Na Koronivalu ni Bā: Upland Settlement during the Last Millennium in the Bā River Valley and Vatia Peninsula, Northern Viti Levu Island, Fiji

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INTRODUCTION

MOST OF THE FIRST WRITTEN ACCOUNTS of western Pacific Island societies dating from the early nineteenth century described endemic intertribal conflict (Campbell 2011; Kirch 2000).[1] On the more mountainous islands, settlements were usually located in defensible locations, typically on hilltops or close to the mouths of caves.[2] This history is alive in oral traditions today throughout the region; in Fiji it is captured in the word *koro*. The word *koro* originally meant hilltop but is today applied to any small or traditional settlement or village, most of which are located along the coast. Its continuing usage recalls the preponderance of hilltop settlements during pre-contact times in Fiji.[3] Abandoned upland settlements are now referred to as *koronivalu* (war-towns) in acknowledgment of their role in past conflict.

Compared to information about the earliest settlement period in Fiji and other western Pacific Island groups, there is a general lack of knowledge about the distribution, age, and function of the old hilltop settlements, although it is widely agreed that most date from the last millennium (Clark and Anderson 2009). In recent years, scientists have conducted studies of hilltop settlements in some Pacific Island groups, although there has been a tendency to focus on the most conspicuous sites rather than building up a picture of entire islands and island groups that would allow for more cogent insights into these questions (Field 2003; Pearl 2004). Even so, there is an emerging consensus around the contemporaneity of the establishment of sites in defensive locations during the last millennium, both across the entire Pacific and subregionally (Field and Lape 2010; Nunn 2007a).

This article reports the results of an extensive survey of inland and upland sites at defensive locations in northern Viti Levu Island (Fiji). The survey encompassed the Bā (formerly Mbā) River valley and nearby Vatia Peninsula (Fig. 1), an area once described as having "the largest concentration of hillforts" in the Fiji Islands (Parry

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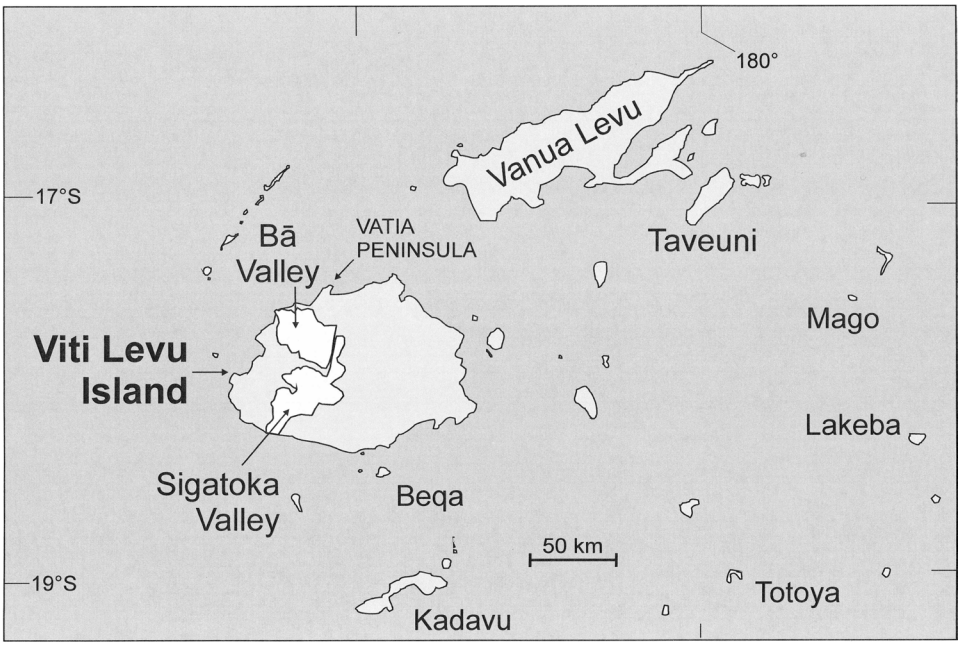

Fig. 1. Map of the Fiji Islands showing the locations of the Bā Valley and Vatia Peninsula, where this study was focused, as well as that of the adjacent Sigatoka Valley in which comparable research has been carried out. (Field 2003; Kumar et al. 2006)

1997:119). In addition to identifying and describing sites from this previously unstudied area, research focused on dating their establishment in order to develop a model of settlement pattern evolution in the last millennium.

PREHISTORIC INLAND AND/OR UPLAND SETTLEMENTS IN THE BĀ VALLEY AND VATIA PENINSULA

From its high-forested interior, the Bā Valley drops through a series of savanna-covered slopes to a broad floor where most of its inhabitants today make their living through a combination of subsistence and cash agriculture. The Bā catchment is some 750 km^2 in area. It meets the sea in the extensive Bā River delta, which is largely covered with mangrove forest, but contains some villages built on sand islands. The Vatia Peninsula lies to the northeast of the Bā delta; it is a high-relief rocky promontory occupied today by only a few people on scattered farms.

The first Europeans to visit the area were bêche-de-mer traders who were active along the coast during the 1840s. Permanent European settlement of the area, underwritten by informal land sales with coastal chiefs, began in 1870. European expansion was retarded for a decade by conflict with inland ("mountain") tribes known deprecatingly as *kaicolo*, or unbiddable persons who occupied *koronivalu* (Ward 1969; Young 1984). Conflict with better-armed coastal tribes and their European allies, the ravages of introduced disease, and conversion to Christianity led to many inland groups resettling in lower, more accessible locations.

Christian missionaries taught these Fijians to devalue their former way of life. As a result, not quite 150 years after many *koronivalu* were abandoned, few people in the Bā Valley and its surrounds know where these settlements were once located. Even fewer are comfortable revealing what is known (rather than pejoratively inferred) of their history. Notwithstanding, we found several key informants in the modern villages of the Bā Valley who identified old settlements more through a knowledge of shell and potsherd scatters than intergenerational oral traditions.

We found seventeen former inland *koronivalu,* none of which had been described before this project, in the Bā Valley, and a further ten on the Vatia Peninsula (Fig. 2). Some of the latter have been described by Parry (1997), but this study found most of these to have been wrongly located and named; the correct locations and names are reported in the present study. Not all *koronivalu* in the area are likely to have been located during this study. The conspicuous gaps shown in Figure 2 may be largely due to the absence of long-established settlements in these areas from which local knowledge could be sourced. The existence of additional *koronivalu* reported by Parry (1997) could not be confirmed.

While there is considerable diversity in the nature of *koronivalu* within the study area, the great majority are located in places with a better-than-average view of the surrounding landscape, indicating their function as places of defense.[4] Most sites are on ridgelines, including all on the Vatia Peninsula (except Matanigāgā) where the topography allows little other option. Others located beneath these ridges were perhaps associated with lookouts (*vale ni yadra*) higher up. Twelve sites (Kāmalu, Matanigāgā, Nailili, Naqara, Naqata, Navinoti, Nayavutū, Qeleiyamacoko, Saravi, Tubabaka, Vatulōlō, Vatusōsoso) are caves and/or rockshelters, all of which except Nayavutū and Vatusōsoso are on the sides of broad valleys with commanding views in two directions. Vatusōsoso is a cave-rockshelter complex on the side of a deep narrow valley and was possibly only a refuge.

While oral traditions regarding the use of these sites are vague, frequently contradictory, and wholly absent in the case of all on the Vatia Peninsula, some valuable insights can be gleaned from their names. Place names often encode the most enduring functional attributes (Olson 1997; Senft 2008). Some names refer to or imply a refuge: Kāmalu means shade; Naqara, cave; Matanigāgā, cave entrance; Nailili, a swinging rope (or vine) used to enter a cave; and Nacule, limestone, a type of rock in which caves are often found. Others refer to specific functions: Koroikewa, a scarp-edge site overlooking almost the entire Bā Valley, means the Kewa hill fort; Nayavutū, the ancestral house-mound (*yavu*); Naveibuli, the (place of) installation of chiefs; Neivilavila, the jumping-off place (of dead spirits); and Vatutāqiri, the ringing rock, possibly a literal reference to a location where an alarm might be sounded to warn of approaching strangers. The name Vatusōsoso means stuffing rock and refers to a tradition, still practiced by persons entering the site today, of stuffing a handful of leaves into a rock fissure to ensure safe passage.[5]

While all sites shown in Figure 2 were described, only nine were subject to more detailed investigation, including excavation and sample analysis (Table 1). Described in alphabetical order below, they include five from the Bā Valley (Koroikewa, Naqara, Nayavutū, Tubabaka, Vatusōsoso) and four from the Vatia Peninsula (Drautana, Matanigāgā, Neivilavila, Vatutāqiri). Following brief site descriptions, results relating to settlement age and subsistence economy are discussed within the broader context of last-millennium settlement changes in the western Pacific Islands.

Fig. 2. Map of the Bā Valley and Vatia Peninsula showing the locations of the twenty-seven *koronivalu* mapped during this study.

Drautana

Located at the terminus of a ridgeline along which the larger Vatutāqiri site is also found, Drautana straddles the only route into this complex site (described below). Drautana is a raised earth mound, as much as 34 m in diameter, surrounded by a rock embankment. At its center, the mound contains a stone cairn identified by local informants as a burial site. Given its location, it seems likely that Drautana was constructed as a gateway to Vatutāqiri, a guard point from which aggressors could be

repelled. In this case, it is likely to have been constructed at the same time as Vatutāqiri or slightly afterwards once potential threats to the latter had either become better known or increased.

A single excavation in an area of dense surface shell scatter revealed a cultural deposit 35 cm thick from which the only stone tool (a Type 2C adze) found on the Vatia Peninsula was recovered. A marine shell from close to the bottom of the cultural layer suggests the site may have been first occupied around A.D. 1320 (Table 1).

Koroikewa

Located on the edge of a scarp dropping a sheer 500–600 m to the north, Koroikewa commands broad views in every direction. At least three house mounds (*yavu*) were found on the mountaintop, as well as scatters of marine shell fragments and potsherds. No unambiguous signs of defense were noted although the site is inaccessible except along a single precipitous route from the southeast.

Excavation revealed a shallow cultural layer containing shells and charcoal. Two unidentified samples were dated; the dates suggest the site was first occupied prior to the last millennium, perhaps as early as A.D. 600 (Table 1). Similar sites along the ridge, including Koroimavua to the west (Fig. 3A), suggest that Koroikewa may have been established as a lookout; subsequent occupants may have valued its natural defensive attributes.

Interestingly, the earliest dates for the occupation of Koroikewa are comparable to those for the upland, inland site of Tatuba in the upper Sigatoka Valley (see Figure 1). The earliest phase of occupation of Tatuba dates between 20 B.C. and A.D. 80 (Field 2004). Since inland settlements predating the last millennium in Fiji are uncommon, these two sites may have had a common or linked function. These sites may plausibly have served as short-term refuges for coastal people traversing Viti Levu Island or as bases for collecting resources from the interior for coastal communities.

Matanigāgā

Matanigāgā is a cave site some 180 m below the large ridge-junction fortified site of Bogikoro, with which it is likely to have been functionally associated (see Figure 2).[6] Even though its interior, principally a chamber 65 m^2 in area and a maximum of ~10 m high, was comparatively small, particular attention was paid to it because it is the only cave occupation found on the Vatia Peninsula. The cave's interior contains scatters of marine shell fragments and potsherds that overlie a cultural layer 60–80 cm thick, which may have begun accumulating as early as A.D. 1440 (Table 1).

Like Neivilavila and Vatutāqiri (described below), it is possible that Matanigāgā cave was used as a refuge by elite individuals or non-combatants.[7] Close to a waterfall, the entrance to Matanigāgā is small and obscured by vegetation. Like many other fortified caves in Fiji having small entrances, the comparative ease of disguising them made them attractive for such a purpose.[8]

Naqara

Naqara is a network of small caves, many containing scatters of marine shell fragments and potsherds, associated with an external (hillslope) occupation. From within the caves, one can exit to both sides of a minor ridge. Recent rockfalls and slopewash

TABLE 1. RADIOCARBON AGE DETERMINATIONS FOR *KORONIVALU* IN THE BĀ VALLEY AND VATIA PENINSULA.

SITE AND SAMPLE NUMBER	LABORATORY NUMBER	SAMPLE MATERIAL	DEPTH (cm)	d^{13} C	CONVENTIONAL RADIOCARBON AGE (B.P.)	CALIBRATED RADIOCARBON AGE (B.P.)	CALENDAR AGE
Drautana							
Drautana (D1)	Wk-28298	marine shell (*Anadara* sp.)	30	1.2 ± 0.2	1011 ± 32	630 – 500	A.D. 1320–1450
Koroikewa							
Nadrugu-35	Wk-25614	charcoal	35	−26.2 ± 0.2	1424 ± 30	1350 – 1180	A.D. 600–800
Korokewa-45 (6770)	Wk-25615	charcoal	45	−25.3 ± 0.2	1047 ± 30	970 – 800	A.D. 98–1150
Matanigāgā							
Matanigāgā (M1)	Wk-26670	marine shell (*Anadara* sp.)	85	1.2 ± 0.2	720 ± 30	450 – 270	A.D. 1500–1680
Matanigāgā (M2)	Wk-26671	charcoal	95	−25.6 ± 0.2	374 ± 30	510 – 310	A.D. 1440–1640
Naqara							
Naqara Cave (N1)	Wk-26673	marine shell (*Gafrarium* sp.)	50	−0.1 ± 0.2	502 ± 30	230 – 0	A.D. 1720–1950
Naqara Cave (N2)	Wk-26674	charcoal	62	−24.2 ± 0.2	307 ± 30	470 – 300	A.D. 1480–1650
Nayavutū							
Nayavutū-80 (6767)	Wk-25612	marine shell (*Gafrarium tumidum*)	80	0.0 ± 0.2	629 ± 33	390 – 130	A.D. 1560–1820
Nayavutū-80a (6777)	Wk-25616	charcoal	80	−24.0 ± 0.2	342 ± 30	460 – 300	A.D. 1490–1650
Nayavutū-90 (6768)	Wk-25613	marine shell (*Anadara* sp.)	90	−0.6 ± 0.2	660 ± 31	420 – 190	A.D. 1530–1760
Nayavutū-90a (6778)	Wk-25617	freshwater shell (*Septaria* sp.)	90	−5.4 ± 0.2	884 ± 31	800 – 680	A.D. 1150–1270
Neivilavila							
Neivilavila (NV1)	Wk-27689	charcoal	20	−26.8 ± 0.2	219 ± 31	310 – 0	A.D. 1640–1960
						230 – 140 (61.9%)	1720–1810 (61.9%)

(Continued)

Tubabaka							
Tubabaka (T60)	Wk-25995	freshwater shell (*Batissa* sp.)	70	−8.5 ± 0.2	747 ± 34	735 − 655	A.D. 1215–1295
Tubabaka (T1)	Wk-26675	marine shell (*Anadara* sp.)	55	−1.3 ± 0.2	609 ± 30	330 − 100	A.D. 1620-1850
Tubabaka (T3)	Wk-28292	marine shell (*Anadara* sp.)	43	−0.9 ± 0.2	635 ± 33	310 − 120	A.D. 1640–1830
Vatusōsoso							
Vatusōsoso (K1)	Wk-26676	marine shell (*Anadara* sp.)	75	−1.2 ± 0.2	616 ± 30	360 − 110	A.D. 1590–1840
Vatusōsoso (K1a)	Wk-26677	charcoal	75	−25.5 ± 0.2	878 ± 30	910 − 720	A.D. 1040–1230
Vatusōsoso (K2)	Wk-26678	charcoal	75	−26.6 ± 0.2	320 ± 30	470 ± 300	A.D. 1480–1650
Vatusōsoso (K2a)	Wk-26679	marine shell (*Anadara* sp.)	75	−0.5 ± 0.2	624 ± 31	370 ± 120	A.D. 1580–1830
Vatutaqiri							
Vatutaqiri (V1)	Wk-26672	marine shell (*Gafrarium* sp.)	55	0.5 ± 0.2	476 ± 30	230 − 0	A.D. 1720–1950
Vatutaqiri (V2)	Wk-28293	charcoal	20	−26.1 ± 0.2	266 ± 35	440 − 140	A.D. 1510–1810
Vatutaqiri (V3)	Wk-28294	marine shell (*Anadara* sp.)	37	0.2 ± 0.2	512 ± 33	230 − 0	A.D. 1720–1950
Vatutaqiri (V4)	Wk-28295	marine shell (*Anadara* sp.)	50	−0.9 ± 0.2	551 ± 31	250 − 0	A.D. 1700–1950
Vatutaqiri (V6)	Wk-28297	marine shell (*Anadara* sp.)	30	0.0 ± 0.2	531 ± 33	230 − 0	A.D. 1720–1950

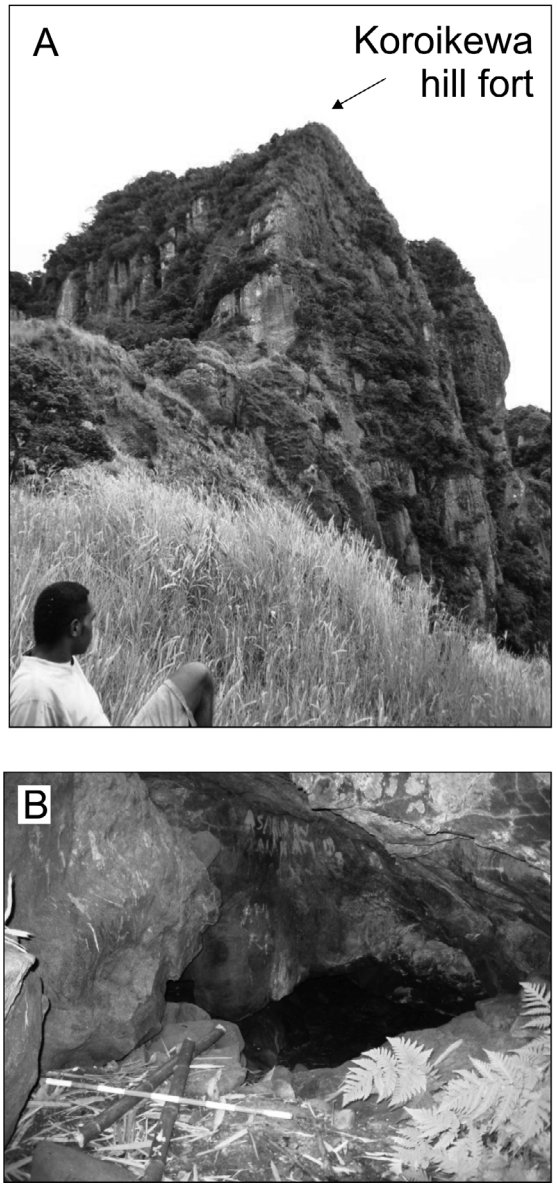

Fig. 3. A. View of Koroikewa. B. Entrance to the cave at Nayavutū (1-m rod for scale).

linked to land-use change and increased incidence of vegetation burning make it difficult to reconstruct the extent of the site.

Owing to the site's sacred (unspecified) associations, landowners would not permit excavation other than auger holes, dated samples from which suggest that the site may have been occupied as early as A.D. 1480 (Table 1).

Nayavutū

Similar in setting to Vatusōsoso (see below), Nayavutū is a cave on the side of a dark forest-covered narrow valley. It is likely to have functioned principally as a refuge.

According to local informants, collapse has changed the nature of the cave entrance, which today is a slit (Fig. 3B) leading to a large chamber some 170 m^2 in area and no more than 2.6 m high. Plausible oral tradition suggests this chamber was once linked to others that are no longer accessible because of roof collapse. The cave floor is covered with shell fragments and potsherds overlying a cultural deposit 80–90 cm thick. A date on a freshwater bivalve found at the bottom of the cultural sequence suggests this cave may have been occupied as early as A.D. 1150 (Table 1).

Neivilavila

Similar to Vatutāqiri (below), the ridgeline site of Neivilavila is elongate and characterized by a series of stone walls that accentuate the already formidable natural defenses of the site (Fig. 4). Excavations and dating focused on the larger, higher Vatutāqiri site rather than Neivilavila, although this is a well-preserved, fortified upland site worthy of further study.

Although obscured today by dense vegetation, Neivilavila comprises four concentric rings of boulder walls within which were found several house mounds. The center of the site is a rock mound some 3 m high, the center of which was flattened to accommodate a single dwelling for an elite personage, according to local informants. The stone walls are well preserved, averaging 1–2 m in height and some 1.5 m wide. The scattered boulders around the site might have been the source of the rock in the stone walls, but it seems more likely that these rock scatters represent materials fallen from stone walls and that the stone used to build the walls was originally carried up from the shoreline, some 30–40 m downslope, where similar boulders abound.

Shellfish remains are scattered across the site as well as many pottery fragments. A single excavation through cultural material yielded no datable material in its lower parts. The sole date for this site is from a shallow hearth feature that may have been formed as early as A.D. 1640 (see Table 1). This is unlikely to approximate the age of site establishment.

Tubabaka

High up the flanks of a broad valley and adjacent to a small tributary stream, Tubabaka is a rockshelter almost 30 m deep and reaching heights of 9.4 m (Fig. 5). Shell fragments and potsherds cover its floor and litter the slopes below. Still used regularly by local people hunting wild pig, it is likely that Tubabaka's original function was as a refuge. Yet, as for Vatusōsoso (below), it is probable that Tubabaka was linked at particular times with other sites, especially along the nearby ridgetop, so may have functioned as part of an aggressor or defensive community.

Several excavations were made revealing a cultural layer 58–70 cm deep. A valve of a freshwater mollusk from a depth of 70 cm was dated; it suggests that this site may have been occupied as early as A.D. 1215 (see Table 1).

Vatusōsoso

At the base of a densely forested narrow valley with a perennial stream, Vatusōsoso is a complex of caves and rockshelters interspersed with house mounds that is marked by scatters of marine shell fragments and potsherds. Some oral traditions remain extant in the meaning of the place name (see above); others tell of former paths that

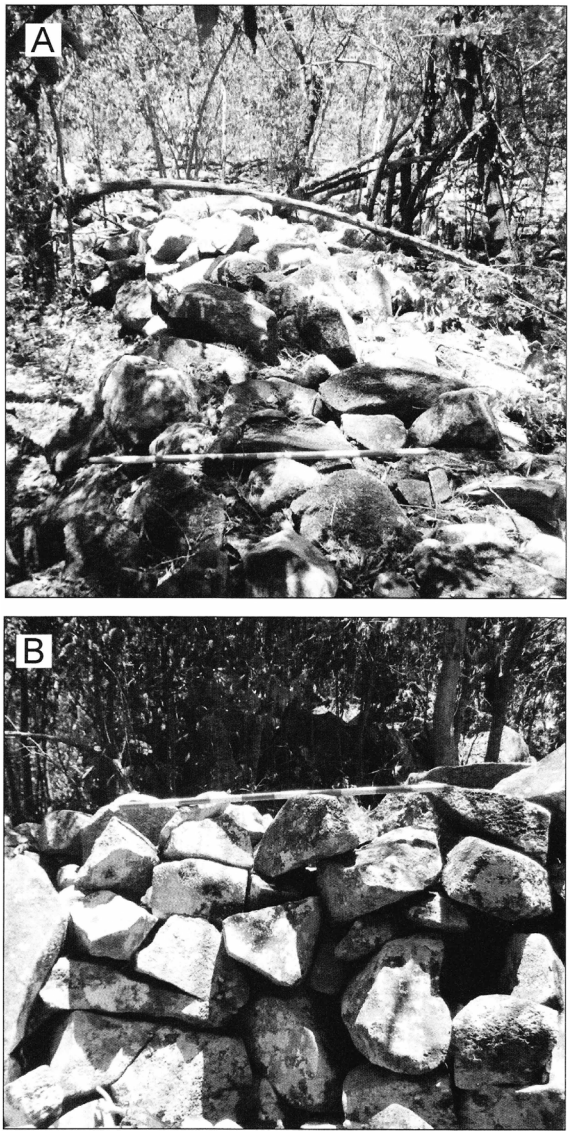

Fig. 4. Two views of rock walls at Neivilavila (1-m rod for scale).

linked Vatusōsoso to the watershed atop the ridge in this area, perhaps only an hour's walk away. This suggests that the site may have been used principally as a refuge, perhaps to hide non-combatants. Excavations were made in various parts of the site and samples taken for dating. The earliest date comes from unidentified charcoal and suggests that occupation may have begun as early as A.D. 1040 (see Table 1).

Vatutāqiri

The largest ridgeline settlement discovered and mapped during this research, Vatutāqiri is an extraordinary place: a series of house mounds and occupation zones stretching

Fig. 5. View of the rockshelter at Tubabaka.

175 m (excluding Drautana, see above) along a steep-sided ridge that is sometimes less than 10 m wide and exhibits relative relief of as much as 80 m (Fig. 6).

The only approach to Vatutāqiri is from the south. It requires passage past Drautana, which suggests this was a gateway site or guard post (see above). Thence one passes along a narrow ridge to a broad, artificial ditch with a single entrance to the main part of the site. As many as seven rings of stone wall were mapped, each following the contours of the site. They surround a circular 25-m^2 summit named Vatuvatuvā.[9] According to oral tradition a house (*sue*) belonging to an unknown chief once stood there.[10] Excavations on the summit revealed a shallow cultural layer and a human burial, which was reinterred (Fig. 7).

As with the stone walls at Neivilavila (above), those at Vatutāqiri represent a huge amount of labour. Yet owing to the greater height of Vatutāqiri, the main part of which is more than 300 m above sea level, the effort involved in transporting boulders, some weighing more than a ton, up the steep slopes from close to sea level to their present positions is extraordinary to contemplate.

As shown in Figure 6, excavations were made in six places on Vatutāqiri, mostly in shallow (<60 cm) cultural deposits, the earliest date coming from a marine shell that suggests the site was occupied as early as A.D. 1510.

AGES OF *KORONIVALU* ESTABLISHMENT: CAVEATS, CONSTRAINTS, AND CONCLUSIONS

Given that extant oral traditions are generally few and vague, dating the establishment of *koronivalu* in the study area can be done effectively only through radiocarbon dating of diagnostic materials close to the base of sedimentary sequences in particular parts of these sites. This involved several challenges. One is that the degree of disturbance of these sediments, from both human and non-human processes, is unknown

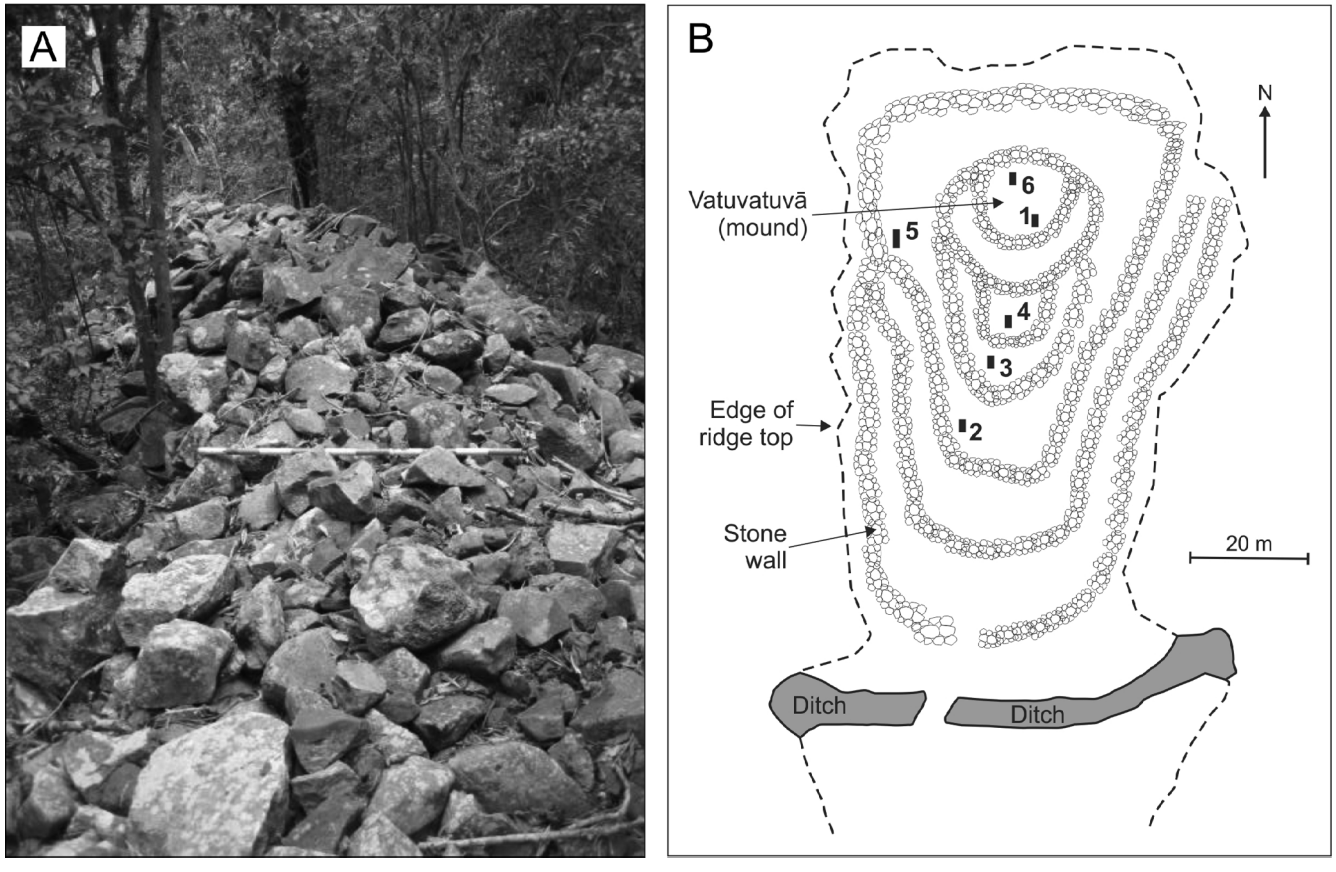

Fig. 6. The *koronivalu* at Vatutāqiri.
A. Example of a rock wall approximately 330 m above sea level (1-m rod for scale).
B. Map of the main part of Vatutāqiri, showing the location of Vatuvatuvā (see Figure 7). (Figure partly based on Parry 1997 : 120)

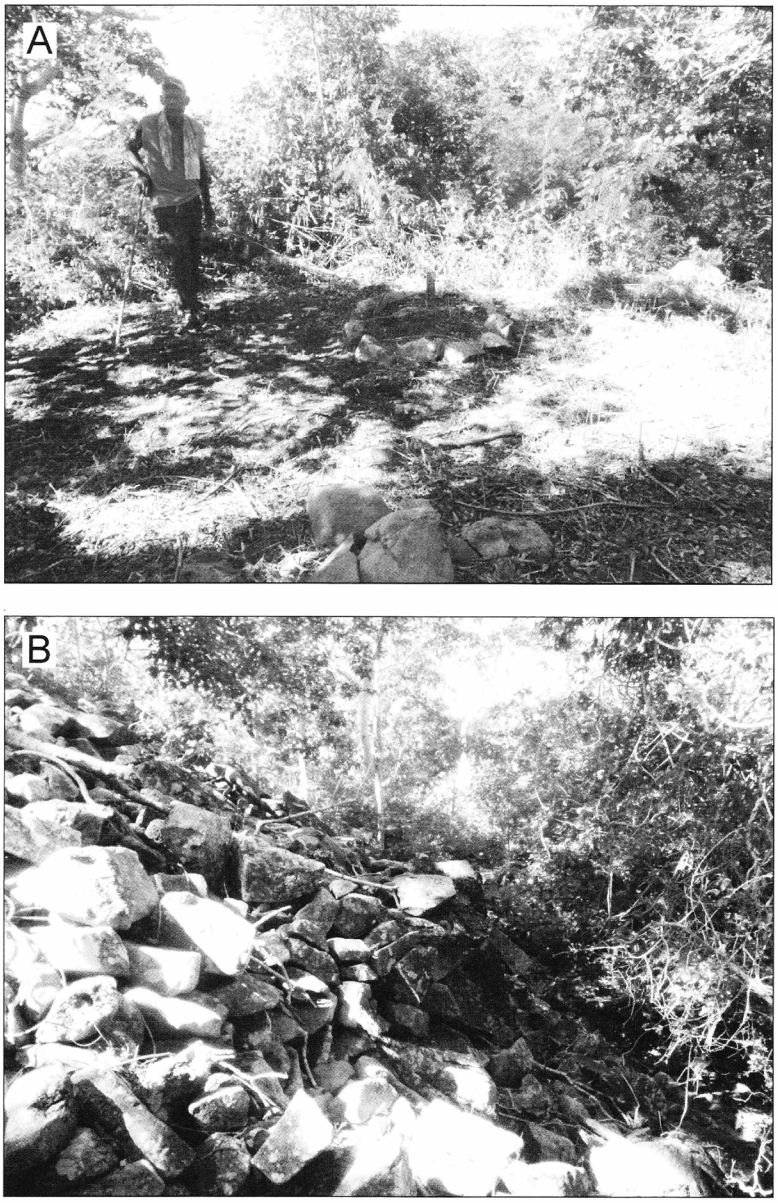

Fig. 7. A. The mound of Vatuvatuvā at the highest point of Vatutāqiri.
B. View of the rock wall that surrounds Vatuvatuvā, the top of which is about 355 m above sea level.

but could potentially mean that the deposits being sampled for dating have been reworked or have had their older parts removed. On the other hand, the materials selected for dating, particularly charcoals, could have reached their present locations without human intervention. If so, their age would be meaningless in terms of settlement history.

There are other issues of concern regarding certain materials used for dating. Many tropical Pacific trees are long-lived, so give radiocarbon ages that can be 100–200 years earlier than the event horizon in which they occur (Allen and Wallace 2007). The dates provided by charcoal alone, as for Koroikewa and Neivilavila, do not engender much confidence since there are no comparative dates from other types of material. Conversely, more faith can be placed in the charcoal dates for Matanigāgā, Naqara, and Nayavutū because they are all consistent with dates from other materials at the same stratigraphic depth (see Table 1). Of the two charcoal dates from Vatusōsoso, the younger is consistent with the two shell dates from the same level, but the older appears anomalous given that it too came from the same depth; it may be a good example of the long-lived wood effect.

All marine shells dated are from genera (*Anadara* and *Gafrarium*) that are preferred for radiocarbon dating because they are suspension feeders and feed in only a single mode (Hogg et al. 1998). In this context, their reliability for age determination is enhanced because of the paucity of carbonate rocks in the study area (Petchey and Clark 2011). This is good reason to consider the marine-shell dates in Table 1 as more reliable than those from either charcoal or freshwater shells.

Freshwater shells (*Batissa* and *Septaria* in Table 1) are generally avoided for radiocarbon age determination because of the significant reservoir effects that are involved in freshwater carbonate precipitation. Most studies of these effects have found that species-specific reservoir corrections that reduce calculated ages by 200–450 years should be applied (Berger and Meek 1992; Culleton 2006), but no such corrections are available for these genera.

With such caveats in mind, it is possible to use the radiocarbon ages in Table 1 to arrive at a plausible framework for the establishment of *koronivalu* in the study area. Calibrated age ranges are shown in Figure 8A, but many of these can be justifiably adjusted or discarded as in Figure 8B for reasons to do with the inherent dependability of the sample materials or because particular ages are not the earliest for a particular site. The vertical black (not grey) bars in Figure 8B therefore represent the most reliable age ranges for site establishment in the study area.

Although the age (as in Figure 8B) for the oldest charcoal sample from Koroikewa may not be an indicator of a human presence there around A.D. 700, it is tentatively regarded as such owing to its comparability to the date of an early occupation phase at Tatuba, which is in a similar location in the adjacent Sigatoka Valley to the south (see above). Of more interest is the cluster of eight ages, dating between A.D. 1200 and 1750, that mark the more widespread establishment of *koronivalu* in the study area. There is no clear chronological distinction between sites in the Bā Valley and on the Vatia Peninsula; both areas seem to have been occupied from the same time. It is possible (as shown in Figure 8B) that an early phase (A.D. 1200–1400) was followed by a later phase (A.D. 1500–1750). This is similar to the chronology for the establishment of most inland settlements in the adjoining Sigatoka Valley that occurred between A.D. 1300 and 1500 (Field 2004; Kumar et al. 2006).

Comparable studies for the establishment of inland settlement in other Pacific Island groups include: Samoa, where mountaintop sites date from A.D. 1300–1500 (Green 2002; Pearl 2004); high islands in Micronesia, where fortified hilltop sites were constructed in the period A.D. 1300–1500 (Rainbird 2004); the isolated Rapa Island in the southeast Pacific, where hill forts began to be established around A.D. 1500

(Kennett et al. 2006); and East Timor, where, despite a few earlier dates, most hill forts were established during the mid-fifteenth century (Lape and Chao 2008).

DISCUSSION

There is no direct evidence about where people in the Bā Valley and its surrounds may have lived prior to the establishment of the *koronivalu* described above. It is reasonable to suppose that they lived along the island's coast and were dependent largely on foods obtained from nearshore marine (reef–lagoon) environments as well as from coastal lowlands (Carson 2011; Clark and Anderson 2009; Szabó and Amesbury 2011). The reason for the lack of evidence may have to do with the dynamism of these environments, especially around the sediment-choked mouths of large rivers like those in the Bā Delta along the fringes of which mangrove forest probably spread considerably during the last millennium (Nunn 2005).

As elsewhere in the Pacific region, the shift from coastal to upland settlement that occurred during the fourteenth and fifteenth centuries was abrupt and represented a profound change in tropical Pacific Island societies, which had been effectively coastal since their inception. It has been widely acknowledged that this change in settlement pattern was a response to the increased threat or incidence of conflict rooted in increased competition for food resources, the available supply of which had dropped sharply relative to demand (Field and Lape 2010; Nunn 2007a).

The fact that all *koronivalu* described from the Bā Valley and Vatia Peninsula are in either defensive or refuge locations, most of which are equally suited to function as bases from which attacks could be launched, supports the idea that their establishment was linked to increased conflict. Questions remain around whether these *koronivalu* were initially permanent settlements or were occupied only when persons who usually resided in more vulnerable locations were threatened by increased conflict (Robb and Nunn in press). There are also questions around how such functions may have changed during the course of the occupation of *koronivalu*.

The presence of marine-shellfish remains dating from the time of occupation of all *koronivalu* studied might suggest that they were indeed used by coastal dwellers only in times of danger because it seems unlikely that people living permanently in such places would have undertaken such long journeys to the coast to collect shellfish. However, few other foods may have been available in these inland areas, at least initially to people otherwise accustomed to plentiful marine foods in their diets (Robb and Nunn in press). More telling is the human effort involved in creating fortifications, particularly those at Vatia Peninsula sites such as Bogikoro and Vatutāqiri, which suggests that their occupation was long term. Most plausible is a scenario in which the early period of *koronivalu* occupation was sporadic, changing into permanent or long-term occupation later on.[11]

If the establishment ages of hill forts across widely separated Pacific Island archipelagoes are indeed similar, an ultimate and region-wide cause of fortification is required rather than an explanation (such as increased population pressure on food resources) confined to a single island group (Kirch and Rallu 2007). Such an ultimate cause of societal change is likely to be linked to climate change (Lape and Chao 2008; Nunn 2007a). Two mechanisms have been suggested. The first supposes that climate variability, as measured by the frequency of El Niño events, led to increased drought severity, duration, and/or incidence (Field and Lape 2010; Lape and Chao 2008).[12]

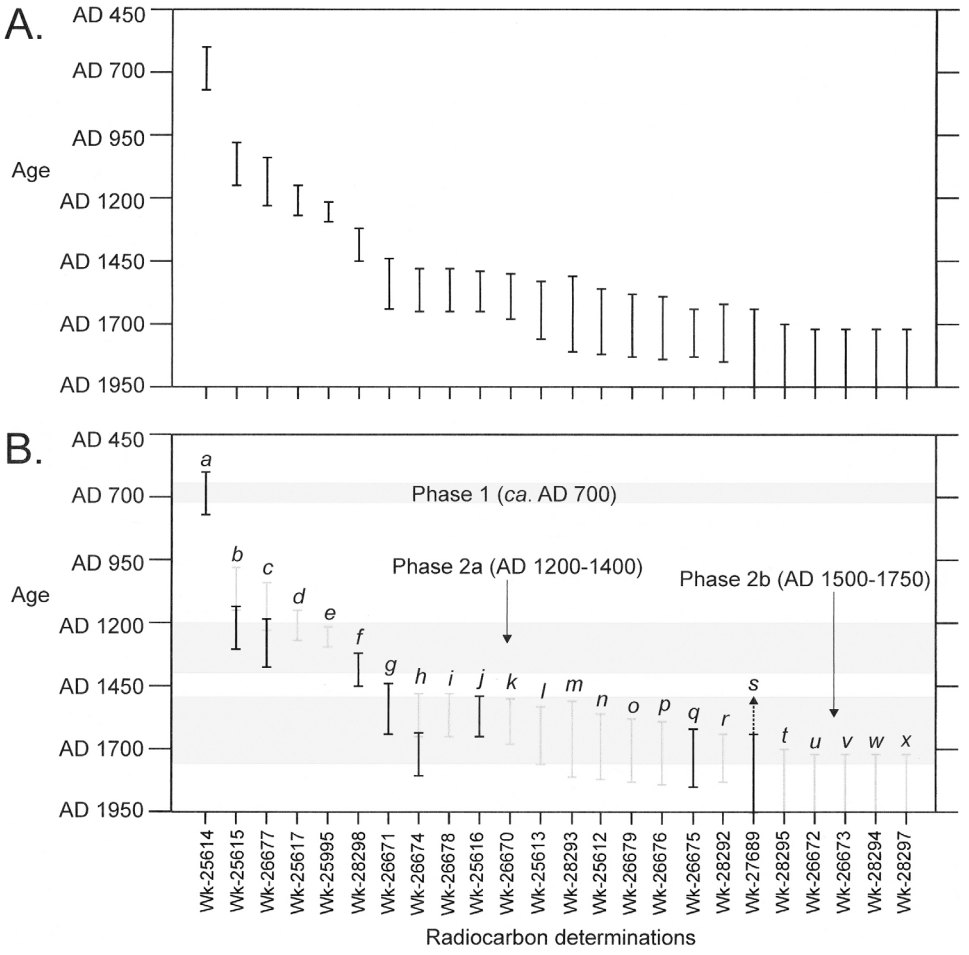

Fig. 8. Radiocarbon ages for *koronivalu* in the Bā Valley and Vatia Peninsula.
A. Calibrated radiocarbon ages (from Table 1).
B. Adjusted ages for the establishment of *koronivalu* (black lines) distinguished from other ages (gray lines). Adjustments were carried out for each date as follows:
a—(Koroikewa) earliest age for site, possibly not indicator of human presence, possibly age for early phase indicative of sporadic first millennium A.D. occupation;
b—(Koroikewa) age for later occupation phase from unknown charcoal, reduced by 150 years to account for inbuilt age (new age, A.D. 1130–1300);
c—(Vatusōsoso) earliest age for site, reduced by 150 years to account for inbuilt age (new age, A.D. 1190–1380);
d—(Nayavutū) earliest age for site, discarded because of unknown age reduction needed because of use of freshwater shell in favor of *j*;
e—(Tubabaka) earliest age for site, discarded because of unknown age reduction needed because of use of freshwater shell in favor of *q*;
f—(Drautana) earliest age for site, reliable marine-shell sample;
g—(Matanigāgā) charcoal date, assumed not to be from old wood as any reduction in age would render it younger than the reliable marine-shell date in a younger stratigraphic context, not adjusted;
h—(Naqara) earliest age for site, reduced by 150 years to account for inbuilt age (new age, A.D. 1630–1800);
i—(Vatusōsoso) age not regarded as site earliest, see *c*;
j—(Nayavutū) charcoal date, assumed not to be from old wood as any reduction in age would render it younger than the reliable marine-shell date in a younger stratigraphic context, not adjusted;
k—(Matanigāgā) age not regarded as site earliest, see *g*;
l—(Nayavutū) age not regarded as site earliest, see *j*;

Fig. 8 (cont.)

m—(Vatutāqiri) date assumed not to refer to earliest occupation because of reliable earlier age for linked site of Drautana, see *f*;
n—(Nayavutū) age not regarded as site earliest, see *j*;
o—(Nayavutū) age not regarded as site earliest, see *j*;
p—(Vatusōsoso) age not regarded as site earliest, see *c*;
q—(Tubabaka) earliest reliable age for site, not adjusted;
r—(Tubabaka) age not regarded as site earliest, see *q*;
s—(Neivilavila) sample from hearth close to surface of cultural layer, not considered age for site establishment, shown as minimum age;
t—(Vatutāqiri) date assumed to refer not to earliest occupation because of reliable earlier age for linked site of Drautana, see *f*;
u—(Vatutāqiri) date assumed to refer not to earliest occupation because of reliable earlier age for linked site of Drautana, see *f*;
v—(Naqara) age not regarded as site earliest, see *h*;
w—(Vatutāqiri) date assumed to refer not to earliest occupation because of reliable earlier age for linked site of Drautana, see *f*;
x—(Vatutāqiri) date assumed to refer not to earliest occupation because of reliable earlier age for linked site of Drautana, see *f*.

The second argues that sea-level fall in A.D. 1250–1350 radically reduced coastal (offshore and onshore) food productivity (Nunn 2007*a*, 2007*b*). Both mechanisms could conceivably have led to food crises for coastal dwellers, the outbreak and increased incidence of conflict, and the abandonment of settlements in exposed coastal locations in favor of those in defensible inland sites. Both mechanisms, which are not mutually exclusive, could have led ultimately to the establishment of *koronivalu* in the Bā Valley and on the Vatia Peninsula.

CONCLUSION

Comparatively little is known about the history of the few centuries prior to European contact in western Pacific archipelagoes such as Fiji, which continues to frustrate interpretations of post-contact history. This paper has shown that the outline of this period of history can be reconstructed using geoarchaeological methods. It suggests that the "endemic" warfare witnessed by many early visitors during the first part of the nineteenth century in particular is likely to have commenced only 500–600 years earlier, plausibly as a result of the effects of rapid climate change on food resources.

This conclusion supports the growing realization of the important role of extraneous forcing of societal change during the prehistory of Pacific Islands (Anderson 2009; Nunn 2012; Seeto et al. 2012) and underscores the much-touted vulnerability of island communities to such forcing in more recent times and for the foreseeable future (Barnett 2011; Lewis 2012; Nunn 2009).

There are many more questions about the last-millennium histories of Pacific Island countries that can be answered only by more in-depth research of the kind described in this article.

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NOTES

1. The appearance of fortified inland sites on many Pacific Islands around the middle of the last millennium "illustrate the late occurrence of endemic warfare on a supra-community scale" (Green 2002:146). An 1840 account of Totoya Island in Fiji found its inhabitants "to be constantly at war, and are obliged to reside on the highest and most inaccessible peaks, to prevent surprise and massacre" (Wilkes 1845:145).
2. Examples are the '*olo* (cognate with Fijian *koro*) of the Samoan archipelago, described in 1839 as "usually on the top of some high rock, or almost inaccessible mountain, where a small force could protect itself from a large one" (Wilkes 1845:151) and their counterparts in Fiji "perched curiously on the apex of rocky pinnacles, a position singularly secure from invasion" (Britton 1870:55).
3. Personal communication, Dr. Paul Geraghty, 28 February 2012.
4. A comparable study from the Yasawa Islands of western Fiji reached the same conclusion (Smith and Cochrane 2011).
5. Most translations of place names in this paragraph were provided by Dr. Paul Geraghty.
6. Parry (1997:121) shows a detailed reconstruction of the Bogikoro site, which he erroneously named Drautana.
7. Neivilavila and Vatutāqiri contain single house mounds at their highest points, interpreted as refuges for elite people whom the occupants of the *koronivalu* were determined to protect from aggressors.
8. The author heard oral traditions about three other caves in Fiji he visited that tell of cave entrances (and/or side chambers) having been sealed to conceal the presence of people within. Two of these caves are named Osonabukete; one is near Nasaqalau Village on Lakeba Island in the Lau Group (eastern Fiji), the other near Naitauvoli Village in Wainimala district on Viti Levu Island. The author penetrated 1.2 km into the third such cave, Volivoli Cave, which is above the village of the same name on the south coast of Viti Levu Island.
9. Parry (1997:120) identified the entire site (Vatutāqiri) as Vatuvatuvā, which all local informants said was incorrect. Their preferred names are followed in the text.
10. The unknown chief is characterized as *dua*, literally "a tribal [*yavusa*] chief from olden times," implicitly one whose bloodline is not certainly known today.
11. A similar situation was envisaged for Lakeba Island in eastern Fiji in which the establishment and initial episodic occupation of hill forts within 500 m of the coast occurred around A.D. 1300 and was followed in the period A.D. 1450–1750 by more prolonged occupation of these sites and others throughout the island (Best 2002).
12. Droughts are always potentially more damaging to island societies than those on larger landmasses, although major prehistoric societal changes along the Pacific coast of South America are attributable to prolonged droughts (Dillehay and Kolata 2004).

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ABSTRACT

Former settlements, now abandoned, are found in inland upland locations on many larger islands in the tropical Pacific. In Fiji, such settlements are known today as *koronivalu* (war-towns) and, as elsewhere in the region, appear to have been established within the same period during the first half of the last millennium. Twenty-seven *koronivalu* were mapped for this research in the Bā Valley and nearby Vatia Peninsula, northern Viti Levu Island (Fiji); of these, nine were subject to detailed investigation. All *koronivalu* are in defensible locations, either with exceptional views across the surrounding landscape or hidden within deep narrow valleys. At all *koronivalu*, evidence for the consumption of marine shellfish was found, even though the sites are often far from the coast. Twenty-four radiocarbon ages from charcoal and shellfish remains were obtained. A

single age around A.D. 700 from the farthest inland site (Koroikewa) appears anomalous. The remainder, once adjusted, suggest that most *koronivalu* in the study area were established A.D. 1200–1750, perhaps separable into early (A.D. 1200–1450) and later (A.D. 1500–1750) phases. While questions remain about the functions of these *koronivalu,* the fact that, as elsewhere in Fiji and in other western Pacific Island groups, they appear to have been established within the same period suggests that there is a region-wide explanation for the profound settlement-pattern change this implies. Climate change, perhaps expressed through drought and/or sea-level change, appears the only plausible external forcing mechanism. KEYWORDS: Pacific Islands, Fiji, hill forts, settlement pattern, marine subsistence, climate change.