NEW ZEALAND
ARCHAEOLOGICAL
ASSOCIATION

ARCHAEOLOGY IN NEW ZEALAND

THE EMERGING PATTERN OF EARLIEST HUMAN SETTLEMENT IN FIJI: FOUR NEW LAPITA SITES ON VITI LEVU ISLAND

Roselyn Kumar[1], Patrick D. Nunn[2] and William R. Dickinson[3]
[1]Institute of Applied Sciences, The University of the South Pacific, [2]Department of Geography, The University of the South Pacific, [3]Department of Geosciences, University of Arizona

Introduction

In the course of fieldwork, archaeological and geological, on Viti Levu Island, the largest in the Fiji group (Figure 1), we have made several surface collections of potsherds from sites where none had been recorded before. At four locations (Figure 1) these collections were found to include sherds with dentate-stamped designs characteristic of the Lapita people, the earliest-known inhabitants of the Fiji Islands. This paper reports briefly on the four sites, examining their relationships to other sites, before commenting on the implications for the emerging pattern of Lapita settlement on Viti Levu.

Site 1: Qaqaruku rockshelter, northeast Viti Levu

As previously reported by Kumar (2002a) and Nunn *et al*. (2003) a single dentate-stamped sherd was found in December 2001 on the floor of the Qaqaruku rockshelter, some 150 m northeast of the inland village Naivoco (Figure 2). The find was unexpected in the sense that there was no previous report of early ceramic-making peoples in this area and that our collection was made only because we were so surprised to have found the floor of this shallow rockshelter covered with so many potsherds.

From the mountains above Qaqaruku the islands offshore eastern Viti Levu where Lapita sites were established (Moturiki, Naigani, Ovalau) are clearly visible, which may be one reason for supposing their occupants to have been linked with those at Qaqaruku. In order to test this, the sand temper of the Qaqaruku dentate-stamped sherd was analysed.

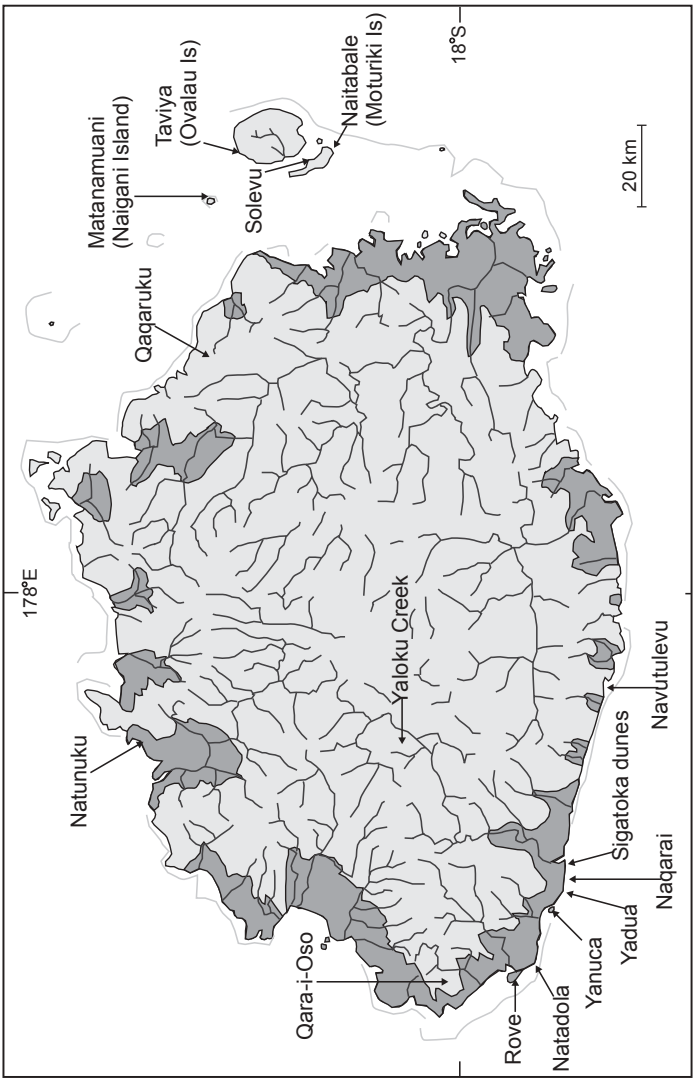

Figure 1. Map of Viti Levu Island and islands off the east coast showing the main features and the locations of the newly-discovered Lapita sites (at Qaqaruku, Navutulevu, Yadua and Rove). Coastal lowland is shaded. The other Lapita sites were all identified either in the compilation by Clark and Anderson (2001) or by Nunn et al. *(2003).*

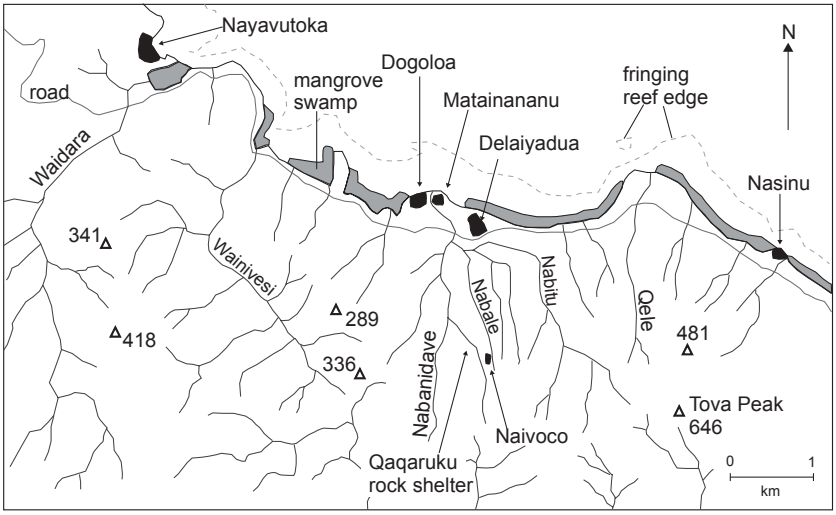

Figure 2. The location of the Qaqaruku rockshelter site, northeast Viti Levu (after Kumar, 2002a).

Temper analysis involves the identification of the mineral composition of the sand fraction in a thin section of the potsherd. Many different ratios of particular minerals have been used to determine the (likely) provenance of particular pieces of pottery in the tropical Pacific Islands. For example, temper analyses of sherds from the Toaga site in the Manua Islands of American Samoa showed that they were all made on the islands, none even imported from nearby Tutuila Island, where the source material could be distinguished mineralogically from those on the Manua Islands (Dickinson 1993). In contrast, potsherds found on the southern atolls of Tuvalu, where the raw materials for making pots are absent, were shown by temper analysis to have come from the north coast of Viti Levu Island in Fiji (Dickinson *et al*. 1990).

The Qaqaruku site where this sherd was collected is an inland site, and the sherd temper showed characteristically subrounded and poorly-sorted grains. This suggests that the pottery was made locally using river sands. An additional factor that supports this interpretation is that there are no calcareous particles in this temper, which would be expected had it been made from beach sands. Beach sands are also well-sorted and composed of well rounded particles compared to river sands. Beyond that, however, it is not possible to say where the sherd was made. The Qaqaruku site lies close to the boundary between the Tova Andesite and the Nakorotubu Basalt which cannot be distinguished in sand tempers because

of the dominant clinopyroxene and plagioclase present in both lithologies (Dickinson 2002a).

The implications of the discovery of an inland Lapita site in northeast Viti Levu are similar to those associated with the discovery of a site in an analogous location in southwest Viti Levu by Anderson *et al*. (2000). This site, Qara-i-Oso II, is also 2–3 km inland and located some 200 m above sea level, with commanding views over the coast and coastal plain. The discovery of these two inland sites demonstrates that the Lapita people were clearly not averse to occupying sites away from the shore, and poses the question as to how many more sites there might be in such locations, and when and why they were occupied (Kumar 2002a).

Site 2: Navutulevu Village foreshore, south coast Viti Levu

Navutulevu is a large village seaward of the main coastal highway on the south coast of the island. It is enclosed in a structural embayment into which waves, commonly driven by the southeast tradewinds, are focused. One result of this is that, notwithstanding the protective effect of the offshore reefs, the front of the village is eroding and currently forms a cliff 3–4 m high, in which RK found a dentate-stamped sherd in March 2002.

It is no surprise to find evidence for a Lapita presence at Navutulevu, although this represents the easternmost such evidence yet obtained from the island's south coast. Part of the reason for this lack of evidence may be that the huge amounts of sediments deposited along the south coast by the large rivers that drain the southeast (windward) side of the island may have obscured the evidence.

Site 3:Yadua Village foreshore, southwest Viti Levu

The village Yadua is one of the largest on the south coast of Viti Levu, occupying an alluvial-marine promontory 2–3 m above mean sea level extending outward towards the southeast (Figure 3). Facing windward, there is a long history of shoreline erosion at Yadua and it is likely that the dentate-stamped sherd found here by RK in June 2002 was eroded out of the sandy promontory. There is also the possibility that it was carried from an inland area down the Yalasuna River but we consider this less likely.

The temper of the Yadua sherd was also analysed in thin section. Like the Qaqaruku sherd (see above) the absence of calcareous grains in the temper of this sherd suggests that it was made using quartzose river sand rather than beach sand. This interpretation is supported by the observation that the sand particles are subrounded to subangular. The rocks from which these river sands derived are certainly those igneous rocks found in southern Viti Levu. Dickinson

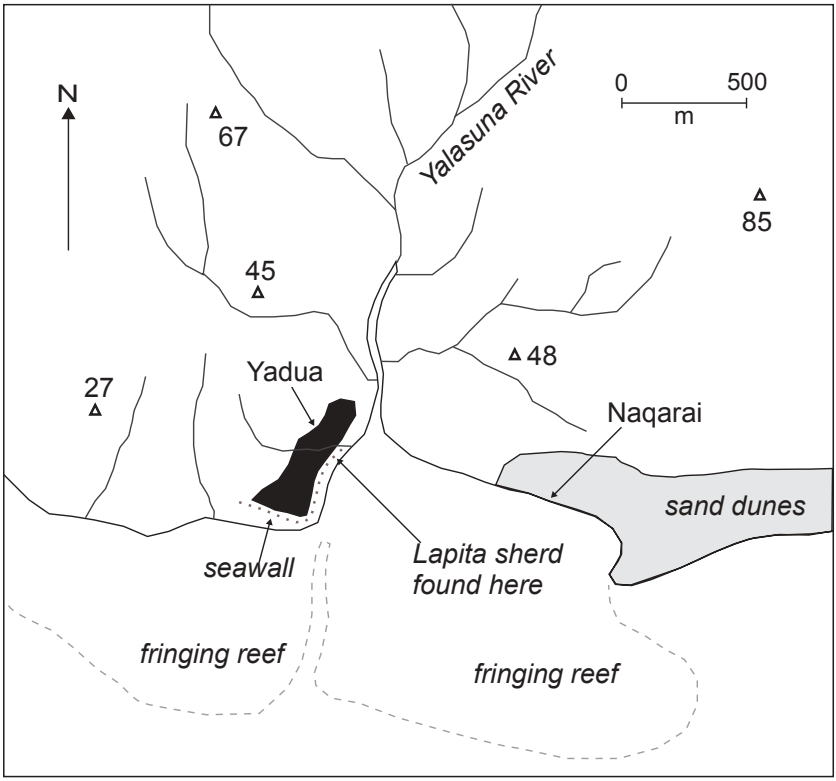

Figure 3. The location of the Yadua site, southwest Viti Levu, in relation to the Naqarai Lapita site and the Sigatoka sand dunes. Spot heights in metres are shown.

(2002b) does not favour the manufacture of this sherd from Yalasuna River sands because there is no material in it which could be linked to the Cuvu Formation (limestone and marl) exposed in the lower Yalasuna valley.

More interesting is the relationship of the Yadua temper to the tempers of Lapita sherds analysed by WRD from the Lapita sites immediately to the east, at Naqarai and the Sigatoka Sand Dunes, and to the west, at Yanuca (Figure 1). There are no similarities between the mineralogy of the Yadua sherd and those analysed from Lapita times at either Naqarai or the Sigatoka Sand Dunes. Rather, the Yadua sherd is indistinguishable from the Lapita sherds recovered from the Yanuca site.

Several mineralogical criteria using proportions of common minerals like quartz, feldspar and pyroxene were used by Dickinson (2002b) to reach this conclusion. First the QF index of 86, the Q/F index of 59, and the P/F index of 82 for the Yadua sherd are very close to the values of 85±4, 58±5 and 79±4 for the six Yanuca sherds analysed. Secondly, the types of hypabyssal and felsitic igneous rock fragments in the Yadua sherd are "quite familiar" from Yanuca tempers (Dickinson 2002: 2).

What this temper analysis means is that the people who were manufacturing pots during Lapita times at the mouth of the Sigatoka River (including Naqarai) using locally available materials did not make the Yadua Lapita sherd. This is likely to have been made locally within the southwest part of Viti Levu, perhaps at Yanuca, although it is not possible to distinguish a sherd made there from a sherd made using river sand in several other rivers in southwest Viti Levu (Dickinson, 2002b).

Site 4: Rove foreshore, southwest Viti Levu

Rove is the name given to a straight stretch of beach some 5 km west of Natadola. Natadola is where a Lapita sherd was collected by Palmer (1965), a record accepted as authentic by Clark and Anderson (2001) in their critical survey

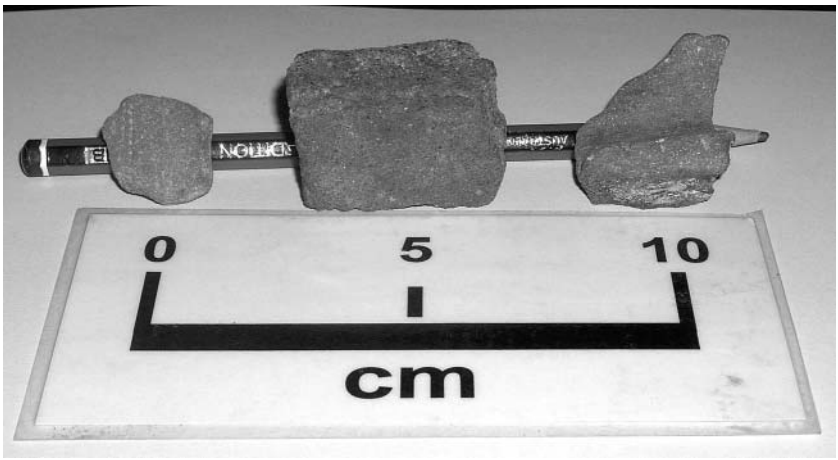

Figure 4. Dentate-stamped potsherds from the Rove site. The left sherd is a body sherd with lines of dentate stamping. The centre one is a vertical (top-down) view of a rim with three lines of dentate stamping. The right one is a notched rim.

of Fiji Lapita sites. Although facing southwest, the Rove site is eroding and numerous slump blocks mark the 2 m cliff at the back of the beach. The coastal plain at this location is highly sandy and occupied by sugar-cane fields. All three dentate-stamped sherds (Figure 4) found at Rove were found by RK along the shoreflat at low tide on separate visits in February and August 2002.

Sigatoka Valley sites

A ^{14}C date on a sample obtained in 2000 from a charcoal band in river terrace sediments about 42 km up the Sigatoka Valley gave a calibrated age of 5579–5052 cal yr BP (3629–3102 BC) (Nunn *et al*. 2001, recalibration by Kumar 2002b). This has been interpreted as a product of a pre-human fire, perhaps associated with a prolonged dry period caused by a mega El Niño event. It shows the ability of natural processes to produce charcoal bands, at least on an island like Viti Levu, without human assistance.

Following the reporting of this date, a new project to investigate alluvial charcoals in the Sigatoka valley region was undertaken. Dates were obtained on samples from several sites (Nunn and Kumar n.d.) but the most interesting were from Yaloku Creek, 40 km in a straight line from the Sigatoka River mouth (Figure 5). Calibrated ages of 2917–2350 cal yr BP (967–400 BC) for a conspicuous charcoal concentration near the base of a 7–8 m section of alluvial-colluvial sediments support a scenario in which the original vegetation of this area burned, producing the charcoal and destabilizing the landscape leading to the accumulation of the overlying sediments. The dates show that this event could clearly have taken place during the Lapita era.

More recent unpublished work by Julie Field (University of Cambridge) focused on cultural occupations of some of the limestone caves in the Sigatoka Valley. The oldest occupation dated was in Tatuba Cave (Figure 5) at 1993±35 BP (calibrated to 90 BC–AD 120) which, while post-Lapita, is surprisingly old for a site so far (65 km) inland. This date may be taken to confirm the evidence from Yaloku Creek that the earliest inhabitants of the southwest coast of Viti Levu did occasionally travel along the Sigatoka Valley. We speculate that this was to explore the area's natural resources, perhaps even to traverse the island to visit north-coast settlements, rather than to settle permanently.

Discussion and Conclusions

It is possible to interpret the Lapita-era dates from Yaloku Creek as an indicator of burning by humans. This interpretation, combined with the early occupation date from Tatuba Cave, could be taken as meaning that the earliest settlers of this part of Viti Levu did not confine themselves to the coast, as most writers have assumed, but regularly moved along the Sigatoka Valley, perhaps

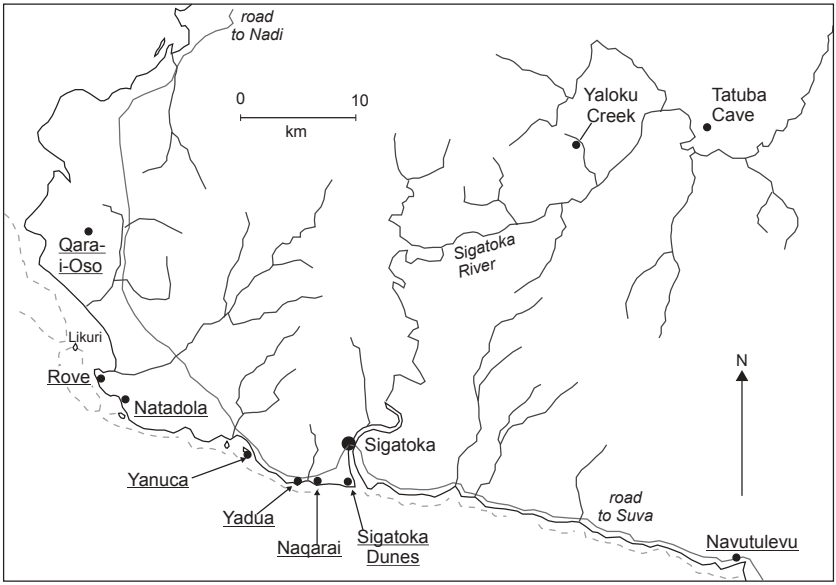

Figure 5. The known pattern of Lapita sites in southwest Viti Levu. Names of Lapita sites are underlined. Note that there is also evidence for Lapita-era burning at Yaloku Creek and that the earliest cultural layer at Tatuba Cave dates from 1993±35 BP.

with the goal of exploiting its resource potential and/or using it to traverse the island and visit communities on the north coast. In this context, the existence of slightly inland Lapita sites at Qara-i-Oso II (Anderson *et al*. 2001) and Qaqaruku (see above) might be significant. Such inland sites might mark the transitory stage between early times when settlement was exclusively coastal and later (Lapita?) times when settlement was both coastal and farther inland. The model in Figure 6 shows how early Lapita settlement was exclusively coastal but then, perhaps as population increased or natural disasters made coastal communities realise their vulnerability, settlements began to move slightly inland. Later, as cross-island trading networks became more important and people became more familiar with the exploitation of inland resources, some settlements may have been founded farther inland. These changes may have been a result of population pressure on coastal resources, the development of a more complex trading network, or displacement of coastal communities by natural disasters such as tropical cyclones. Clearly more information is needed to test such ideas.

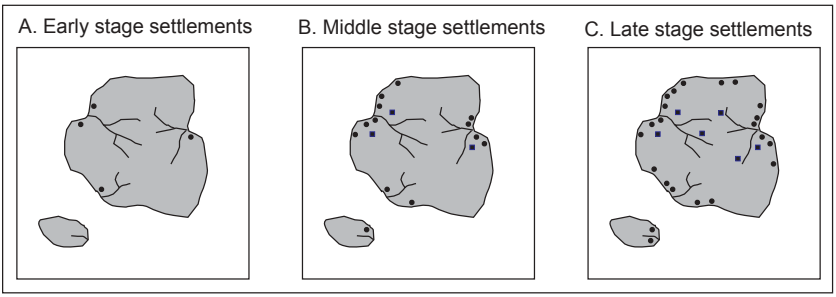

Figure 6. Simple model showing the possible development of Lapita settlement in Fiji. Circles represent coastal settlements, squares represent inland settlements.

With accelerating sea-level rise and the associated erosion of many soft-rock Pacific Island coasts, the visibility of ancient (Lapita) settlement sites is likely to rise. The kind of research we have carried out is important because there is a danger that otherwise knowledge of ancient settlements will be lost forever.

Acknowledgements

We are grateful to the landowners of the various sites mentioned for permission to collect pottery, and to Sepeti Matararaba (Fiji Museum) for help in identifying particular decorative styles. Thanks too to Julie Field for giving us permission to cite her unpublished dates and interpretations from Tatuba Cave.

References

Anderson, A., G. Clark and T. Worthy, 2000. An inland Lapita site in Fiji. *Journal of the Polynesian Society*, 109: 311–316.

Clark, G. and A. Anderson, 2001. The pattern of Lapita settlement in Fiji. *Archaeology in Oceania*, 36: 77–88.

Dickinson, W.R., 1993. Sand tempers in sherds from the Toaga site. In P.V. Kirch and T.L. Hunt (eds.), *The Toaga Site: Three Millennia of Polynesian Occupation in the Manua Islands, American Samoa*, 151–156. University of California, Berkeley.

Dickinson, W.R., 2001. Petrography and geologic provenance of sand tempers in prehistoric potsherds from Fiji and Vanuatu, South Pacific. *Geoarchaeology*, 16: 275–322.

Dickinson, W.R., 2002a. Petrography of sand temper in a Lapita sherd from Qaqaruku Rockshelter in Ra (NE Viti Levu, Fiji). Petrographic Report WRD–213.

Dickinson, W.R., 2002b. Petrography of sand temper in a Lapita sherd from Yadua Village, west of Sigatoka Dunefield (SW Viti Levu, Fiji). Petrographic Report WRD–216.

Dickinson, W.R., J. Takayama, E.S. Snow and R. Shutler, 1990. Sand temper of probable Fijian origin in prehistoric postsherds from Tuvalu. *Antiquity*, 64: 307–312.

Kumar, R., 2002a. Discovery of a Lapita sherd inland of the northeast coast of Viti Levu Island, Fiji: insights and implications. *The University of the South Pacific, Institute of Applied Sciences Technical Report 2002/5*.

Kumar, R., 2002b. Location, age and significance of charcoal in alluvial-colluvial sediments, Sigatoka Valley, Viti Levu Island, Fiji. *The University of the South Pacific, Institute of Applied Sciences Technical Report 2002/6*.

Lepofsky, D., 1988. The environmental context of Lapita settlement locations. In P.V. Kirch and T.L. Hunt (eds.), *Archaeology of the Lapita Cultural Complex: A Critical Review*, 33–47. Burke Museum, Seattle.

Nunn, P.D., 2001. Ecological crises or marginal disruptions: the effects of the first humans on Pacific Islands. *New Zealand Geographer*, 57: 11–20.

Nunn, P.D. and R. Kumar, n.d. Alluvial charcoal in the Sigatoka Valley, Viti Levu island, Fiji. Submitted to *Palaeogeography, Palaeoclimatology, Palaeoecology.*

Nunn, P.D., R. Kumar and S. Matararaba, 2003. Recent research relating to Lapita settlement in Fiji. In C. Sand (ed.), *Pacific Archaeology: Assessments and Prospects: Proceedings of the International Conference for the 50th Anniversary of the First Lapita Excavation, Koné–Noumea 2002*, 183–186. Le Cahiers de l'Archéologie en Nouvelle-Calédonie, 15. Service des Musées et du Patrimonie, Noumea.

Nunn, P.D., R. Thaman, L. Duffy, S. Finikaso, N. Ram, and M. Swamy, 2001. Age of a charcoal layer in fluvial sediments, Keiyasi, Sigatoka Valley, Fiji: possible indicator of a severe drought throughout the Southwest Pacific 4500–5000 years ago. *South Pacific Journal of Natural Science*, 19: 5–10.

Palmer, B., 1965. Lapita style potsherds from Fiji. *Journal of the Polynesian Society*, 75: 373–377.