, 1981 and the excavated material was taken to the University of Auckland for study, much of it in a fragile condition and encrusted with cemented sand.

A preliminary unpublished report by Best was produced in November of the same year (Best 1981), which concluded that the site belonged to the earliest part of Fiji's prehistory and also that it had more stratigraphic integrity than some other early Fijian Lapita sites known at that time. Four shell samples were sent for dating to the Institute of Nuclear Sciences, New Zealand, two obsidian flakes were sent to W. Ambrose, Department of Prehistory, ANU for sourcing at Lucas heights, and four bird bones to Dr J. van Tets, Division of Wildlife Research CSIRO, Australia for identification. An MA thesis on the pottery and other archaeological material was written by R. Kay, a student at the University of Auckland (Kay 1984).

Subsequent research in Fiji and West Polynesia indicated the continuing importance of Naigani and, in April 2000, a further excavation was carried out by G. Irwin and S. Best of the University of Auckland, S. Matararaba of the Fiji Museum and graduate students from Auckland. Again, the excavated material was taken to Auckland for study. Samples sent to other researchers included a selection of bones to T.H. Worthy, a further obsidian flake to G. Summerhayes, stone tools to M. Turner and worked shell to K. Szabo. Seven further samples for dating were sent to the Radiocarbon Dating Laboratory, University of Waikato. An MA dissertation on the fish bones was completed by S. Hawkins in 2000 and an MA thesis on the pottery and other artefacts by J. Carpenter in 2002. Naigani was further considered in a general review of Lapita in Fiji by Best (2002).

THE ISLAND

Naigani is nearly 2.0 km² in area and surrounded by an extensive coral reef. The current village is on the western side of the island and the archaeological site is on the eastern (Figure 1). As part of the Lomaiviti Group it lies 15 km east of Viti Levu and the same distance north of Moturiki Island which has another coastal Lapita site, Naitabale,

1 Department of Anthropology, University of Auckland
2 Biological, Earth and Environmental Sciences, University of New South Wales
3 Waiatarua, Auckland, New Zealand
4 School of Culture, History and Language, Australian National University
5 Geometria Ltd., New Zealand
6 Fiji Museum, Suva, Fiji
Corresponding author: g.irwin@auckland.ac.nz
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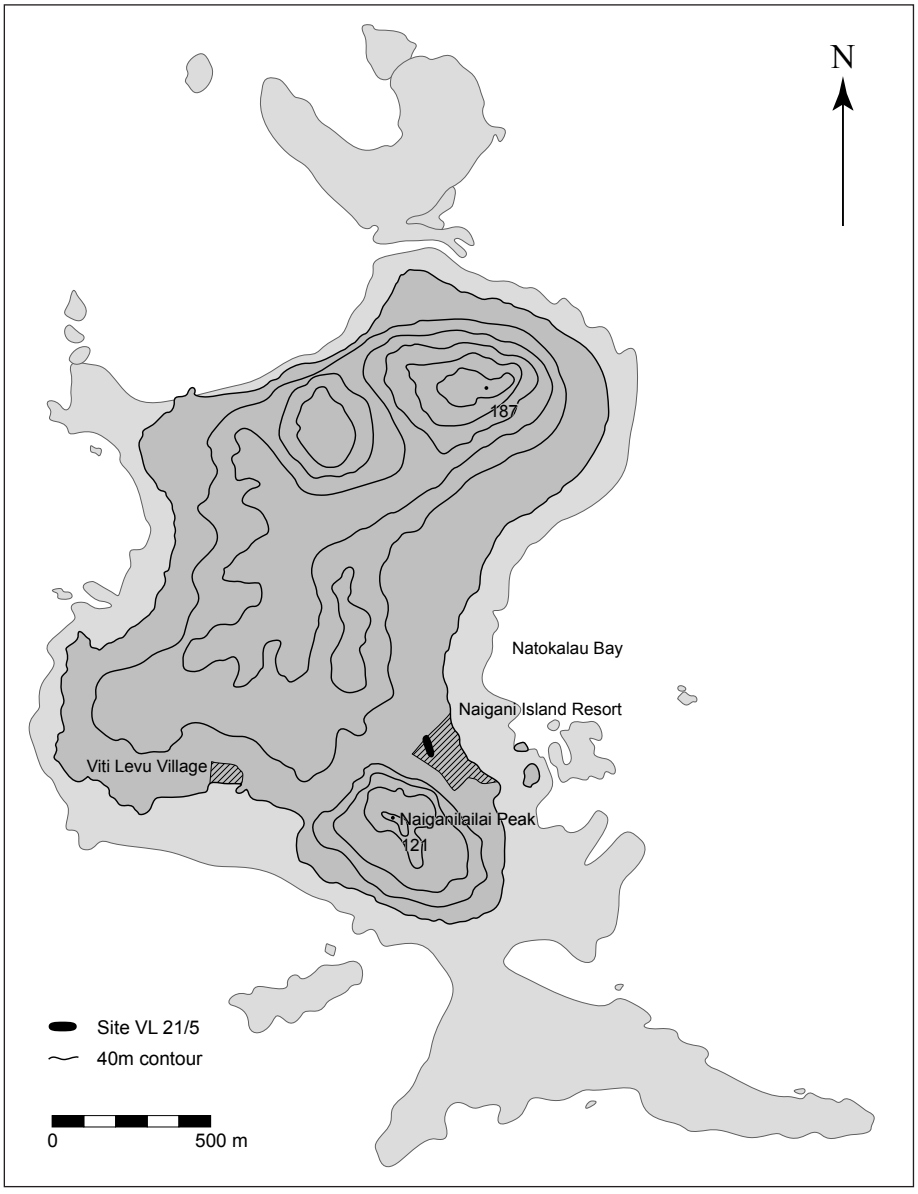

Figure 1. Naigani Island and the location of Site VL 21/5. At the time of occupation the site lay at the shore beside a recently-formed fringing coral platform, which was a likely reason for site selection.

possibly of similar age (Nunn 2007). Naigani has a rugged topography (Figure 1) with terrain divided into 75% steep land, 10% rolling and 15% flat (Twyford & Wright 1965: 41). Geologically, much of the island is andesinite, a feldspar-rich rock resistant to weathering, apparently unique in Fiji (Ibbotson 1961); an alternative classification is pyroxene-andesine dacite (P. Black, pers. comm.). There is also upraised coral limestone conglomerate around the southwestern part of the island.

Annual rainfall at Levuka on nearby Ovalau averages about 2500 mm a year (Best 1981). The current resort and the former Lapita site have a good supply of spring water, but the village on the western side of the same coastal flat experiences water shortages. Today, much of the island is bushed, with occasional small cleared spaces and the coastal flats are under plantation. Only about 15 hectares of the island have a soil type suitable for food gardens (Twyford & Wright 1961: 450), but Naigani's reef and marine resources are extensive. There were 116 people living on the island in 1831 (Best 1981).

THE SITE

During the mid-Holocene sea level highstand the southernmost hill of Naigani was separated from the rest of the island (Best 1981). The site of VL 21/5 was occupied during the period of sea level fall (Dickinson 2003) and was evidently established on dry land on a sand spit that extend-

ed south from the main island during the formation of a tombolo connecting two islands (Figure 2). At that time the site lay at the shore with a recently-formed fringing coral platform along the eastern (windward) side which was a likely reason for site selection (Nunn & Heorake 2009: 248). There was easy access by canoe in the shelter of the islands and likely access to a mangrove swamp to leeward. Coastal progradation has since left the site around 100 metres inland, but no uplift is needed to explain the post-Lapita landscape change–only a drop in sea level of around 1.2 m and an increase in sedimentation from the occupation of the island interior (Nunn & Heorake 2009).

EXCAVATION

A total of 120 square metres has been excavated. In 1981 Best excavated Units 1–16 (Figure 3). There was very little surface material and the excavations were located to explore the wider extent of the site with just Units 2 and 3 investigated on the top of the dune. Figure 3 shows the estimated extent of the Lapita occupation and the top of the initial dune. The three schematic sections A-B, C-D and E-F in Figure 4 show the former crest of the dune and the deposit sloping down its seaward (eastern) side.

The 2000 excavation began with the line of testpits 1A to 7A set along a slightly elevated dune ridge on the seaward side of the Lapita occupation (Figure 3). These revealed a sparse cultural deposit in a sand matrix containing scattered cooking stones, marine shells and sherds–mainly of Lapita-derived plainware pottery but with some carved paddle ware. There was one intact earth oven with cooking stones in Testpit 3A. Beneath this deposit, and below approximately a metre of sterile concreted sand, Lapita-age materials were encountered at the bases of testpits 3A and 7A, at the level of the old beach front (Carpenter 2002, Figure 3.5). This indicates that, as the shoreline prograded eastward, there was intermittent later use of the site.

In the next stage of the 2000 excavation Testpits A–G were used to locate the distribution of dentate-stamped pottery and then the main excavation area of 24 m^2 was excavated in what appeared to be the richest part of the site (Figure 3). Concurrently, Testpits H–O were used to further define the wider extent and structure of the site. Note that Testpits N and O were located respectively 21 metres and 33 metres northwest of the resort boundary fence, and are not shown in Figure 3.

It became evident that at some time between 1981 and 2000 much of the deposit in the south of the site had been bulldozed away to provide fill for a swampy area within the resort (Figure 3).

Sieves with mesh sizes of 7.0 mm, 3.5 mm and 2.5 mm were used in 1981 with most of the Lapita occupation layer being put through the finest. In 2000 a screen size of 6.5 mm was used for Layer A and 3 mm for layers B and C. Excavation was by natural layers. In 2000 decorated potsherds and chert flakes were recorded in three dimensions by an electronic theodolite, but other finds were collected by 50 cm quadrat and 5 cm spit.

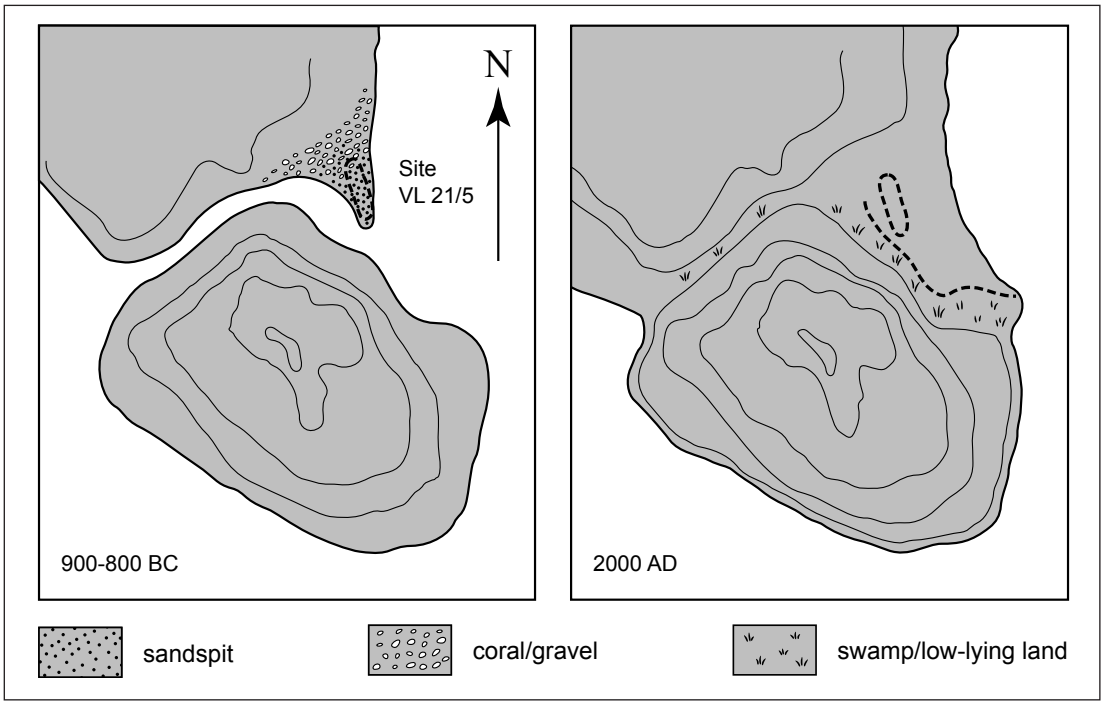

Figure 2. The site of VL 21/5 was occupied during a period of sea level fall and was evidently established on dry land on a sand spit that extended south from the main island before the two islands were joined. The site now lies around 100 m inland from the existing shoreline.

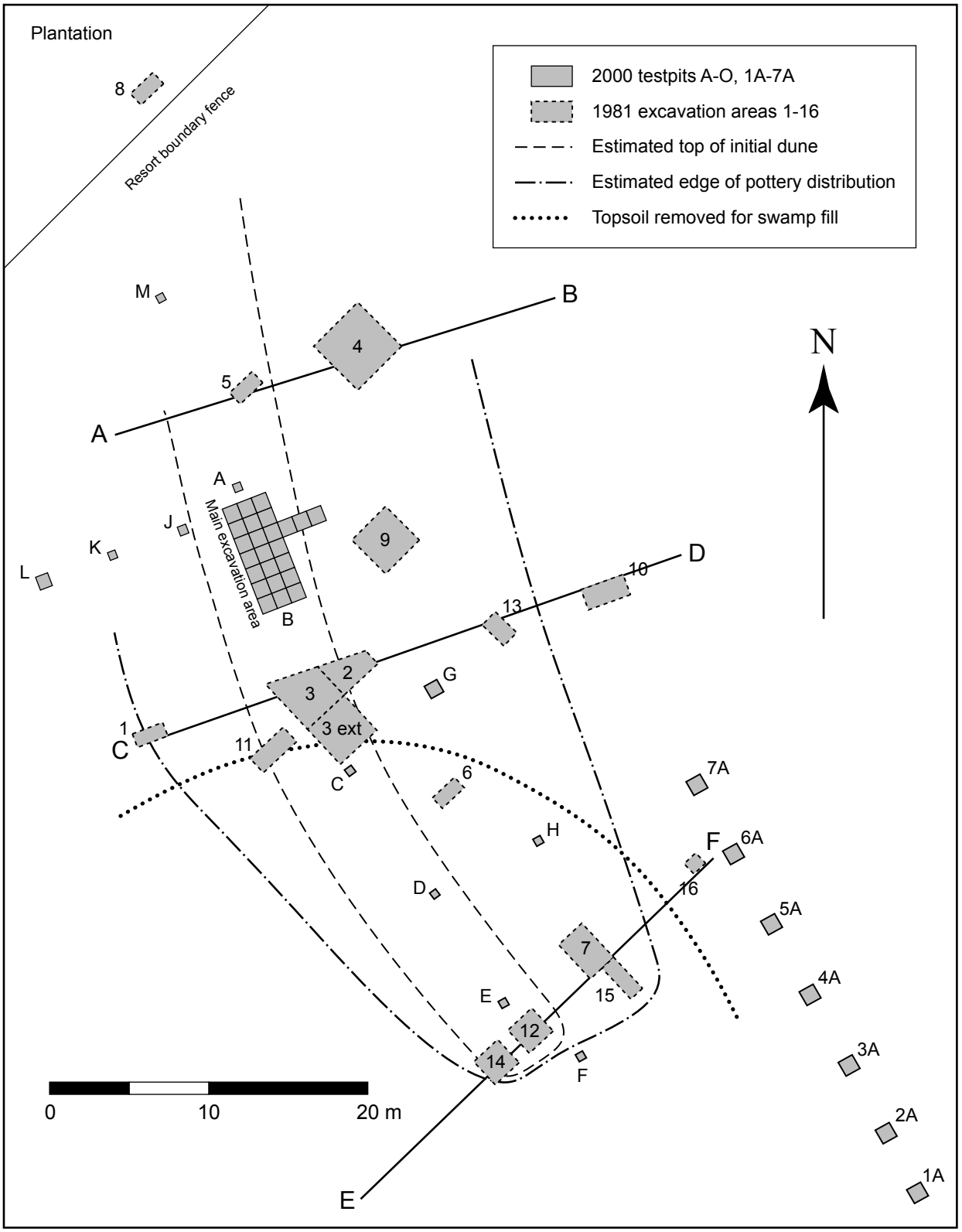

Figure 3. A plan of the excavations of 1981 and 2000 showing the location of three cross-sections illustrated in Figure 4. Testpits N and O, not shown in the figure, were beyond the resort boundary fence; N is 21 m northwest and O is 33 m. Adapted from Best 1981.

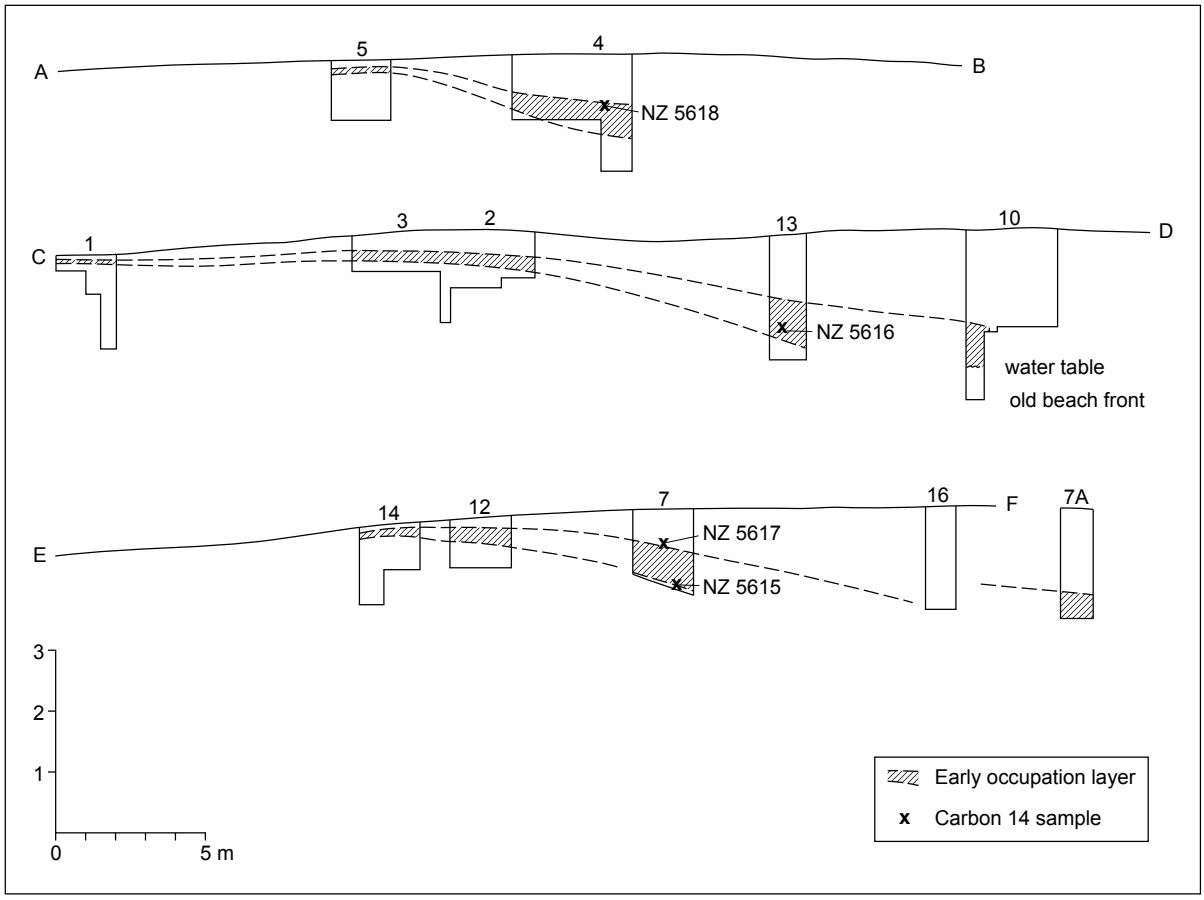

Figure 4. Three schematic sections A-B, C-D and E-F show that the site was situated on the former crest of the coastal dune and the deposit sloped down its seaward (eastern) side. As the shoreline prograded, Lapita-age deposits were sealed beneath material from later episodes of occupation. The levels from which radiocarbon samples were collected in 1981 are shown. Note the vertical exaggeration of scale. Adapted from Best 1981.

Stratigraphy

The east and south section drawings of the main 2000 excavation area are shown in Figure 5, where the soil along the spine of the old dune was thinner than elsewhere in the site, as seen in cross-sections shown in Figure 4.

Layer A was a black topsoil with abundant stones and some potsherds.

Layer B was a brown sand which contained much of the cultural deposit. Large numbers of oven stones were dispersed through the layer, but in the lower zone of the layer they were also found at the top of ovens that remained more intact.

Layer C was the yellow/white sand surface of the original beach mixed with cultural material including cooking stones, stone flakes, marine shells, bones, and potsherds that were scattered across the surface of the original beach, with patches of ash and stained sand.

Structures

Many features including ovens and firescoops intruded from the lower part of Layer B into C. A plan of excavated features is shown in Figure 6 and a photograph in Figure 7. Most of the ovens had been raked out and their contents scattered, but some others were more intact with cooking stones and large shells in moist concreted sand and ash. Very large *Trochus* shells were most common with smaller numbers of *Lambis*, *Conus* and *Tridacna*, plus some other bivalves (Carpenter 2002). Some oven structures had moved laterally with continued use, as in Squares G4 and G5. An episode of cooking is represented here, very possibly occurring within a limited period of time. One of the best surviving structures was the lower part of an oven in Square A5 which contained 13 very large *Trochus* shells measuring up to 15 cm across the base, with two cooking stones among shells and three more at the base together with two decorated Lapita sherds–all found in a discrete mass of concreted sand (Figure 6).

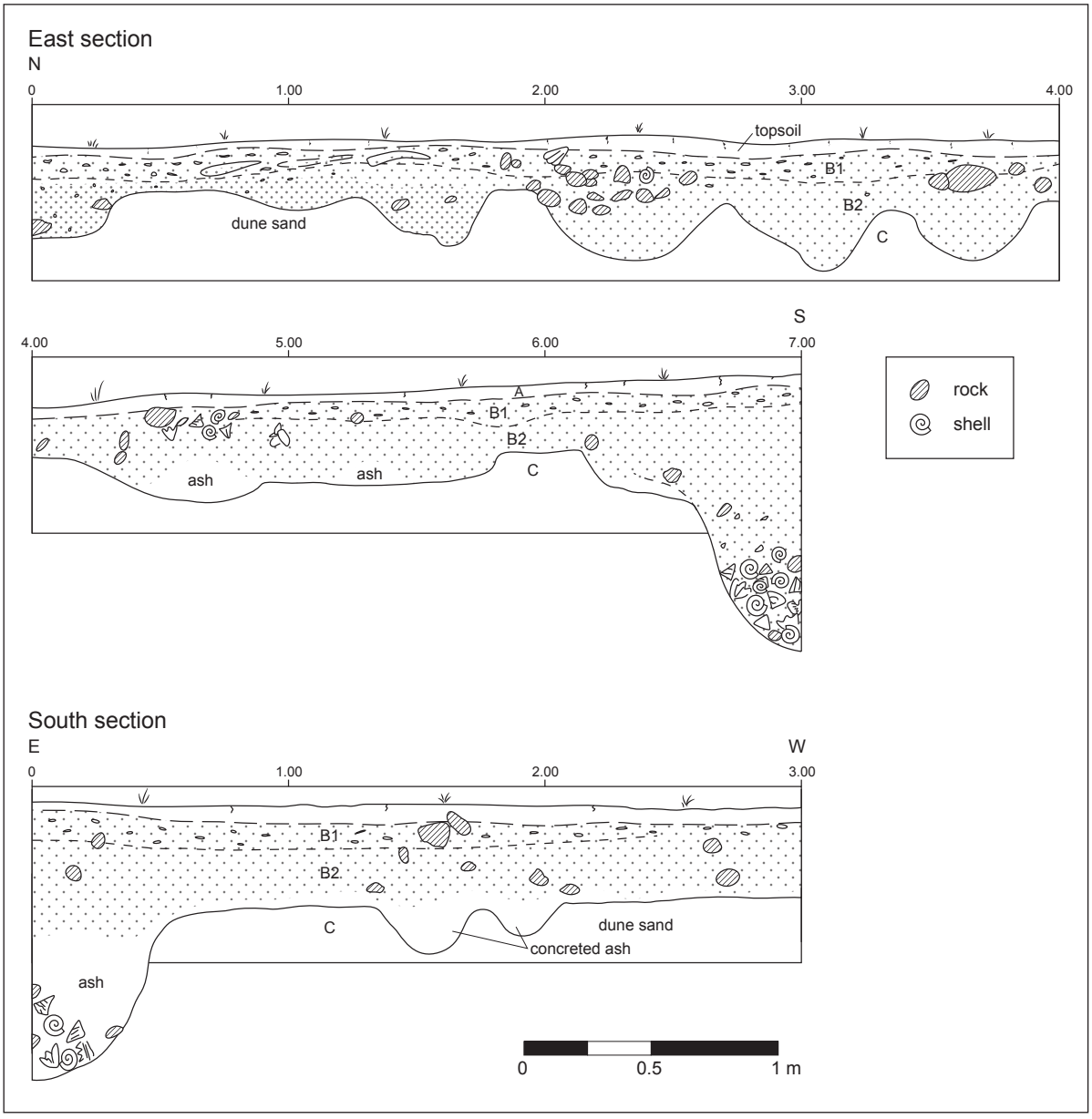

Figure 5. East and south sections of the main excavation in 2000. Note that the layer designations are different from those shown in Carpenter 2002.

Disturbance

The ovens were part of an accumulating occupation surface composed of materials that had been mixed, largely during Lapita times, but the deposit was so shallow that it could have been disturbed at any time since then, and undoubtedly this occurred. Some of the material found in some of the features could have been intrusive from above. However, the intact ovens selected for radiocarbon dating contained only sherds that were definitely from Lapita pots.

The distribution of pottery from the area of the main excavation provides some index of disturbance and mixing. Of the decorated potsherds recovered, 60% were dentate stamped and 30% incised. The remaining 10% – mainly from the upper levels – were made up of Lapita-derived plainware and paddle impressed ware (Carpenter 2002). The proportion of dentate stamped pottery increased with depth and dentate stamping was found to be spatially associated with the ovens (Carpenter 2002). The frequency of larger sherds increased in the lower levels of the deposit indicating less disturbance than above.

RADIOCARBON DATING

There are now 11 radiocarbon dates from the Lapita site of

Naigani. Six are on samples collected in 2000 from *in situ* cemented contents of ovens from the main excavation. A seventh sample came from Testpit G, Layer C. Included in the samples are two shell/charcoal pairs. Wk 10296 and Wk 10297 were two very large *Trochus* shells, and Wk 10294 and Wk 10295 were AMS measurements by IGNS (NZA-14584 and NZA-14583) on charcoal fragments from sand found inside the two shells respectively. The charcoal sample Wk 10294 was identified by R. Wallace as possibly grass, reed or palm frond. Wk 10295 was on unidentified charcoal and gave an older result, possibly due to inbuilt age.

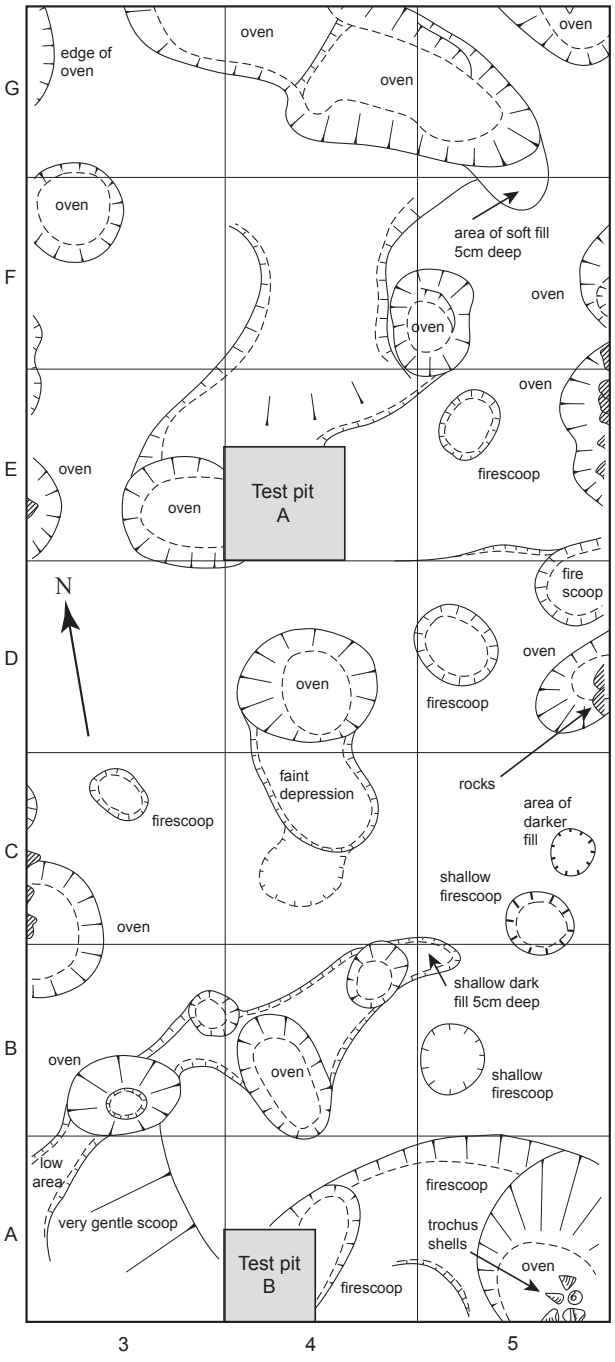

Figure 6. A plan of ovens and firescoops which intruded from the lower part of Layer B into C. Many ovens had their contents scattered, but some others were more intact with Lapita-age cultural materials in concretions of sand and ash. Some oven structures had spread laterally, as in Squares G4 and G5. A period of cooking is represented (Squares are 1 m).

Four samples were collected by S. Best in 1981. These came from spatially different parts of the site, two from the lower part of the Lapita deposit and two from the upper part, as shown in Figure 4. These results have been recalibrated.

Calibrated results, calculated by the laboratories concerned, are shown in Table 1 and Figure 8. The marine shell calibrations used a δR value of 11 ± 6 as advised by Dr Fiona Petchey of the Waikato Radiocarbon Laboratory.

The calibrated results are stratigraphically concordant, show a consistency of age across the site and suggest a difference in age between the bottom and top of the Lapita deposit. On this basis it seems reasonable to propose that:

Naigani was first settled by around 900 BC, or possibly a little earlier.

1. The dated cooking ovens are associated with the Lapita period of the occupation.
2. The Lapita occupation was of fairly short duration and probably ended prior to 700 BC.

PALAEOFAUNA

In recent decades there have been significant discoveries of extinct and previously unknown terrestrial vertebrates in fossil sites in Fiji, New Caledonia and Vanuatu, and some are large enough to be termed megafauna (Worthy & Anderson 2009). The 1981 and 2000 excavations at VL 21/5 revealed a fairly small number of elements of some taxa, but these are highly significant because they reveal interaction with the Lapita settlers of Naigani. The bone was initially sorted by S. Hawkins and the identifications shown in Table 2 are by T.H. Worthy.

Iguanids

Fiji presently has two species of iguana *Brachylophus fasciatus* and *B. vitiensis*. However, palaeontological investigations have revealed the presence of a giant iguana that grew up to 1.5 m long and was presumed to be terrestrial (Worthy *et al.* 1999). It was recently described as *Lapitiguana impensa* by Pregill & Worthy (2003). The Naigani 2000 fauna includes 10 bones of this species and a further two bones that are possibly from it (Figure 9), that were identified by morpohological comparison with bones of *Brachylophus vitiensis* (specimens in Museum of New Zealand Te Papa Tongarewa), and *Lapitiguana*. The definitely identifiable bones include two shafts of right humeri and a shaft of a left humerus whose mid-shaft, width-depth measurements all differ–indicating they are from three individuals. A vertebra, identified as equivalent to between #12 and

Figure 7. A photograph of the base of the main excavation of 2000 after removal of the cultural zone of Layer C – the original sand surface.

#15 in the vertebral series of *B. vitiensis*, had the following measurements: ventral length = 28.7, dorsal length along zygopophyses = 27 mm; width at anterior zygopophyses = 26 mm, width at posterior zygopophyses = 20.5 mm. Several of the bones are burnt indicating almost certainly their use as food. Represented elements include humeri, femora, tibiae and vertebrae. Naigani represents the first known site where people ate these iguanas, although their possible use is indicated in sites on the nearby main island of Viti Levu, as well, e.g., Qaraniosi II (Worthy & Clark 2009). Similarly, in Tonga, bones of a large extinct guana (*Brachylophus gibbonsi*), about half the size of the Fijian one, have been found in many Lapita sites and it became extinct within a few centuries of human arrival (Steadman *et al.* 2002).

Crocodilian

The palaeontological record of Viti Levu has revealed a crocodilian of the mekosuchine group described as *Vo-*

Table 1. *The radiocarbon dates from excavations at Naigani, Fiji. Calibrated dates shown as calBC.*

Lab No.	Location	Material	δ13	CRA	BC 2σ	Stratum
Wk 10294	Sq. A5	Charcoal*	–22.0 ± 0.2	2852 ± 57	820–1120	oven
Wk 10295	Sq. E4	Charcoal #	–26.9 ± 0.2	2945 ± 57	910–1270	oven
Wk 10296	Sq. A5	Shell, *Trochus**	3.0 ± 0.2	3110 ± 52	790–1090	oven
Wk 10297	Sq. E4	Shell, *Trochus* #	3.4 ± 0.2	3125 ± 44	800–1100	oven
Wk 10298	Sq. G5	Shell, *Lambis*	1.4 ± 0.4	3046 ± 51	750–1000	oven
Wk 14510	Testpit G	Shell, *Trochus*	3.1 ± 0.2	3077 ± 33	760–1000	C
Wk 14511	Sq. E7	Shell, *Trochus*	2.7 ± 0.2	3036 ± 33	760–950	oven
NZ 5615	Area 7	Shell, *Tridacna*	2.9 ± 0.1	3066 ± 32	780–990	base
NZ 5616	Area 13	Shell, *Tridacna*	2.3 ± 0.1	3077 ± 36	780–1010	base
NZ 5617	Area 7	Shell *Saccostrea*	0.5 ± 0.1	2973 ± 36	700–910	top
NZ 5618	Area 4	Shell, *Trochus*	4.2 ± 0.1	2935 ± 36	590–850	top

Notes: *, # Shell/charcoal pairs. CRA values for NZ 5615–NZ 5618 from Anderson and Clark (1999)

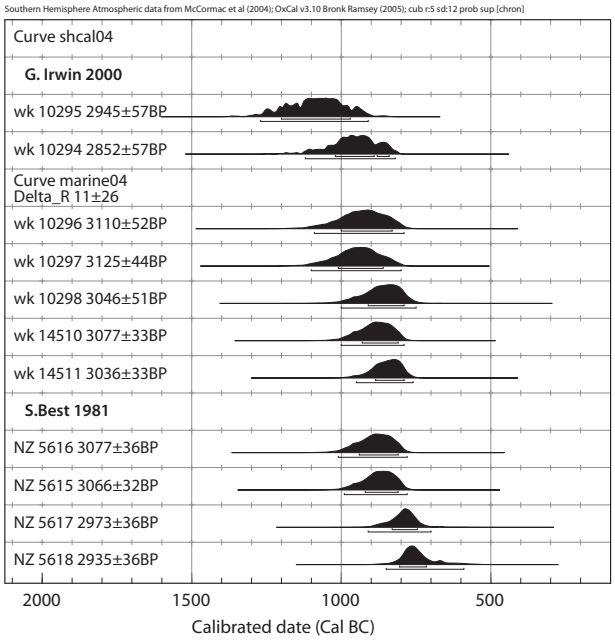

Figure 8. The C^{14} results show a consistency of age both horizontally and vertically in the site. Naigani was first settled by 2900 calBP. The Lapita occupation was of fairly short duration and probably ended by about 2700–2750 calBP.

lia athollandersoni by Molnar *et al*. (2002) which grew to around 3 m in length. It is most similar to *Mekosuchus inexpectatus* from New Caledonia (Balouet & Buffetaut 1987), and *Mekosuchus kalpokasi* from Vanuatu (Mead *et al*. 2002), as well as fossil mekosuchine material from Australia (Molnar *et al*. 2002; Worthy & Anderson 2009). These discoveries show the former presence in the southwest Pacific of an endemic group of crocodilians. In Fiji they were top carnivores and may have preyed on the giant iguana, large birds, or fish (Molnar *et al*. 2002).

The Naigani fauna includes a distinctive trapezoid osteoderm or scute from the neck region of a crocodilian. At 20 mm long, 14.3 mm wide and 10.5 mm high it is relatively large. A worn tooth of a crocodilian has a crown 5.45 mm long (anterior to posterior in jaw) by 3.78 mm wide, with a preserved height of 6.4 mm and an estimated original height of 8 mm (Figure 10). A cranial fragment of a crocodilian is also represented. None of these elements is referrable with certainty to the endemic species found formerly on Viti Levu, but they definitely reveal the presence of a crocodilian at Naigani. Salt water crocodiles have been recorded at least once in the last century in Fijian waters, so the possibility of these elements belonging to *Crocodylus porosus*, the only living crocodile in the region, needs to be considered. The strongly keeled tooth is, however, consistent with a mekosuchine and hence *Volia*, rather than *Crocodylus*. Thus, these bones most likely belong to the endemic crocodile, but the finding of diagnostic bones such as cranial elements is needed to verify this.

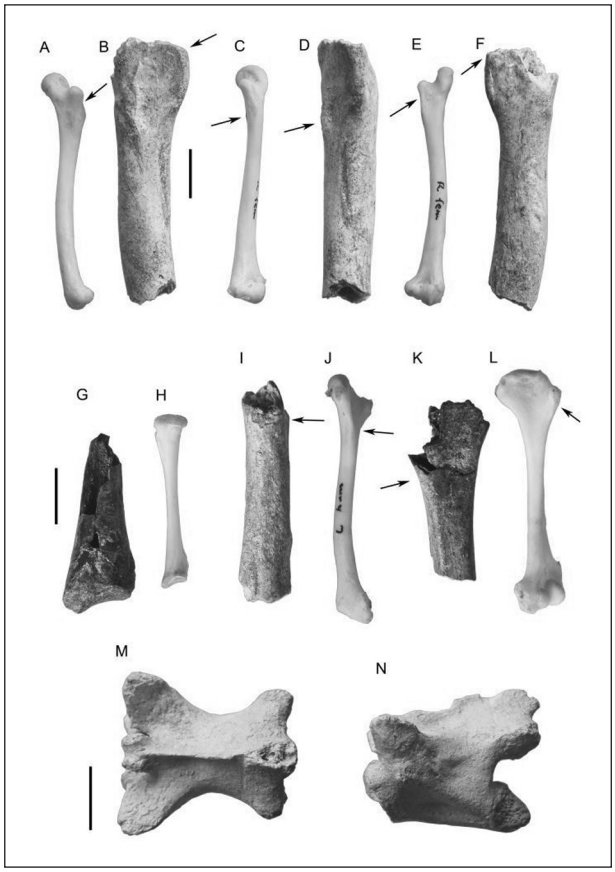

Figure 9. Iguana bones. *Brachylophus vitiensis*, NMNZ 7333 (A, C, E, H, J, L); *Lapitiguana impensa*, ID = 61 (B, D, F), ID = 118 (G), ID = 75 (I), ID = 72 (K), ID = 77 (M, N). Right femur, medial view (A, B); ventral view (C, D); ventromedial view (E, F). Right tibia, cranial view (G, H). Humeri: medial view left (I, J); cranial view of right (K) and left (L). Dorsal vertebra, placement 12 to 15, in dorsal view (M), and left lateral view (N), caudal to right. Arrows point to homologous points in each paired comparison. Scale bars = 10 mm. ID is archaeological, as per Table 2.

Birds

A single bone of the domestic fowl *Gallus gallus* was identified. This species is rare in early Fijian sites but frequently associated with Lapita in Tonga (Burley 2005; Worthy & Clark 2009). The provenance of this particular bone in Layer B1 of the 1981 excavation means that its association with Lapita is likely, but not certain.

Two other species of bird were identified and the pattern of bone breakage was consistent with their being killed and eaten. One was the giant megapode *Megavitiornis altirostris* described from Viti Levu by Worthy (2000). Four certainly identified bones represent at least two individuals. A further femur shaft is probably also of this species but lacks sufficient diagnostic features to be certain.

The only other taxon identified is a large pigeon that

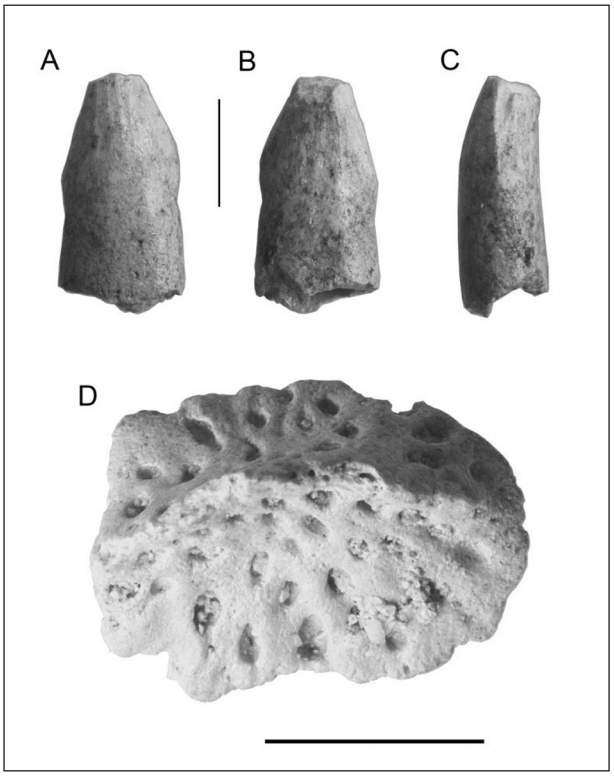

Figure 10. ?*Volia athollandersoni*: A–C tooth, ?right side, A lateral, B, medial, C anterior view; D, scute. Scale bar A–C = 5 mm, D = 10 mm.

does not differ from the extinct large fruit pigeon *Ducula lakeba* of the Lau Group (Worthy 2001). A species similar to, but not certainly the same as *D. lakeba*, was also found in the archaeological site of Kulu Bay on Beqa Island in possible association with Lapita deposits (Worthy & Clark 2009). The available fragments at Naigani are not sufficiently complete to be certain of the species identity as all lack diagnostic ends. However, it is certainly a large pigeon, much larger than the extant *Ducula* species and it is an extinct species.

Disposition of Palaeofaunal Remains

The iguanid and crocodilian bones were found in the main excavation of 2000. Eleven elements of giant iguana were concentrated in six mainly contiguous 1 m^2 units but one (ID 61) came from the spoil heap. Crocodilian remains were found in three adjoining square metre units C3, D3 and D4. All of these finds came from the same occupation surface as dated by six radiocarbon samples. The bones of extinct taxa were found both as oven contents in association with dentate-stamped sherds, very large marine shells and cooking stones, and also in rake-out material from ovens scattered through the cultural zone of Layer C and around the interface of Layers B and C.

THE SIGNIFICANCE OF NAIGANI IN THE LAPITA COLONISATION OF FIJI

A number of issues are discussed including chronology, ceramic history, economy, origins, interactions and settlement. Not considered here is the substantial assemblage of stone adzes and flakes (Best 1981, Carpenter 2002, Turner n.d.), and the numerous artefacts of shell (Best 1981, Carpenter 2002, Kay 1984, Szabo 2010).

Chronology

We estimate a secure age for settlement of Naigani as 2900 calBP. Clark and Anderson (2009) include VL 21/5 among a group of well-dated early Fijian sites which includes Bourewa at around 2950–3050 calBP (Nunn 2007), and Lakeba (Site 196) at 2750–2950 calBP (Best 2002). The Naitabale site on Moturiki Island, may have been established about 2950–2850 calBP at about the same time as Naigani (Nunn & Heorake 2009), although Clark and Anderson (2009) suggest possibly rather later.

Ceramic history

Lapita sites with stylistically early ceramics on Viti Levu and nearby islands include Bourewa, Naigani, Yanuca, Natunuku and Naitabale (Best 2002; Carpenter 2002; Clark & Anderson 2009). However, in terms of vessel form, Naigani still lacks forms known elsewhere. Only one possible flat-bottomed dish with flaring rim and one possible vessel stand have been reported (Best 1981), in contrast to Yanuca and Natunuku, where flat dishes were common. Jars with large appliqué bands on the rims are also absent from both Naigani and Lakeba. It may be the case that some ceramic attributes found in other Fijian sites had already dropped out of the Naigani inventory, or alternatively, their apparent absence or scarcity is a product of the fairly small sample of decorated ware (Carpenter 2002).

After Lapita, there were subsequent episodes of occupation associated with Lapita-derived plainware and carved paddle pottery which are not well controlled archaeologically at Naigani.

Economy

For most Fijian Lapita sites the contribution of terrestrial vertebrates and fish to the diet is largely unknown because middens preserving bones are rare. It may be that midden areas of other sites have not been excavated or taphonomic issues may be involved. Naigani is significant as the only Fijian Lapita site with a bone sample currently able to capture interactions with some extinct taxa.

VL 21/5 was certainly the earliest Lapita site on Naigani Island on the evidence of the impact on local resources. The faunal evidence also supports the general conclusion that Lapita economies in the east were less reliant on

Table 2. *Remains of Palaeofauna. Measurements of elements are given in mm.*

ID	Year	Unit	Layer	Taxon	Element	NISP
60	2000	C3	C	*Lapitiguana impensa*	sR tibia, SW=7.3, SD=5.9	1
61	2000			*Lapitiguana impensa*	sR femur, SW=9.8, SD=9.0	1
71	2000	F3	C	*Lapitiguana impensa*	sR humerus, SW=6.6, SD=6.5	1
72	2000	C4	C	*Lapitiguana impensa*	sR humerus, SW=7.2mm, SD=6.7	1
75	2000	A3	B/C	*Lapitiguana impensa*	sL humerus, SW=8.8, SD=7.8	1
76	2000	C3	C	*Lapitiguana impensa*	vert #9–15	1
76	2000	C3	C	*Lapitiguana impensa*	left side thoracic vert	1
77	2000	B4	C	*Lapitiguana impensa*	vert #12–15	1
118	2000	F3	B/C	*Lapitiguana impensa*	dR tibia, max. width = 14.2, min. width = 8.6	1
131	2000	C4	C	*Lapitiguana impensa*	vert centrum	1
65	2000	E3	B/C	? *Lapitiguana impensa*	?manual phalanx	1
180	2000	C4	B/C	? *Lapitiguana impensa*	pt vertebra	1
76	2000	C3	C	Crocodilian	scute neck region	1
94	2000	D3	B/C	Crocodilian	cranial fragment	1
113	2000	D4	C	Crocodilian	tooth	1
64	2000		C	*Ducula* sp. cf *D. lakeba*	pR radius	1
69	1981	9	C2	*Ducula* sp. cf *D. lakeba*	dL coracoid	1
70	1981	9	C5	*Ducula* sp. cf *D. lakeba*	pR radius	1
73	1981	9	C2	*Ducula* sp. cf *D. lakeba*	sL tibia	1
78	1981	9	B6	*Ducula* sp. cf *D. lakeba*	sL femur	1
124	1981	9	C3	*Ducula* sp. cf *D. lakeba*	sL tmt	1
123	1981	9	C2	Columbid (prob *D. lakeba*	S scapula	
270	1981	9	C2	Columbid (prob *D. lakeba*	sL tibia	1
271	1981	3	B1	*Megavitiornis*	dR tmt	1
272	1981	3	B2	*Megavitiornis*	dL tibia	1
273	1981	4	B4	*Megavitiornis*	d+sL tibia	1
274	1981	4	B4	*Megavitiornis*	L fibula	1
58	1981	3	B2	cf *Megavitiornis*	s femur	
59	1981	2	A5	cf *Megavitiornis*	p phalanx	1
191	1981	14	A3	?*Megavitiornis*	femur	1
63	1981	4	B2	cf *Megapodius* sp.	dR coracoid	1
74	2000	G4	C	cf *Megapodius* sp.	sL tmt	1
68	1981	8	B1	*Gallus gallus*	pR coracoid	1

Notes: Bones are identified as left (L) or right (R) elements which, when prefixed by 'p', 's' or 'd', indicates proximal, shaft or distal parts of elements. Abbreviations for elements include cmc, carpometacarpi; pt, part; quad, quadrates; and tmt, tarsometatarsi.

transported animals for subsistence than those in the west (Best 1984; Burley 2007; Clark & Anderson 2001; Davidson & Leach 2001; Groube 1971). There is no pig or dog bone from Naigani and the single chicken bone was not from the earliest deposit. One possible dog bone was reported in the original assemblage (Best 1981:17) but this identification has been changed. Worthy and Clark (2009) have recently concluded that it is still uncertain when the pig and dog were introduced to Fiji and their absence suggests they played a minor role in Lapita subsistence. This may have led to pressure on the native fauna. The human impact is plain to see at Naigani where the evidence suggests that some taxa were hunted, cooked and eaten including the extinct giant iguana, the giant megapode *Megavitiornis*, a species of large *Ducula* pigeon and, most probably, the endemic crocodilian.

Other faunal remains–not described here–were more typical of Lapita sites and included turtle, fruit-bat, lizard, rat (*Rattus exulans*) and birds. A study of fish bones indicated an assemblage dominated by carnivorous species, which could be unusual for early Lapita sites (Hawkins 2000).

Origins and Interactions

Early Fijian Lapita sites show some diversity, especially in their pottery, but how this is to be explained in terms of diverse origins and/or local diversification remains uncertain. Affinities have been noted in the presence or absence of decorative motifs between Naigani and other sites in Fiji, as well as with the Reefs-Santa Cruz and New Caledonia (Best 1981, 2002; Carpenter 2002; Clark & Anderson 2009), but such comparisons are not resolved.

There are now three small pieces of obsidian known at VL 21/5 from the Kutau source of New Britain (Best 2002; G. Summerhayes pers. comm.). All three pieces were found close together in the site (Square E8 in 2000 and Unit 9 in 1981). Direct transportation of the material would seem most likely–as opposed to down-the-line exchange–which suggests that the settlement of Naigani was close in time to some particular colonisation event in Fiji.

There is evidence for the transportation of temper used in pottery-making to Naigani and Lakeba from sources elsewhere in Fiji (Best 2002; Dickinson 1997, 2001) and these sources were discovered quickly. There are comparable cases in other Pacific islands of extensive and rapid seaborne surveys of quality industrial materials carried out very early in the settlement period, and New Zealand provides another striking case.

It is likely that some of the larger birds and reptiles were hunted on the large island of Viti Levu, 15 km distant, as self-sustaining populations of these species do not seem likely to have been possible on the 2 km² area of Naigani. Certain species of shellfish were probably gathered on Viti Levu, too (Hawkins 2000).

Concluding remarks

At VL 25/1 we have evidence for the initial Lapita occupation of Naigani. While it was possibly not settled directly from Island Melanesia, it was not far removed from such an event. In terms of the radiocarbon evidence it was an early Fijian Lapita site although not as old as Bourewa. In terms of the ceramic evidence it displays what Burley *et al.* refer to as 'ceramics of Western Lapita stylistic aspect' (2010:135), but a couple of pottery vessel forms may have already dropped out which were abundant at other sites.

The scale of settlement was modest–small village or hamlet size–suggesting the arrival of one or two colonising canoes. The early use of widespread resources suggests a mobile population and the likelihood of early contact between contemporary settlements.

Naigani shares many characteristics associated with other Lapita sites in terms of environmental location and the use of economic resources. There is new evidence for the involvement of humans in the extinction of the giant iguana, endemic crocodile, *Megavitiornis* and a species of *Ducula*.

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