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An Archaeological Exploration of Vanikoro, Santa Cruz Islands, Eastern Melanesia

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ABSTRACT

An archaeological reconnaissance of Vanikoro Island, in the Santa Cruz group of eastern Melanesia, was carried out in 1977 and 1978 as one part of the Southeast Solomons Culture History Programme. During site survey, a total of 24 sites were identified, including prehistoric and early historic village sites, stone fishtraps, rockshelters, grindstones, and temporary camp sites. All of these sites are situated in the coastal zone, and no evidence was obtained of interior occupation. Test excavations were carried out at three village sites on Teanu Island. Two of these were relatively shallow deposits (Sites VK-6 and VK-7), dating to late prehistoric and early historic times. The third site (VK-10, Emo Dune Site), with nearly two metres of stratified midden, is entirely prehistoric, with a basal radiocarbon age of 1750 ± 85 B.P. This site contains a variety of portable artefacts, most notably ceramics decorated in the Mangaasi style. The implications for a former period of more extensive contact between the New Hebrides (Vanuatu) and the Santa Cruz Islands are discussed.

Keywords: MELANESIAN PREHISTORY, SANTA CRUZ ISLANDS, VANIKORO, MANGAASI POTTERY, ADZE TYPOLOGY, FAUNAL ANALYSIS.

INTRODUCTION

Among the anthropologically least known islands of eastern Melanesia, Vanikoro is famed for its association with the ill-fated French explorer, J. F. G. de La Pērouse. Sometime in 1778 the frigates *La Boussole* and *L'Astrolabe*, propelled by one of the fierce tropical cyclones that periodically lash the Santa Cruz Islands, struck and went down on the western barrier reef of Vanikoro. La Pērouse's fate became a mystery that was not solved until 1826, when the intrepid Peter Dillon on the *Saint Patrick* called at Tikopia (228 kilometres east of Vanikoro). There the Polynesian inhabitants showed him objects of European manufacture that they had brought back from Vanikoro on trading visits (Kirch and Yen 1982:48-52). Dillon subsequently launched an expedition to Vanikoro (this story is fully told by Davidson, 1975), where he not only confirmed that this was indeed the site of La Pērouse's shipwreck and demise but also recorded the first detailed account of Vanikoro and its inhabitants (Dillon 1829). Hearing of Dillon's discoveries, the French navigator Dumont d'Urville proceeded to Vanikoro in 1828, just a few months after Dillon's departure from the island. D'Urville's account (1833) likewise provides many details of Vanikoro culture and society. As well, the artist who accompanied him, de Sainson, produced a series of lithograph views of villages, people, and artefacts.

These early accounts of Dillon and d'Urville are still among the most detailed ethnographic statements on Vanikoro. Ray (1926) recorded something of the linguistic situation, but serious anthropological fieldwork did not begin until Davenport's study in 1960, which itself was restricted to one month's stay (Davenport 1968). The most intensive studies on Vanikoro were conducted as part of the Southeast Solomon Islands Culture History Programme (Green 1976a), beginning with a brief linguistic reconnaissance by Cashmore in 1970-1971. During

the second phase of the Solomons Project, from 1977 to 1978, Vanikoro was the subject of intensive linguistic analyses by Peter Lincoln (University of Hawaii), material culture studies by Roger G. Rose (B. P. Bishop Museum), ethnobotanical and palynological studies by D. E. Yen (B. P. Bishop Museum) and J. Powell (Sydney Herbarium), and an archaeological reconnaissance by the author. The present report is the first to appear from these various undertakings, although several others are in preparation. In addition, Lincoln has edited a book of "custom" notes prepared by Vanikoro headman Ben Tua (1979), a valuable contribution to the island's sparse ethnographic corpus.

Vanikoro has been rather thinly populated throughout the historic period, and this may have been the case in prehistory as well. Davenport (1968:264) recorded a 1960 population of 138 persons resident in five settlements. By the time of my fieldwork in 1977-1978, the population had increased somewhat (partly because of immigration), but was still restricted to seven hamlets, small and widely dispersed: the principal settlement of Puma, the school at Numbuko, Lavaka Village, Lale Village, Emoa Village, the Tikopia settlement of Murivai, and a small Sikaiana settlement at Usili. There are no roads, with all contact between settlements achieved via dugout canoe. A major historic settlement in the past was Paeu, headquarters of the Vanikoro Kauri Timber Company.

Despite the small and dispersed population, the linguistic situation on Vanikoro is complex, with three distinct languages. These languages (originally thought to be dialects by Gaimard, 1834) are Vano (also spelled Vana, Vanou, and Fano) on the Northwest side of Vanikoro, Tanema (Tanima, Tetau) on the southeast side of the island, and Teanu (also referred to as Buma) on the smaller island that bears the same name. Like Davenport (1968), Green (1976b) regards these three languages as unequivocally Austronesian, belonging to the Oceanic subgroup. Green further asserted that the Vanikoro languages were not part of Pawley's Eastern Oceanic subgroup but rather "belong to some as yet undefined Oceanic subgroup, as is attested by their phonology, grammar, numeration, kinship terms, and lexicon" (Green 1976b:59). The Vanikoro languages show certain similarities with the three languages of nearby Utupua (Green 1976b:table 3), and Green suggested that one could reconstruct a Proto-Utupua-Vanikoro stock from which all six languages derived. An interesting feature of all of these languages is a large number of evidently Polynesian loan words, indicated by the petrified article *t*V, as in Teanu *tepolau* "bachelor's house", or *telakau* "dance clubs" (cf. Tongan *lakalaka*).

An additional suggestion of possible contact with Polynesian speakers consists of the so-called "Tonga songs" recorded by Tua (1979:33-34). These are said to be in an unknown language, the lexical structure of which does seem very Polynesian, though not readily identifiable with any extant Polynesian language. It is known that regular voyages between Vanikoro and Tikopia occurred at the time of initial European contact, with mats, arrows, and pigs as regular items of exchange (Kirch and Yen 1982:10, 26). This was, of course, how items from La Perouse's ships had originally been carried to Tikopia, where they made their way into Dillon's hands.

Aside from the evidence of former contact with Polynesian speakers, there are various ethnographic suggestions of relationships to the south, particularly with the Banks and Torres Islands. The most important of these is the Tamate dance cult, described by Davenport (1968:267-273) and Tua (1979). The Tamate characters (note again the petrified *t*V form of the name) are said in myth to have been brought from the island of Veluko (Tua 1979:10, spelled Feluko by Davenport). This is of interest, as in nearby Tikopia the name Varuka refers to Vanua Lava in the Banks (Kirch and Yen 1982:92, 340). At any rate, the Tamate dance cult is clearly related to

similar cults bearing the same name in the Banks Islands and elsewhere in the northern New Hebrides (Codrington 1891:69-86).

Despite these indications of former contact with the New Hebrides and with Polynesian speakers, in historic times Vanikoro's closest external relationships are known to have been with Utupua and Nendö in the Santa Cruz group. Vanikoro and Utupua were both sources of the red feathers of the *Myzomela* sp. honeyeaters, used in the manufacture of money belts in Nendö and subsequently exchanged with Reef Islanders for concubines, pigs, and other valuables. The red-feather-money exchange network of the Santa Cruz Islands, which was carried out by the *tepuke* navigators of the Duff Islands, is described by Davenport (1962, 1964).

Aside from these rather vague and imprecise indications of language and custom, there was no direct evidence relating to the possible prehistory of Vanikoro prior to the commencement of our archaeological study in 1977. As with most of the other islands of eastern Melanesia, Vanikoro truly constituted an archaeological *terra incognita.*

OBJECTIVES AND SCOPE OF FIELDWORK

The archaeological explorations reported here were carried out over the course of two brief field trips. Although a larger study of Vanikoro prehistory was originally envisioned as part of the second phase of the Southeast Solomon Islands Culture History Programme, the vagaries of local shipping rendered this impossible. In 1977 I spent 11 days on the island, accompanied by Douglas Yen and Lawrence Foanaota (Solomon Islands Museum). During this period we covered part of Teanu Island, conducted some limited test excavations and reconnoitred by canoe the north and west coasts as far as Lale Village. In 1978 I spent 19 days on Teanu with only local assistance. Unfortunately, a breakdown in all three outboard motors on the island prohibited forays around the larger island of Banie. During the 1978 season, I concentrated on test excavation of the deep stratified sand dune site at Emo (VK-10).

Given the absolute dearth of archaeological information for Vanikoro prior to our 1977 reconnaissance, our objectives were basically those of obtaining what Jones (1980) has called "first order" information: basic data on the kinds of sites and their general distribution, on chronology, artefact typology, and possibly on palaeoenvironment. We were well aware that in the limited time available (which turned out to be even more restricted than originally planned) we could do little more than scratch the surface of these two large, rainforest-cloaked, and generally trackless islands. Yet, it seemed clear enough, given the objectives of the Southeast Solomons Programme (Green 1976a), that some basic knowledge of Vanikoro culture history would be of inestimable value, particularly for comparison with the more fully investigated sequences of Santa Cruz, the Reef Islands, Tikopia, Anuta, and Taumako (Green and Cresswell 1976, McCoy and Cleghorn 1979, Kirch and Yen 1982, Kirch and Rosendahl 1973, B. F. Leach and J. M. Davidson: pers. comm.).

I have advisedly termed our survey an archaeological "exploration," and it must be regarded as simply that: an initial exploration of the island's sites, with some glimpses of an as-yet incompletely defined sequence. Though a great deal more intensive work will be required before anything like a complete sequence can be proposed, our four weeks of exploration yielded an abundance of data, some with considerable implications for eastern Melanesian prehistory, particularly the evidence for the once extensive distribution of Mangaasi-style ceramics, and for cultural connections between the Santa Cruz and New Hebrides archipelagoes.

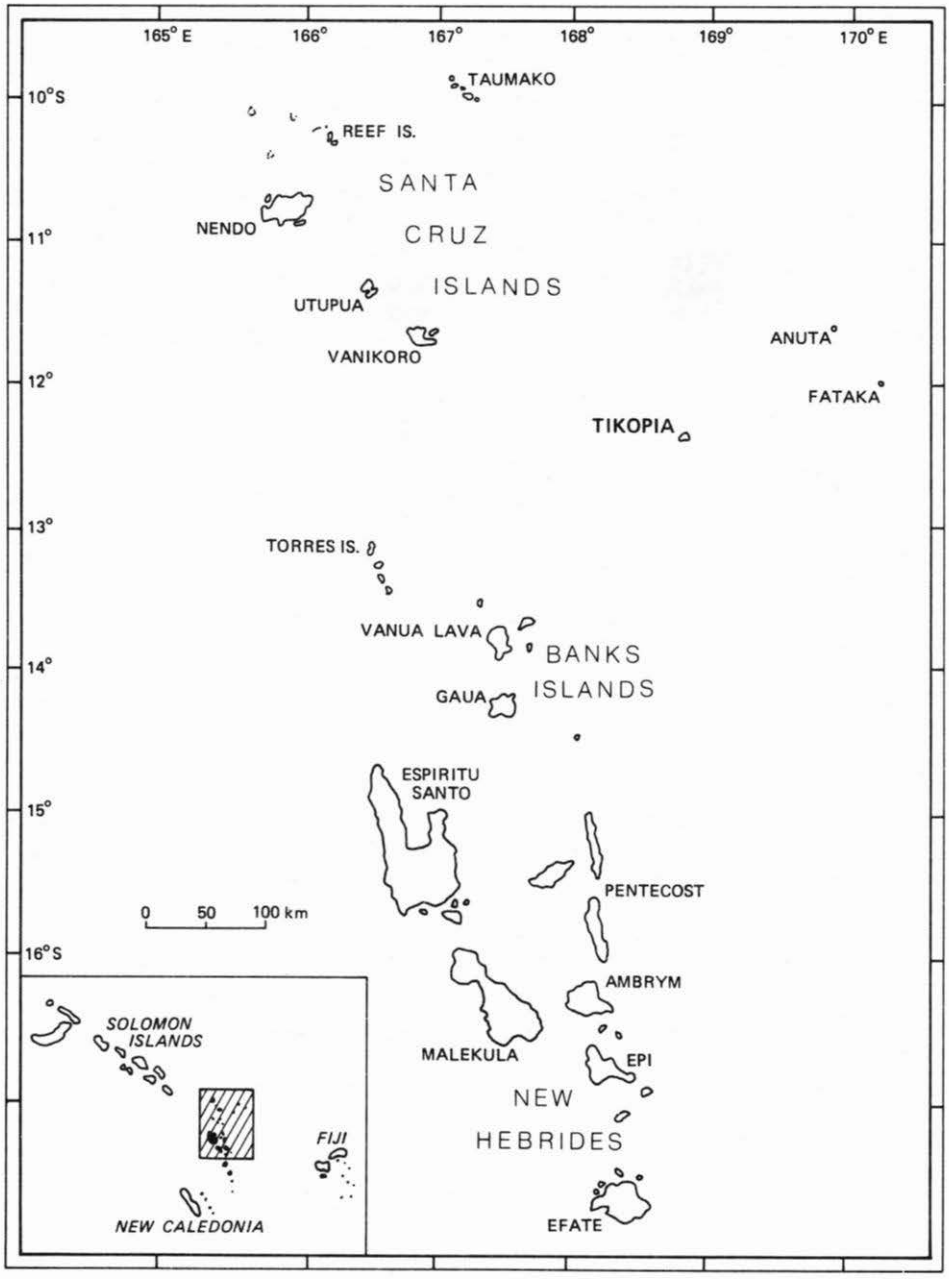

Figure 1: The Santa Cruz Islands, Banks Islands, and northern New Hebrides (Vanuatu), showing the location of Vanikoro in relation to nearby islands.

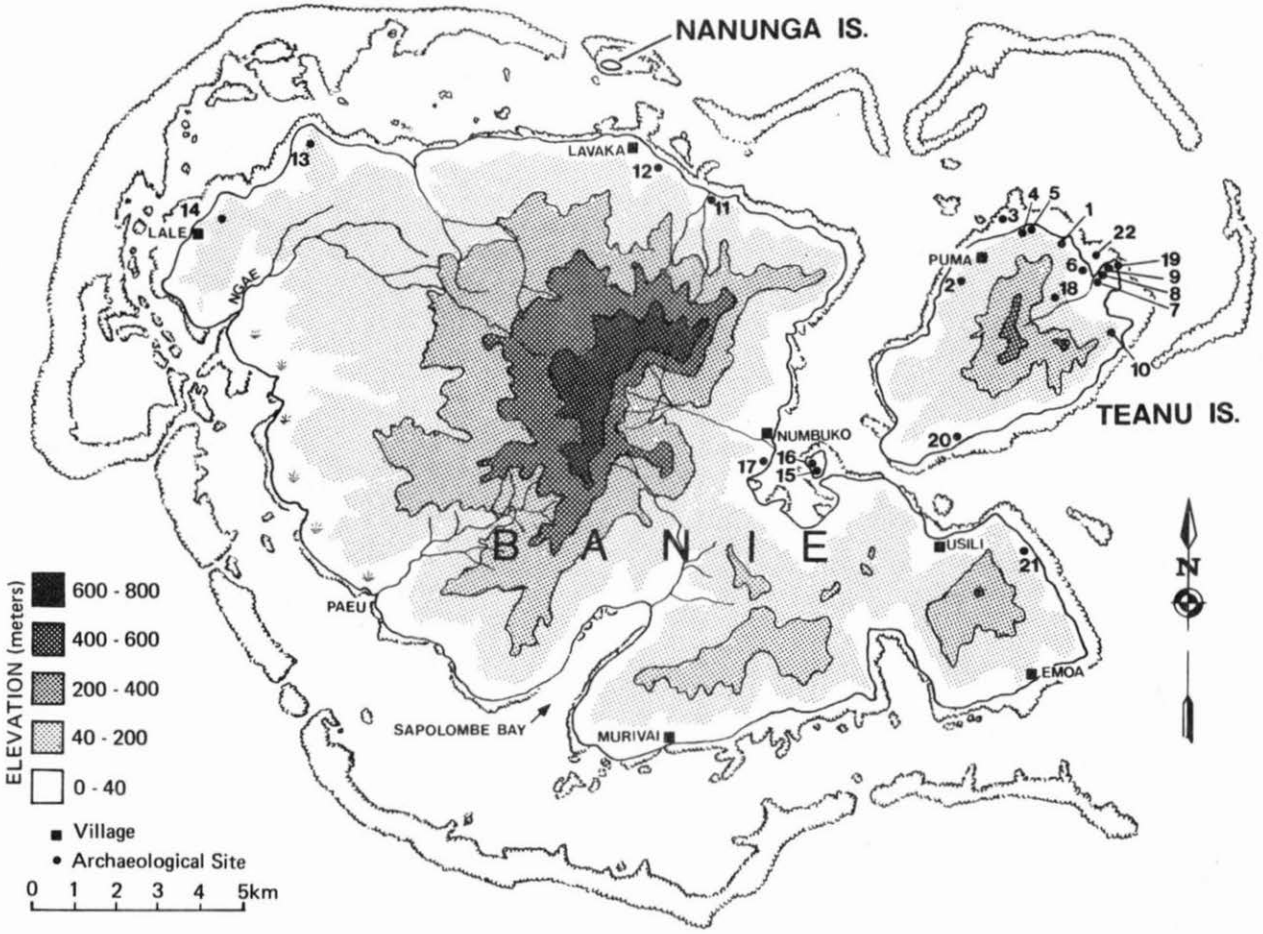

Figure 2: Topographic map of Vanikoro, showing modern villages and archaeological site locations.

THE SETTING

The southernmost of the Santa Cruz Islands, Vanikoro (11° 40′ S., 166° 50′ E.) actually consists of two high volcanic islands, Banie and Teanu. Utupua Island, about 30 km to the northwest, is clearly visible from Vanikoro, while the large island of Nendö (Santa Cruz) lies about 125 km distant, again in a northwesterly direction. To the south, the Torres Islands are about 170 km distant, while the Banks Islands are slightly farther, about 210 km. The Polynesian outlier of Tikopia lies 228 km to the southeast. Ethnographic and archaeological evidence indicates that in the past the inhabitants of Vanikoro had contacts with all of these surrounding islands (Fig. 1).

Approaching Vanikoro by ship from the north or east, one receives the impression of a large sombre island, thoroughly cloaked in dense tropical rainforest, its high central mountain crest (924 m) usually shrouded in clouds. After negotiating the pass through the partly submerged barrier reef and coming close inshore, one discerns a deep bay separating Teanu Island from the larger Banie (Fig. 2). Teanu, with a central mountain rising to 480 m, has a single village, Puma, the seat of local government. Banie has three widely separated villages, Lavaka on the north, Lale on the west, and Emoa on the southeast. Murivai, a small settlement of Tikopians, lies slightly west of Emoa and at Usili, across from Teanu, an extended family of Sikaiana immigrants has created a small hamlet.

The basal geology of Vanikoro consists entirely of basaltic volcanic rocks built up from four eruptive centres (Dennis, in press). Of these rocks, pyroclastics such as agglomeratic tuffs are most abundant, followed by extrusive, porphyritic lavas and finally by limited intrusives (mostly sub-vertical dikes). Along the coastal areas, deposits of Recent alluvium have built coastal plains up to 0.5 km wide; many of these are low-lying and marshy and have been extensively colonised by mangroves. Calcareous sand beaches are more restricted in their distribution but are found in various places, especially around the north and east parts of Teanu and at places around the eastern side of Banie. As Dennis (in press:56) notes, "fringing reef is of more or less continuous development around the coast of Vanikolo" although "mangroves are encroaching on the inner area of the reef," which is dead in places. An extensive barrier reef surrounds most of the island at a distance of two to four kilometres offshore, though it is closest on the west. Passages occur opposite the major bays and rivers. The barrier reef is permanently submerged on the east and northeast but well exposed on the west, a pattern that could be explained by southwesterly tilting (Dennis: in press).

In his 1851 study of coral reefs, Charles Darwin cited Vanikoro as a classic case of a volcanic island undergoing submergence (Darwin 1851: 47-48, 127-128, pl. I). Numbuko, Usili, and Sapolombe Bays are drowned river valleys, and the smaller island of Teanu was at one time joined to Banie. In 1978 I noted several features of the coastal geomorphology of Teanu that point to active coastal erosion, probably the result of submergence: (1) Exposures of coral conglomerate (or "beach rock") are common along the north and east coasts and indicate landward erosion of sand dunes, under which such conglomerates form. (2) Concentrations of basalt boulders, such as the one just northeast of Puma Village, extend out onto the reef flat for several hundred metres and suggest deflation of former colluvial ridges or headlands. (3) Recent active erosion of low-lying calcareous dunes is indicated by one-metre-high scarps and undercutting of coconut palms and large *Calophyllum* trees. Such coastal erosion and submergence may have substantial implications for the archaeologist (cf. Chappell 1982), since the removal of sand dunes may have destroyed archaeological deposits. It is also possible that older archaeological

deposits (e.g., Lapita sites) may be submerged under reef and/or mangrove, as in Western Samoa (Green and Davidson 1974:170-178). Future investigations of Vanikoro archaeology should give serious consideration to these geomorphological possibilities.

Vanikoro lies within the zone of southeasterly trades, which predominate from about April through September. From October to March the weather is hotter, more sultry, and frequently punctuated by torrential downpours. During this latter period the island may also be subjected to tropical cyclones, which devastate large tracts of tropical forest, exposing the hillsides to erosion. Rainfall is high, with about 5,664 mm per year recorded at Paeu during the period from 1932 to 1966, with annual minima and maxima of 4,049 mm and 7,925 mm, respectively (Taylor 1973). During my two stays on the island it rained more often than not, a factor that rendered archaeological fieldwork difficult. The average temperature ranges between 80° and 85°F.

The main island of Banie has numerous large and permanent streams, such as that at Numbuko, and Teanu has several smaller streams that are usually flowing. These provide water for drinking and bathing.

Particular associations of landform, soil, and vegetation have been classified by Wall and Hansell (1976) as a series of "land systems." The greater part of Vanikoro, including most of the interior, consists of the Fanimata, Paeu, and Tangalo land systems; there are dissected landforms on old basaltic or pyroclastic parent materials, with a variety of tropohumults and dystropept soils. Vegetation consists of closed-canopy rainforest, dominated by such species as *Campnosperma brevipetiolata, Calophyllum vitiense, Myristica* spp., *Ficus* spp., *Pterocarpus indicus,* and, in cyclone-disturbed areas, *Macaranga* sp. The kauri, *Agathis macrophylla,* is still common over much of the interior even though it was extensively logged from the 1930s to 1966.

At the base of the larger valleys are alluvial floodplains constituting the Unggi Land System. Here the soils are eutropepts on the colluvial fans and tropofluvents on the floodplains proper. Some of these are under cultivation. The majority of the coastline is made up of the Kumotu Land System, consisting of tall mangrove forests (9 to 12 metres high) on very poorly drained silt loam to sand (tropaquents). The dominant species in these saline swamps are the mangroves *Rhizophera* spp. and *Brugiera gymnorrhiza*. In areas more remote from the villages, these swamps harbour the seagoing crocodile, *Crocodilus porosus.* Smaller areas along the coast, especially on Teanu Island, are made up of the Lomousa Land System of calcareous dunes. The Lomousa Land System is of archaeological significance because all of the known prehistoric and early historic village sites located during our survey are situated in this environment. Future archaeological survey work on Vanikoro should take special note of areas with Lomousa dunes, and systematic transect excavations in these environments may prove rewarding. (The land system maps in Wall and Hansell's report do not show all Lomousa areas; some smaller calcareous dunes are omitted.)

The Newire land system covers about 13 km² in the upper drainage of the Ngae River (Fig. 2). This area of low rolling hills has laterized soils (oxic dystropepts, oxic tropohumults, haplorthox), with a vegetative association of ferns, especially *Gleichenia linearis, Lycopodium* sp., and stunted shrubs and trees (e.g., *Trichospermum* sp., *Commersonia* sp.). The area is illustrated by Wall and Hansell (1976, pl. 8.6), who remark that it probably results "from regular burning during dry periods." Elsewhere in the tropical western Pacific, similar degraded fernlands are generally the result of human activity (e.g., Aneityum, Spriggs 1981; Lau

Islands, Hughes *et al.* 1979; Futuna, Kirch 1981). This Newire Land System may also reflect a previously intensive use of the Ngae River system, a possibility that should be followed up by future archaeological research in the area.

ARCHAEOLOGICAL SURVEY RESULTS

During the course of archaeological survey, 24 discrete sites were discovered and recorded; a complete list of these, with locational data, is given in Appendix A. The following pages summarise the survey results according to major site categories.

VILLAGE SITES

A total of 15 sites represent old village or hamlet locations; some of these have been abandoned only within the past 100 to 150 years. Excavations at three of these are described in a following section of this paper.

Three small hamlet sites were formerly located along the northwestern side of Nomianu Islet: Epao (VK-7), Vetele (VK-8), and Aneve (VK-9). Nomianu Islet, now connected to the mainland of Teanu by a tidal flat choked with mangrove, was formerly a separate islet, and the location of these villages may reflect defensive advantage. Excavations at VK-7 are described below. Site VK-8 lies on the narrow coastal flat and is marked by the presence of *Artocarpus, Barringtonia,* and *Areca* tree crops. An east-west-trending transect was cut through the undergrowth from the shore to the base of the hillslope, revealing a grindstone and several low, incomplete house outlines of volcanic cobbles. An earth oven was also observed. The only surface artefact found was an unfinished *Trochus*-shell armband fragment. A 0.25 m^2 test pit excavated along the east-west transect, some 13.8 metres inland of a large *Barringtonia* tree on the shore, revealed a thin (about 5 cm) deposit of humic loam with no visible midden, overlying stony clay wash from the nearby hillslope. The site did not appear to have been occupied for any length of time. The Aneve village site (VK-9) was pointed out by the Puma people, but time constraints did not permit us to clear the site or closely examine it.

Across the Ero Pine River from Nomianu Islet, and situated on a broad sandy dune of the Lomousa Land System, is the Pokobe-Mekimumule village site (VK-6). This site was evidently still occupied in the early part of the present century, before the populace moved to Puma. Excavations here are described below.

The Emo dune site (VK-10), situated on the weather coast of Teanu Island, is the most significant village site discovered during the course of our work, with a stratified deposit nearly 2 metres in depth. Excavations at Site VK-10 are also described below.

On the southern side of Teanu Island is the site of Muie Village (VK-20), evidently the principal habitation of the Tevai people during the visits of Dillon and Dumont d'Urville in the 1820s, the village being abandoned some time during the nineteenth century. Dillon (1829 (II): 173) called the village "Davey", but d'Urville (1833 (V):144) correctly rendered it "Tevai", describing the settlement as follows:

> Their village is composed of some thirty huts quite pleasingly grouped under a clump of coconut palms and other trees, in a little valley at the foot of the mountain; its population can increase to around 200 persons. (d'Urville 1833 (V):150)

D'Urville also described a god-house ("maison de l'*Atoua*") situated in the village:

> This house of the Atoua was a bigger and better constructed hut than the others, furnished all the way around with platforms of mats in the form of camp-beds for sitting or sleeping, and abundantly supplied with arms, ropes and various implements. It seemed to me that it was both a room for arms and for meetings, rather than a kind of temple, since I did not observe anything there that might relate to some kind of worship. (d'Urville 1833 (V):151)

Figure 3: Tom Kaula next to dike stone prism at Site VK-20, Muie Village Site.

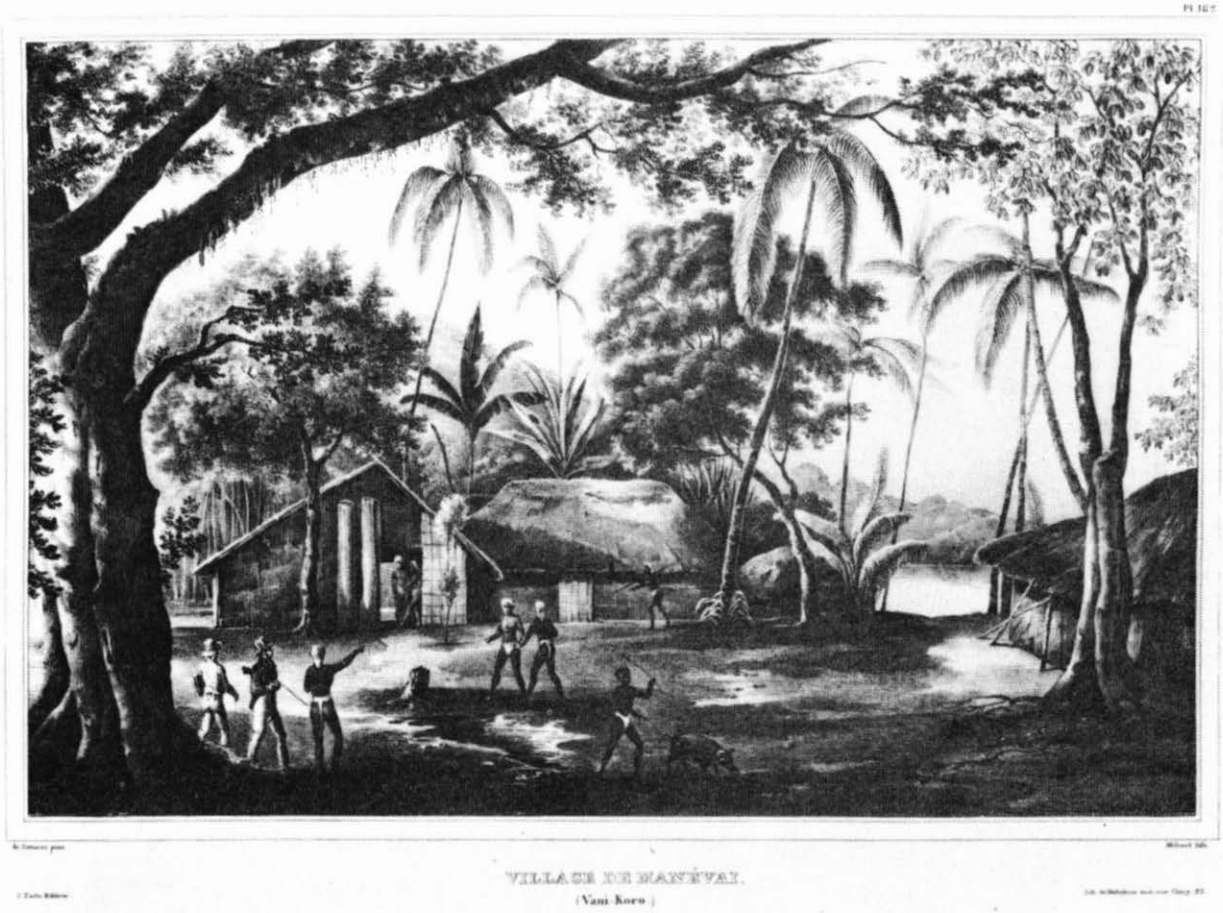

Figure 4: Site VK-15, Nemmawate Village on Manieve Islet, as it appeared in 1828 (de Sainson, D'Urville *Atlas*, P1. 182).

It is very likely that this structure functioned not only as a temple or cult house but as a men's meeting and sleeping house.

Our survey of the site was limited to a few hours; a plan to return to the site and conduct test excavations was thwarted by a breakdown in the only outboard engine on the island. The village site, marked by scattered shellfish midden, appears to cover an area of about 80 by 80 metres immediately back from the shore; the terrain is a low, sandy dune of the Lomousa Land System. A low mound at the rear of the site may be a midden or trash heap. A number of surface artefacts were found scattered over the site surface, and a small surface collection was made. The most interesting surface feature is an upright prism of volcanic stone, probably a dike stone fragment, measuring 41 cm high, 15 cm wide, and 8 cm thick (Fig. 3). This is evidently a god-stone of some sort and conceivably may mark the spot of the former god-house described by d'Urville.

One of my informants noted that across from Muie, near Usili, is the site of another former village (VK-24), at which shell adzes are occasionally found on the surface. This corroborates the following statement of d'Urville:

> Not long ago there was also a village on the beach of Ocili, and one can still see the ruins of it. But the inhabitants were exterminated following some battles, and their territory fell under the power of the tribe of Tevai. (d'Urville 1833 (V):166)

We were not able to visit the site.

Proceeding southeast around Ne Mabeli Point from Usili, another former hamlet site, Kulavanu (VK-21), is marked by scattered shellfish midden over an area of low, undulating, sand dunes, about 50 metres inland of the present shoreline. Since the site is now covered with fairly dense coastal forest (dominated by *Calophyllum* and other large trees), the exact area covered by this midden scatter is difficult to determine. Six *Tridacna* adzes and a worked *Arca* shell were collected from the surface during the course of a brief reconnaissance.

An important village during the period of Dillon's and d'Urville's voyages was Nemmawate (VK-15), situated on the south side of a small island, Manieve, that lies near the head of Nemambili Bay. An 1828 view of the village by de Sainson shows a cluster of thatched houses and coconut palms near the water's edge (Fig. 4). The site, which was visited briefly during both 1977 and 1978, consists of a sandy flat with a swampy *Cyrtosperma* pit directly inland. The site has suffered considerably from coastal erosion, encroachment of mangroves, and land-crab disturbance. A curved expanse of jumbled coral cobbles at the water's edge (about 20 metres long) was said to have been a former retaining wall. Considerable quantities of shellfish midden are eroding out of the cultural deposit at the water's edge, including large *Lambis* and *Trochus* shells. On the flat, inland of the eroding bank, are several coral uprights, an earth oven, and several free-standing volcanic stones. Our surface reconnaissance yielded a small collection of portable artefacts, including *Trochus*-shell armbands and *Tridacna*-shell adzes.

Several reputed old village sites were briefly visited during a canoe reconnaissance along the northern coast of Banie Island. On a low-lying flat of volcanic sand east of the Ngapiangga River mouth, the presence of a former hamlet (VK-11) is marked by a grove of *Inocarpus fagiferus* trees, otherwise surrounded by mangrove. The only archaeological feature observed was a volcanic upright dikestone slab nearly buried in the sand; this was said by Ben Tua to be a sacrificial stone at which offerings were placed. East of the Lavaka River is the abandoned village of Nekusoe (VK-12), nearly eroded away by high wave action. The presence of a former settlement is indicated by several coconut, *Inocarpus,* and *Barringtonia* trees.

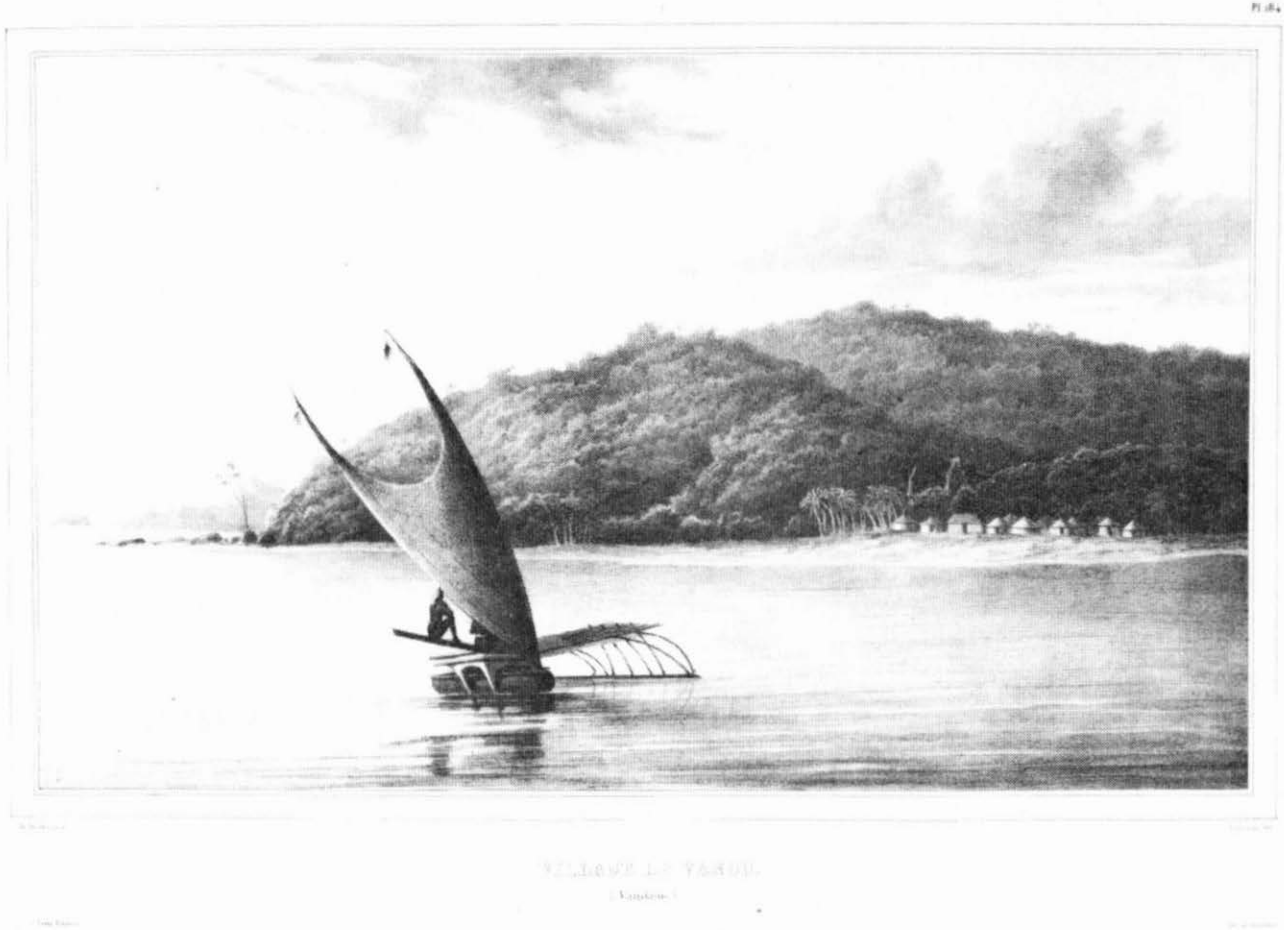

Figure 5: Site VK-13, Vano Village, and a Vanikoroan canoe, as seen by de Sainson in 1828 (D'Urville *Atlas,* P1. 184).

Nomilepwanenu Point, at the western end of Banie, is the site of another important village occupied at the time of Dillon's and d'Urville's voyages. The village of Vano (VK-13) as seen from the sea, a cluster of houses located at the foot of a small valley, was illustrated in a lithograph by de Sainson (Fig. 5).

Volcanic cobbles and boulders that are strewn across the sand beach have in places been cleared to create canoe landings. At one point on the reef a freshwater spring bubbles up, providing the only local source of potable water, there being no permanent stream nearby. Behind the strand are numerous tree crops, including coconut, *Metroxylon, Barringtonia, Artocarpus,* and *Areca*. Just inland of the beach are two rotten kingposts of a round-ended house (*moe omono*), still standing in 1977. Inland of the house remains, in the western part of the small valley, is an area of dark, carbon-rich soil with numerous fire-altered oven stones and abundant shellfish midden exposed on the surface as a result of land-crab burrowing. A small collection of surface artefacts was made.

The Ngama village site (VK-14) lies in an area of gardens and coconut plantation, immediately northeast of modern Lale Village. Several intermittent streams discharge here, creating a broad alluvial/colluvial fan upon which the site is located. The soil is dark and carbonaceous, with considerable shellfish midden littering the site, exposed by gardening activity and land-crab burrowing. Large *Trochus* shells are especially plentiful. The presence of former structures is marked by some low stone alignments; one of these was said to have been a *moe tandoe* "worship house". Informants from Lale Village reported finding *Tridacna*-shell adzes on the site while gardening; one *Terebra*-shell chisel was found during our brief reconnaissance, as well as two *Trochus*-shell armband fragments.

The former village site of Temopine (VK-23) is said to be near the modern village of Emoa. We were unable to visit the site due to the lack of canoe transport in 1978. The Bonobono village site (VK-17), on the southern bank of the Numbuko River, was pointed out by Ben Tua but not visited.

STONE FISHTRAPS

On the northwest reef flat of Tevai Island are two sites (VK-3 and VK-22) called *tamburo* by the Puma people; these are stone fishtraps of a type known widely throughout parts of Micronesia but seldom reported for Melanesia. The Puma people, who use the traps for fishing but do not repair or maintain them, also claimed to be ignorant of their mode of construction. They appear to hold these constructions in some awe, stating that they were the work of "devils" at an unknown time. That the fish traps are of some antiquity is suggested by two facts: (1) they now lie largely submerged, the tops of the weirs projecting above the sea only at extremely low tides, rendering them non-functional most of the time; and (2) the volcanic cobbles and boulders of which they are constructed are thoroughly cemented together with calcium carbonate and coral growth. It appears that the traps or weirs were built at a time of lower relative sea level.

Site VK-3, consisting of four such traps, is diagrammed in Figure 6. The traps, which are linked, form a barrier to receding current flow across a low point or channel in the reef flat. Fish swimming with the tide would have been directed by the lateral walls into the circular traps, where they could be easily speared or captured with nets. Site VK-22, on the reef directly seaward of the Pwa Vono River outlet, consists of five such structures, in a more damaged condition than Site VK-3. A photograph of the circular trap of one of these structures is shown in Figure 7.

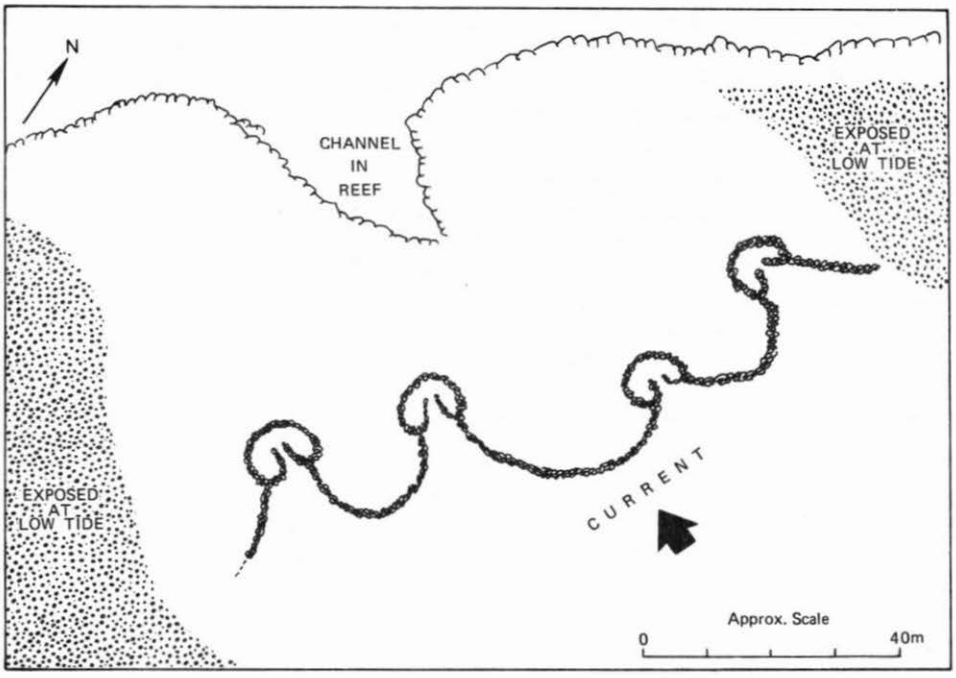

Figure 6: Sketch map of stone fishtraps, Site VK-3.

TEMPORARY CAMP SITES

Two sites consisted of the former locations of temporary "bush" or garden houses, apparently never inhabited on a permanent basis. One such location (VK-4) at Tetuwo, not far from Puma Village, lies on a sandy dune ridge. A test excavation here, down to 70 cm, revealed dispersed charcoal flecking and a few shellfish fragments indicative of human activity, in a yellow-brown sandy matrix to a depth of 45 to 50 cm.

A second site (VK-18) is located at Pwa Vono, on a colluvial slope used as a garden in 1978. Clearing of the forest for gardening had revealed four stone ovens (Fig. 8); informants reported finding two clay pipes on the surface, and I noticed a fragment of historic bottle glass, as well as several *Turbo*-shell opercula. Ben Tua indicated that the site had been used as a "bush house" location and garden area during the time of his mother, before the abandonment of Site VK-6 nearby.

A similar sort of temporary-use site, although not reported as such by Puma informants, may be situated on two low dunes located behind a dense mangrove swamp about 2 km southwest of Puma. Our attention was attracted to these dunes by a concentration of fire-altered oven stones eroding out of the dune bank, designated Site VK-2. Three small test pits excavated into the dune surface showed minor stratigraphic evidence of disturbance, but no indications of permanent settlement.

GRINDSTONES

Site VK-5 consists of two grindstones situated among the volcanic rocks along the coastline, west of a small headland jutting into the sea. One grindstone has a single large ovoid depression; the second has one ovoid depression and a narrow groove. Informants stated that the narrow groove was used for sharpening bone arrow

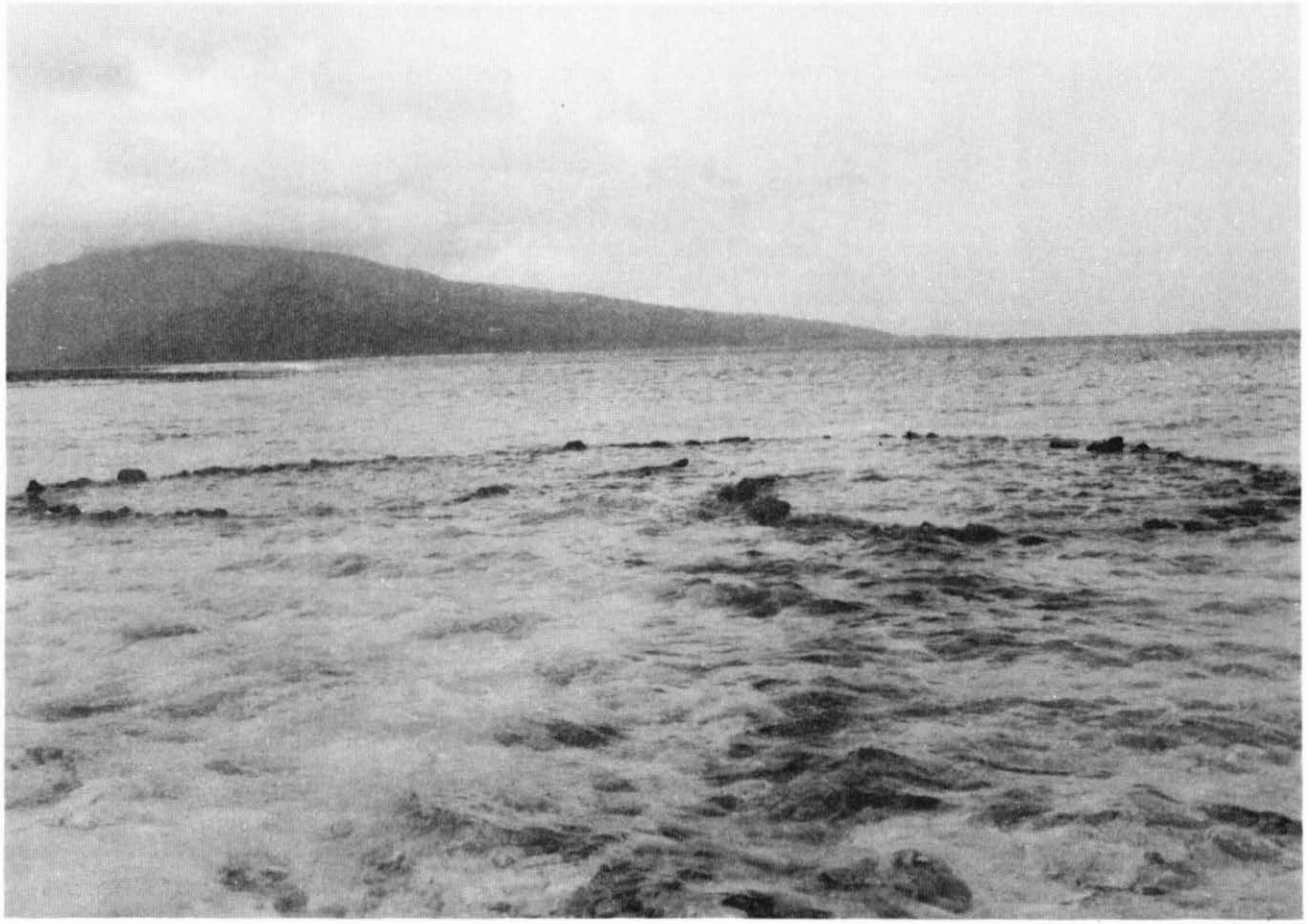

Figure 7: Circular catchment basin of stone fishtrap, Site VK-3. The cloud-shrouded summit of Banie Island lies in the background.

Figure 8: Stone-outlined oven at Pwa Vono camp site, Site VK-18.

points and the ovoid depressions for sharpening adzes. Along the coastal trail northeast of Puma is a single, angular, upright, volcanic slab, supported at the base by a cairn, with a large grindstone (*viniviai*) adjacent (Site VK-1). The grindstone has five depressions, said by informants to have been used for sharpening adzes.

MANIEVE ROCKSHELTER (VK-16)

This small rockshelter, on Manieve Island not far from Nemmawate and situated directly above a small beach, is still used as a camping place for fishermen. A midden deposit fills the shelter, and one earth oven was exposed on the surface.

Two caves on the exposed windward coast of Nomianu Islet, both lacking any evidence for occupation or use, are nevertheless of considerable cultural significance for the Teanu people. The larger of these is called Bonge Kangele Vongoro ("cave basket *Canarium*"), the smaller, Bonge ma Tamate ("cave of the Tamate"). The latter is where the legendary Tamate creatures were kept in the interval between their arrival from mythical Veluko Island and the occasion of the first Tamate feast (see Davenport 1968 for a description of the Tamate cult). This site has been designated VK-19.

EXCAVATIONS

Test excavations were carried out at three village sites, all on the smaller island of Teanu. Sites VK-6 and VK-7 were both occupied during the historic period and may have originally been settled in late pre-contact times. Both were identified as named village sites by the Puma people. Site VK-10, on the other hand, was known to the Puma people as a location where shell adzes were frequently found on the surface, but there was no tradition of the site as a village. This latter site proved to have a deep cultural deposit and yielded the most important finds from Vanikoro.

THE POKOBE-MEKIMUMULE VILLAGE SITE (VK-6)

This abandoned village site is situated at the mouth of the large, amphitheatre-headed valley surmounted by Nepleauala Peak. This valley, the largest on Teanu Island, provides the drainage basin for a permanent stream that at present meanders through a mangrove-covered floodplain. The swampy, aggrading floodplain has resulted in the joining of Nomianu Island and Teanu Island, apparently in quite recent times.

Site VK-6 is located on a flat-topped, sandy dune elevated above the level of the swampy floodplain and deposited when the bay was deeper and the stream mouth not clogged with mangrove. Environmentally, the site is well suited to human occupation, with both colluvial ridges and hydromorphic low-lying ground in the near vicinity (the latter suitable for aroids), a permanent source of fresh water, a wide expanse of reef, and a canoe passage opposite the site. The site has two names: Mekimumule, the eastern portion, and Pokobe, the western portion. Two human crania and a shell trumpet were said to have eroded out of the seaward bank at Mekimumule in 1976. A carved post (Fig. 9), a remnant of Vanikoro's first Christian church, still stands in Pokobe, surrounded by several graves outlined with coral slabs. The site is in a young coconut plantation and had recently been cleared of all undergrowth, thus facilitating site mapping with compass and tape at 1:1000.

Aside from a surface scatter of shellfish midden and the structural remains of the church, the only discrete feature noted is a low mound at the inland edge of the site, about 20 metres long and 10 metres wide, elevated about 50 cm above the surrounding terrain, apparently a midden accumulation. The inland portion of the site, not planted in coconut, is covered in mature tree crops of *Artocarpus, Barringtonia, Areca, Pometia,* and *Inocarpus.*

Figure 9: Carved post from the first Christian Church at Vanikoro, at Site VK-6.

Five test pits were excavated: four pits along an east-west baseline through the central portion of the site, and one pit in the low mound at the rear. The pits through the central portion of the site all revealed similar stratigraphies, with a thin cultural deposit (evidenced by dispersed charcoal and disturbances) grading into a sterile basal sand of mixed coral and volcanic grains. (Weakly cemented calcium carbonate concretions in this basal layer indicate some stability for this dune flat.) Pit 4, excavated in the low mound, showed the following stratigraphic sequence:

Layer I 0-31/37 cm. Dark brown silty loam, with fine texture, containing much organic matter and finely dispersed charcoal. Friable, non-sticky and non-plastic. Midden deposit containing considerable shellfish remains.

Layer II 31/37-about 60 cm. A gradational zone of mixed sand-silt loam with a few distinct charcoal flecks. Possibly a garden soil reflecting cultivation activities prior to use of the site for permanent occupation.

Layer III about 60-100 cm. Mixed volcanic-coral sand, sterile.

In sum, Site VK-6 represents a small village of historic age, with a possibility of a prehistoric component.

EPAO VILLAGE SITE (SE-VK-7)

A former village or hamlet site, named Epao, lies next to the shore on the northeastern side of Nomianu Island (Fig. 2). The site is situated on the eastern bank of the Pwa Vono stream effluent and consists of an undulating sandy flat about 50 metres wide. Dense mangrove adjoins the site immediately to the south; formerly, this area would have been sandy reef flat, before the shallow passage between Nomianu and Teanu became choked with mangrove. On the inland edge of the site, a slope of volcanic colluvium rises sharply. This slope has some mature *Inocarpus* trees and *Areca* palms, which may be survivals from the former occupation. The site itself is planted in coconuts.

In 1978 dense second growth (largely *Hibiscus* and *Pipturus*) covering the site had been cleared away for banana planting by one of the Puma people. This revealed that at least four, low (about 75 cm high), amorphous mounds lay between the shore and the base of the colluvium, and these afforded an opportunity to test the area for subsurface deposits. Three pits (each 1 m^2) were laid out along a transect running perpendicular to the coast. TP-1 was situated on top of one of the amorphous midden mounds, and TP-2 and TP-3 lay on the lower ground inland of this mound. Three *Tridacna*-shell adzes and a fragment of blue-on-white china were found on the surface while laying out the test pits.

The stratigraphy revealed in all three test pits was essentially the same, with a single cultural layer consisting of dark gray (5YR4/1), fine-grained, calcareous sand loam, with shell and bone midden and scattered charcoal flecking. This cultural deposit (Layer I) was 80 cm thick in TP-1, 120 cm in TP-3, and about 45 cm thick in TP-2, near the base of the colluvial slope. Underlying this cultural deposit was sterile sand, very pale brown (10YR7/3), with mixed calcareous and volcanic grains, ranging from fine-grained to coarse. The contact between Layer I and the sterile Layer II was irregular and exhibited some land-crab burrows.

Test Pit 1 yielded a fragment of bottle glass and a piece of rusted iron in the upper 10 cm of the cultural deposit. Between 70 to 75 cm below the surface (near the base of the cultural layer), three fragments of *Trochus*-shell armbands were found, one of them unfinished. From TP-2, an adze or chisel of *Terebra* shell was excavated at 30 cm below surface, and a similar adze/chisel of *Mitra* shell was recovered at 5 cm in TP-3. These artefacts suggest that the Epao site was occupied from some time late

in the prehistoric period up into historic times. A recent date for abandonment of the village site is in keeping with the memories of Puma Village residents.

Faunal materials recovered in the 0.25 inch mesh were quantitatively analyzed; the vertebrate remains are tabulated in Table 1, and the shellfish in Table 2.

THE EMO DUNE SITE (SE-VK-10)

By far the most significant site discovered during the course of our work on Vanikoro, the Emo dune site, lies at the base of a shallow, steep-sided valley on the eastern side of Teanu Island, between Nom Nagoba Point to the north and Nom ne Pwaka Point to the south. In 1977 Ben Tua told us that the Puma people sometimes found shell adzes on the surface of the dune at Emo, and, visiting the locality on April 12, we were quite excited to find fire-cracked oven stones, shell midden, and artefacts littering the high sand dunes just inland of the beach. These cultural materials had been displaced from their subsurface context by land crabs, which had extensively burrowed the upper part of the dune. During the two hours that we had available to explore the site in 1977, eleven artefacts were collected, including seven

TABLE 1
VERTEBRATE REMAINS FROM SITE VK-7*

Taxon		TP-1	TP-2	TP-3
MAMMALS				
Sus scrofa		1		
Rattus sp.				1
Felis catus		1		
Pteropus cf. *geddiei*		1	2	
Homo sapiens				1
Medium Mammal		1	3	
MEDIUM AVES/LARGE PTEROPODID		2	9	3
TURTLE			3	6
SMALL VERTEBRATE				3
MEDIUM VERTEBRATE			3	1
FISH				
Acanthuridae	Dorsal Spines	6		1
Diodontidae	Spines	3		1
Elasmobranchii	Tooth (shark)			1
	Vertebrae	4		
Labridae	Pharyngeal Plates	3		
Lethrinidae	Dentary	1		2
	Premaxillary	1		
Muraenidae	Dentary	2		
Scaridae	Dentary			1
	Premaxillary	1		
	Pharyngeal Plates	3		
Serranidae	Dentary	2		
	Premaxillary	1		

*Bone counts.

TABLE 2
SHELLFISH REMAINS FROM SITE VK-7*

Taxon	TP-1	TP-2	TP-3
GASTROPODA			
Trochus niloticus	0.25	0.10	0.10
Trochus maculatus	0.20	—	1.00
Astraea stellare	—	—	0.50
Turbo chrysostomus	1.25	0.05	2.25
Lambis lambis	0.50	0.10	0.75
Strombus maculatus	0.05	—	0.05
Cypraeidae	0.30	—	0.10
Conidae	0.05	—	0.05
Terebridae	—	—	0.05
BIVALVIA			
Arca sp.	—	—	0.25
Chama sp.	—	0.05	2.25
Tridacna spp.	—	0.05	0.25
Codakia sp.	0.05	—	0.25
Asaphis violascens	0.10	0.05	0.10
Veneridae	0.60	—	0.30
TOTALS	3.35	0.40	9.85

* Weights in kilograms

shell adzes, an unfinished armband, a *Conus*-shell disk, a stone sinker, and a coral rubbing stone. Since Emo appeared to be the most promising site for excavation on Teanu Island, I decided to concentrate my efforts there during the 1978 field season.

The Emo site consists of a large sand dune rising directly from the narrow beach to a height of 3.8 metres above mean tide. The fringing reef is quite narrow and is exposed to the southeasterly swell; the height of the dune doubtless reflects this exposed position. Along the northern half of the beach fronting the dune is an exposure of cemented coral conglomerate, indicating some landward erosion of the dune in recent times.

Inland of the dune is a shallow, steep-sided amphitheatre valley, heavily vegetated, with a swampy floor. An intermittent watercourse descends from the valley and traverses the sand dune. A second outcrop of coral conglomerate is exposed in this stream mouth, at an elevation of 0.9 metres above mean tide.

The Emo sand dune is well vegetated, with the dominant species being *Barringtonia* sp., coconut, *Pandanus dubius,* and *Hibiscus tiliaceus.* Three breadfruit trees (*Artocarpus altilis*) were also noted on top of the dune.

A sketch map of the VK-10 site (Fig. 10) shows the positions of our 1978 test excavations. The total area of the dune with cultural materials exposed was estimated at 4,200 ± 500 m^2. Aside from the dense concentration of oven stones and shell midden that litters the dune surface, four archaeological features were noted during clearing. Feature 1, shown in inset in Figure 10, was a rectangular arrangement of five volcanic slabs, standing 10 to 20 cm above the ground surface. These slabs may define a hearth or oven. Feature 2 was a similar arrangement, with a rectangle 75 by 60 cm defined by a large volcanic slab on one side and smaller stones (about 15 cm diameter) on the other three sides. Feature 3, about three metres away, consisted of two upright volcanic slabs forming an L-shaped arrangement. At

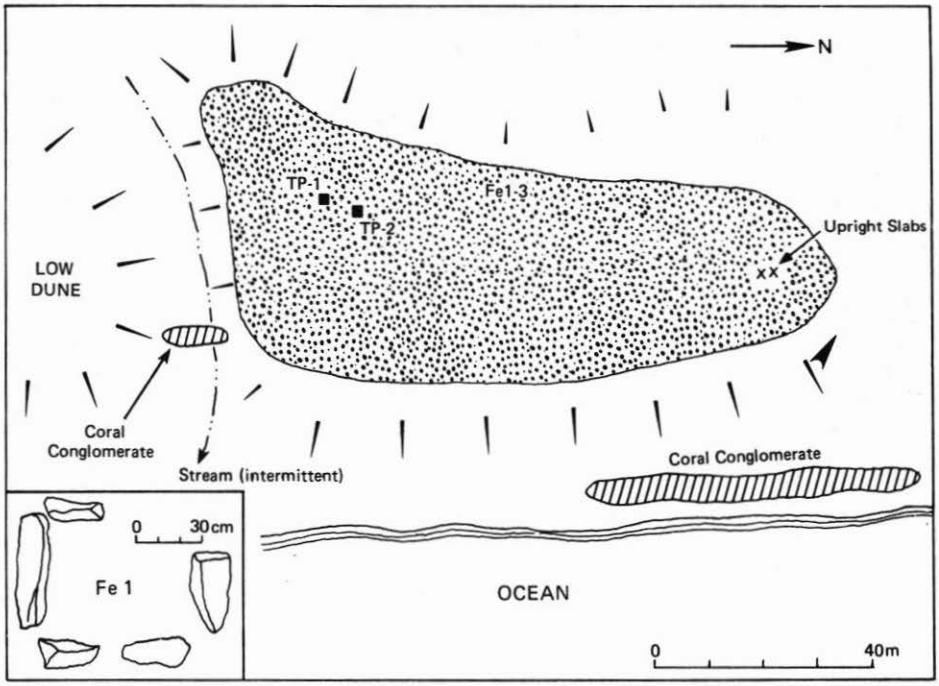

Figure 10: Sketch map of Emo Dune Site (VK-10), showing extent of surface midden exposed over large dune (stippled area), location of test excavations (TP-1, -2), and features 1-3. Inset shows plan of Feature 1.

the northern end of the site, Feature 4 consisted of four large dikestone slabs (50-100 cm in length), in no particular arrangement but probably formerly set as uprights.

Given the limited time available in 1978, only a brief test excavation of this rather large site could be attempted. Two test pits, each 4 m^2 in area (designated TP-1 and TP-2), were laid out four metres apart at the highest point of the dune, about 3.8 metres above mean tide. These test pits provided about a 0.2 percent sample of the site. As no internal stratigraphy was exposed, excavation was conducted in 25 cm levels. All artefacts found *in situ* were plotted, and all excavated soil was passed through 0.25 inch mesh sieves. All shell, bone, and carbonised plant material that remained in the sieves was retained for quantitative analysis.

The cultural deposit, identical in both TP-1 and TP-2, was essentially uniform throughout, reaching depths of 1.75 m in TP-2 and up to 1.9 m in part of TP-1. The deposit consisted of a dark reddish-brown (5YR3/2), compacted, fine-to-medium grained, sandy midden, with dispersed charcoal flecking throughout. It appears that the calcareous sand forming the dune was deposited by the prevailing southeasterly trades, which blow directly onto the beach at Emo. Fire-altered volcanic oven stones were plentiful throughout the cultural deposit. The upper 50 cm was riddled with land-crab burrows and had extensive root penetration. In TP-1 a dark gray lens of "greasy" midden, containing a high frequency of oven stones and charcoal, was exposed in the western half of the pit, between 152 and 159 cm below surface. Aside from this lens, the cultural deposit contained no stratigraphic divisions or features throughout its nearly two metre depth.

TABLE 3
EXCAVATED ARTEFACTS FROM SITE VK-10

Artefact Category	Stratigraphic Level (cm) 0-25	25-50	50-75	75-100	100-125	125-150	150-175	Totals
Ceramic sherds	2	1	1	2	5	7	5	23
Tridacna-shell adzes	3	2	2		8	4	5	24
Tridacna adze preforms			1		1			2
Abrading stones	3	1	2					6
Ornaments								
Armbands	19	8	28	26	42	43	32	198
Conus-shell Beads			2	4	7	5	4	22
Conus-shell Disk							1	1
Pendants			1	1				2
Tectus-shell Rings				1	1			2
Miscellaneous								
Bone points				1	1			2
Worked pearl shell			1					1
Worked haematite	1						1	2
Totals	28	12	38	35	65	59	48	285

Some 79 artefacts were collected on the site's surface, and during excavation of the two test pits, an additional 285 specimens were recovered (Table 3). With a total excavated volume of 14.6 m^3, the average portable artefact density was 19.6 artefacts/m^3, although specimens were somewhat more numerous nearer the base of the deposit. Land-crab burrowing in the upper 50 cm of the deposit, however, may have displaced a large number of artefacts, as well as oven stones and midden, to the site surface. The vertical distribution of artefacts from both test pits is given in Table 3. The collection is dominated by armbands of *Trochus* shell, *Tridacna*-shell adzes, and ceramics. Of particular note is the low density of ceramics, only 1.58 per cubic metre.

The cultural content of VK-10, by stratigraphic level, including artefacts, vertebrate and shellfish midden, and charcoal, is portrayed diagrammatically in Figure 11. All categories of cultural material, except shellfish, are represented by reduced frequencies in the upper levels of the deposit, particularly in the upper 50 cm. The reason for this differential density of materials is not clear, although the extensive bioturbation caused by land-crab burrowing, combined with the action of humic acids in the upper soil layer, could conceivably have resulted in some relative destruction of organic materials. On the other hand, it is also possible that this pattern reflects changing use of the site and of the nature of deposition of cultural materials over time. A definitive explanation of the pattern revealed in Figure 11 must await more extensive excavations at the site.

The excavations at VK-10 yielded a substantial collection of both faunal and floral materials. Molluscan remains were washed, sorted by taxonomic category, weighed, and discarded in the field. Vertebrate remains were returned to the Bishop Museum laboratory, where initial sorting was undertaken by A. C. Ziegler (Vertebrate Zoologist, Bishop Museum), along with identification of the non-fish material. The fish skeletal material was identified by Mr Gary Barnett and by the author.

Non-fish vertebrate materials are itemised by stratigraphic level in Table 4. Pig was present in the site throughout the lower levels, although in relatively small quantities. Two species of rat are represented, and both of these are presumably human introductions to the island. The smaller species is *Rattus exulans*, the

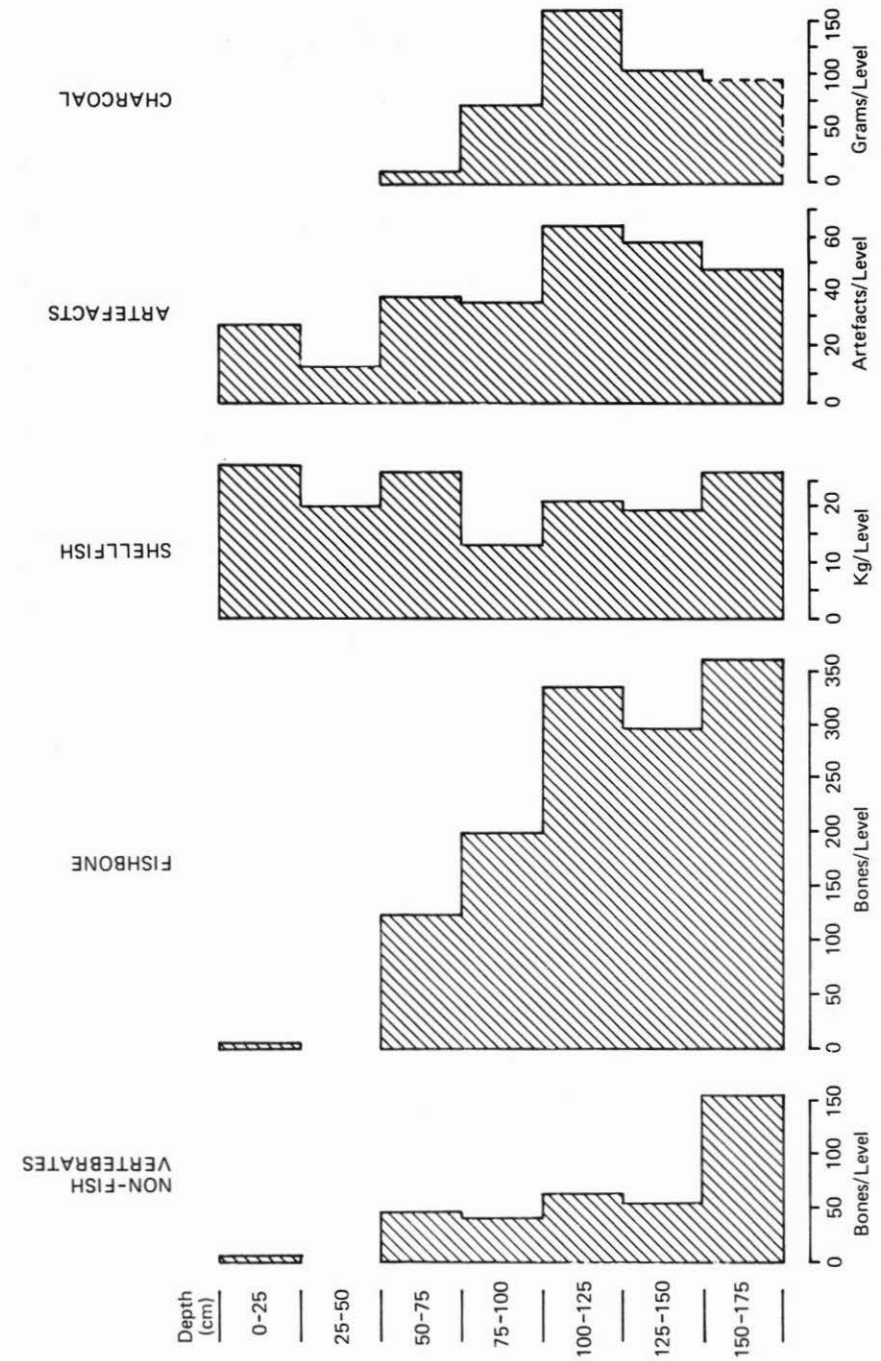

Figure 11: Vertical distribution of cultural materials in Site VK-10.

TABLE 4
NON-FISH VERTEBRATE REMAINS FROM SITE VK-10*

Taxon	Stratigraphic Level (cm) 0-25	25-50	50-75	75-100	100-125	125-150	150-175/190	Totals
MAMMALS								
Sus scrofa	—	—	—	1	1	1	5	8
Rattus exulans	—	—	4	—	14	17	25	60
Rattus sp.	—	—	6	4	2	2	15	29
Pteropus cf. *tuberculatus*	—	—	—	—	—	1	—	1
Pteropus cf. *geddiei*	—	—	8	3	5	11	2	29
Homo sapiens	—	—	1	1	1	—	5	8
Small Mammal	—	—	—	1	—	—	—	1
Medium Mammal	1	—	1	—	2	1	15	20
BIRDS								
Gallus gallus	—	—	—	—	—	—	8	8
Galliform	—	—	1	—	—	—	—	1
Procellariidae	—	—	—	—	—	—	4	4
Porphyrio porphyrio	—	—	—	—	1	—	1	2
Medium Bird	—	—	1	—	4	2	9	16
Large Bird	—	—	—	2	—	1	2	5
REPTILES								
Turtle	1	—	2	—	—	3	2	8
OTHER								
Large Pteropodid/ Medium Bird	1	—	2	4	5	2	17	31
Small Vertebrate	—	—	5	11	5	3	6	30
Medium Vertebrate	3	—	18	16	24	10	39	110
TOTALS	6	0	49	43	64	54	155	371

* Bone counts.

widespread Pacific Rat (Tate 1951). The identification of the larger species is uncertain, though it may be *Rattus ruber*, or possibly one of the mosaic-tailed rats of the genera *Melomys* or *Uromys*. Excavations in prehistoric sites on Tikopia (Kirch and Yen 1982) and in the Reef Islands (Green 1976c) have both yielded skeletal remains of a large rat, probably the same species found at Site VK-10.

The remains of fruit bats from VK-10 are almost totally those of a large bat, probably *Pteropus geddiei*, well distributed throughout the Santa Cruz Islands (Sanborn 1931). The single bone of a smaller species of bat has been tentatively assigned to *Pteropus tuberculatus,* known to occur on Vanikoro (Sanborn 1931).

Scattered human remains were present throughout the deposit, and some of the material classed as "Medium mammal" and as "Medium vertebrate" is probably also *Homo sapiens*.

The jungle fowl, *Gallus gallus*, was clearly represented only in the lower stratigraphic component, although a single galliform fragment from the 50 to 75 cm level may also be of this species. Remains of a shearwater species were also found in the lowest level. Two specimens of the Purple Swamp Hen (*Porphyrio porphyrio*) complete the list of identified birds.

Turtle bones were found in several levels from top to bottom of the deposit; these are probably the Green Sea Turtle (*Chelonia mydas*) or the Hawksbill Turtle

(*Eretmochelys imbricata*). Turtle is a prized food amongst the present-day Vanikoroans, who take them with special heavy-duty nets weighted with stones.

TABLE 5
IDENTIFIED FISHBONES* FROM SITE VK-10

Taxon	Identified Part	Stratigraphic Level (cm) 0-25	25-50	50-75	75-100	100-125	125-150	150-175 /190	Totals
INSHORE FISHES									
Acanthuridae	Dorsal Spine	—	—	82	129	232	200	250	893
Balistidae	Spine	—	—	2	2	5	1	2	12
	Tooth	—	—	1	—	1	1	—	3
Belonidae	Dentary	—	—	—	—	2	—	—	2
	Pharyngeal Plate	—	—	—	—	1	—	—	1
Carangidae	Scute	—	—	—	—	—	1	—	1
Diodontidae	Spine	—	+	—	+	+	+	+	+
	Dentary/ Premax.	2	3	—	—	1	2	—	8
Elasmobranchii	Vertebrae	—	3	—	1	4	6	1	15
Labridae	Dentary	—	3	—	4	3	6	8	24
	Premaxillary	—	2	—	4	6	4	5	21
	Pharyngeal Plate	—	3	—	4	8	3	6	24
Lethrinidae	Dentary	—	1	—	2	6	1	5	15
	Premaxillary	—	1	—	4	4	1	4	14
Mullidae	Dentary	—	—	—	—	1	—	—	1
Muraenidae	Dentary	—	4	—	7	12	12	15	50
Pomadasydae	Dentary	—	—	—	1	1	—	—	2
	Pharyngeal Plate	—	—	—	1	—	—	—	1
Scaridae	Dentary	—	2	—	1	4	4	8	19
	Premaxillary	—	2	—	5	4	5	6	22
	Pharyngeal Plate	1	10	—	26	24	28	27	116
Syngnathidae	Dermal Plate	—	—	—	1	2	1	1	5
BENTHIC FISHES									
Holocentridae	Dentary	—	1	—	1	—	1	—	3
	Premaxillary	—	1	—	—	—	—	—	1
	Operculum	—	—	—	—	—	1	—	1
Lutjanidae	Dentary	—	—	—	—	—	—	1	1
	Premaxillary	—	—	—	—	—	—	1	1
Serranidae	Dentary	—	1	—	5	8	18	17	49
	Premaxillary	—	—	1	1	5	1	5	13
PELAGIC FISHES									
Sphyraenidae	Dentary	—	—	—	—	1	—	—	1
	Premaxillary	—	—	—	—	1	—	—	1
TOTALS		3	37	86	199	336	297	362	1320

* Bone counts.

The vertebrate fauna from Site VK-10 is heavily dominated by fish, and identified fishbones are itemised by stratigraphic level in Table 5. Of the 17 families of fishes represented by this material, 13 are inshore and account for the great majority of the identified material. Most common are surgeonfish (Acanthuridae), parrotfish (Scaridae), wrasses (Labridae), and moray eels (Muraenidae). Of the benthic fishes,

only groupers (Serranidae) are plentiful in the site, and these may in fact be small species found close in to the reef. The only pelagic fish represented in the deposit is a species of barracuda (Sphyraenidae), and these, again, may have been taken close in to the reef. The most striking aspect of this collection of fish remains, then, is the dominance of inshore species. While fishbones are plentiful in the site, it is significant that no fishhooks or, indeed, fishing gear of any kind was recovered during the excavations. A stone sinker, possibly for nets, was found on the dune surface. This might suggest that angling was not an important fishing strategy and that such methods as netting, trapping, spearing, or poisoning were used. Certainly, the absence of angling gear (hooks, line sinkers) in the VK-10 site contrasts with the situation in Tikopia, where such artefacts are relatively common in all phases of the prehistoric sequence (Kirch and Yen 1982).

Nearly 160 kilograms of shellfish midden were recovered from the VK-10 test pits, an average density of 10.9 kg/m^3. The stratigraphic distribution of this material, by 23 taxonomic categories, is given in Table 6. As was noted earlier, shellfish are relatively common in all levels of the deposit and do not decrease in frequency in the upper levels, in contrast with the vertebrate remains. The bulk of the shellfish midden is made up of a relatively few species, primarily the large Spider Conch (*Lambis lambis*), a top shell inhabiting the reef crest (*Turbo chrysostomus*), a medium-sized turban shell (*Trochus maculatus*), and the giant clam (*Tridacna maxima*).

TABLE 6
SHELLFISH REMAINS FROM SITE VK-10*

Taxon	Stratigraphic Level (cm) 0-25	25-50	50-75	75-100	100-125	125-150	150-175	Totals
GASTROPODA								
Trochus niloticus	0.30	0.75	1.25	0.35	1.00	1.10	2.75	7.50
Trochus maculatus	2.95	2.40	2.00	1.30	1.20	0.75	2.70	13.30
Astraea stellare	0.65	0.50	1.75	0.35	0.50	0.45	0.50	4.70
Turbo chrysostomus	1.80	2.25	2.25	1.25	2.25	1.75	6.50	18.05
Turbo marmoratus (operc.)	1.00	0.25	—	—	—	—	—	1.25
Neritidae spp.	—	—	0.05	0.10	0.05	—	—	0.20
Cerithium nodulosum	0.20	0.50	0.30	—	0.10	—	0.05	1.15
Lambis lambis	8.00	6.75	7.00	2.65	3.60	3.25	3.60	34.85
Strombus maculatus	0.30	0.10	0.30	0.45	0.25	0.20	—	1.60
Cypraeidae	1.30	1.05	0.80	1.50	1.50	1.10	1.35	8.60
Thaididae	0.75	0.80	1.25	0.80	1.25	0.10	0.50	5.45
Conidae	1.00	0.20	0.75	0.75	0.35	1.10	0.55	4.70
Mitridae	0.30	0.10	0.20	0.05	0.10	0.15	—	0.90
Terebridae	0.05	—	—	—	0.45	0.10	0.20	0.80
BIVALVIA								
Arcidae—*Arca* sp.	0.25	0.30	0.30	0.05	0.10	0.10	0.20	1.30
Spondyliidae	0.15	—	0.10	—	—	—	0.10	0.35
Chama sp.	0.50	0.25	0.20	0.50	0.10	—	—	1.55
Tridacna spp.	7.70	3.25	7.85	2.25	6.75	8.50	7.50	43.80
Codakia sp.	0.50	0.50	0.50	0.20	0.05	—	0.15	1.90
Tellinidae	0.05	—	0.05	—	1.00	0.05	0.05	1.20
Asaphis violascens	0.30	0.20	0.45	0.35	0.45	0.50	0.30	2.55
Veneridae	0.50	0.40	0.40	0.30	0.30	0.60	0.70	3.20
Pearl shell	—	0.10	—	0.05	0.05	—	—	0.20
TOTALS	28.55	20.65	27.75	13.25	21.40	19.80	27.70	159.10

* Weights in kilograms

The VK-10 deposit also contained carbonised wood and fragments of the endocarp of the *Canarium* almond (Leenhouts 1955). The density of these carbonised materials is shown graphically in Figure 11. The carbonised *Canarium* endocarp fragments were examined by D. E. Yen (Ethnobotanist, Bishop Museum), who has conducted an extensive study of this tree throughout the eastern Solomon Islands and northern New Hebrides. Out of a total of 604 *Canarium* nut fragments from the VK-10 test pits, the majority (91 percent) were too small to assign further to species. A certain number (8 percent), however, could tentatively be assigned to the species *Canarium harveyi*, and several of these appeared to possibly be of the variety *C. h. nova-hebrediense* (Leenhouts 1955:37). Five fragments may possibly be of the species *C. indicum*. The *Canarium* almond today forms an important component of the subsistence base in Vanikoro, as indeed, throughout the Santa Cruz Islands (Yen 1974). The presence of this species throughout the VK-10 deposit thus permits us to trace the role of this plant in local subsistence well back into prehistory.

TABLE 7
RADIOCARBON AGE DETERMINATIONS FROM SITE VK-10

Sample No.	Lab No.	Depth (cm)	Age B.P.	Adjusted Age B.P.*	Corrected Age**
SORC-108	Beta-5497	100-125	1440 ± 60	1440 ± 60	A.D. 450-640
SORC-109	Beta-5498	125-150	1470 ± 70	1450 ± 70	A.D. 455-635
SORC-110	UCR-967	150-175	1750 ± 85	—	A.D. 35-455

* Adjusted according to $^{13}C/^{12}C$ ratio (normalised to -25 per mil ^{13}C).
** Calendric range at 95 percent confidence level, corrected for secular variation in ^{14}C according to Klein *et al.* (1982).

Three charcoal samples, each consisting of carbonised wood fragments and *Canarium* spp. endocarp from the lowest three 25 cm levels of TP-2, were dated by the radiocarbon method (Table 7). The radiocarbon ages were then corrected for secular variation in ^{14}C using the recent tables of Klein *et al.* (1982). The results show that Site VK-10 was first occupied early in the Christian era, probably by the second century A.D. Unfortunately, lacking radiocarbon dates for the upper levels of the site, it is difficult to say precisely how long it was occupied and at what time abandonment took place. However, plotting the available radiocarbon ages on an age-depth curve (cf. Hughes and Djohadze 1980), as in Figure 12, we can derive a rough estimate of the rate of accumulation of the VK-10 deposit. If the sediments accumulated at a steady rate, it is likely that the site was occupied for something like 1,200 years, with a deposition rate of about 0.15 cm/year. This rate is, in fact, close to that estimated for the Sinapupu dune site on nearby Tikopia (Kirch and Yen 1982). An abandonment date of some time around the mid-second millennium A.D. would therefore be indicated. Until such time as further excavations can be conducted at Site VK-10, and the age of abandonment more precisely dated, this estimate may suffice as a first-order approximation.

ANALYSIS OF PORTABLE ARTEFACTS

The reconnaissance survey and excavations on Vanikoro yielded a collection of 490 portable artefacts, the distribution of which is shown in Table 8. Most common and widely distributed were armbands of *Trochus* shell and *Tridacna* adzes. Ceramics, decorated in typical Mangaasi style, were found only at the Emo Dune site. All artefacts from Vanikoro are the property of the Solomon Islands National Museum (Honiara).

TABLE 8
DISTRIBUTION OF PORTABLE ARTEFACTS FROM VANIKORO SITES

Artefact Type	Sites VK-7* S	VK-7* E	VK-10 S	VK-10 E	VK-13	VK-14	VK-15	VK-20	VK-21	Totals
Ceramics	—	—	14	23	—	—	—	—	—	37
Tridacna adzes	3		39	24	2	—	3	2	6	79
Tridacna adze preforms	—	—	3	2	—	—	2	—	—	7
Terebra/Mitra adzes	—	2	—	—	—	1	—	—	—	3
Abrading stones	—	—	6	6	—	—	—	—	—	12
Ornaments										
Armbands	—	3	13	198	2	2	19	6	—	243
Conus-shell beads	—	—	—	22	—	—	—	63	—	85
Conus-shell disks	—	—	2	1	1	—	—	—	—	4
Pendants	—	—	—	2	—	—	—	—	2	
Tectus-shell rings	—	—	—	2	—	—	—	—	2	
Miscellaneous										
Sinker	—	—	1	—	—	—	—	—	—	1
Slingstone	—	—	1	—	—	—	—	—	—	1
Bone points	—	—	—	2	—	—	—	—	—	2
Worked pearl shell	—	—	—	1	—	—	—	1	—	2
Worked haematite	—	—	—	2	—	—	—	1	—	3
Stone knife	—	—	—	—	—	—	—	1	—	1
Worked *Arca* shell	—	—	—	—	—	—	—	—	1	1
European objects	1	2	—	—	—	—	—	2	—	5
Totals	4	7	79	285	5	3	24	76	7	490

*S = surface collected; E = excavated.

CERAMICS

The only ceramics from Vanikoro are those recovered from Site VK-10, representative of a single ware. Of the 37 sherds, 14 were surface collected, and the remaining 23 were excavated from throughout the midden deposit (sherd density = 1.58/m³).

The VK-10 ceramics were manufactured from a uniformly fine, silty-clay paste, which produced surface colours ranging from 10R3-4/3-6 (dark red, dusky red, weak red, and red). The paste includes volcanic sand "temper," dominated by plagioclase feldspars and volcanic rock fragments (see Appendix B). These volcanic sands are very fine-grained and may have been natural inclusions within the clay body, thus not representing manual tempering. The sherds are generally well fired, although there are several instances of incompletely oxidized cores, suggestive of low firing temperatures.

Several sherds bear fine, impressed striations on their exterior surfaces, most clearly visible under a low-power lens. In some cases, these striations or linear depressions form overlapping series. They appear to result from the use of a wooden paddle in thinning the vessel walls. In many cases the striations are obscured by later wiping, scraping, or burnishing of the exterior surface. Several sherds also exhibit a thin red-brown slip.

Body sherds range in thickness from 7 to 12 mm ($x = 9.3$ mm; $s = 1.4$ mm), and the single base sherd measures 15 mm thick. The limited nature of the collection, as well as the small sizes of the sherds, preclude an analysis of vessel form. No rims were recovered, although two partial neck fragments suggest the presence of jars with out-turned necks.

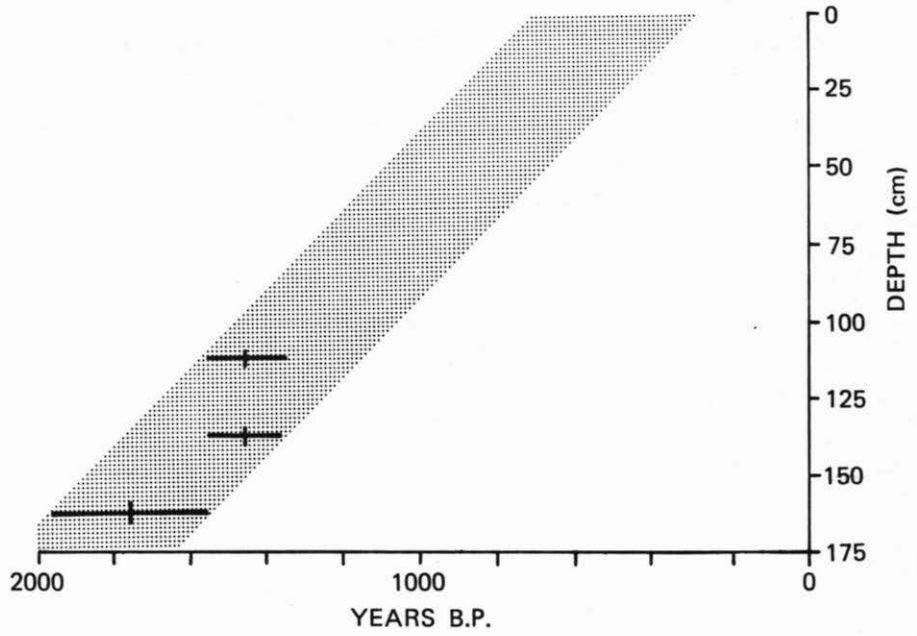

Figure 12: Radiocarbon age-depth curve for Site VK-10. The shaded zone represents the probable rate of deposition.

Twenty-four percent of the sherds carry distinctive decorations (Fig. 13), clearly indicating that the VK-10 ware should be classified as part of the Mangaasi Ceramic Series, originally reported by Garanger (1972) from the central New Hebrides. Incising is most common, with simple geometric designs, such as chevrons, hachured bars, and angular motifs. Also represented are raised nubbins produced by pinching the surface with a fingernail, raised parallel bands, and punctations made with a sharp instrument.

Several independent lines of evidence mutually support the interpretation of the VK-10 ceramics as imports to Vanikoro, most likely from the northern New Hebrides. As noted, the decorations fall within the range already known for the Mangaasi style. Dickinson's petrographic analysis (Appendix B) indicates that the "temper" is not local to Vanikoro, with the island of Espiritu Santo as the most probable source. The low density of ceramics in Site VK-10 furthermore supports the idea that these vessels were imported to the islands, rather than manufactured locally. A similar situation obtains on nearby Tikopia, where the Sinapupu Ware (highly similar to the VK-10 ceramics) appears to be an import from the New Hebrides.

TRIDACNA-SHELL ADZES

The Vanikoro artefact collection includes 79 whole or fragmentary adzes of *Tridacna* shell, of which all but 16 are from Site VK-10 (where 39 were surface collected and 24 were from the excavation units). There are also seven preforms, which have been chipped but not ground or polished. All of these adzes appear to be made from the common *Tridacna maxima*, and, with one exception (from the lowest level of Site VK-10), all are from the ventral margin of the shell. The exceptional adze was made from a portion of the hinge.

Figure 13: Decorated ceramic sherds from Site VK-10.

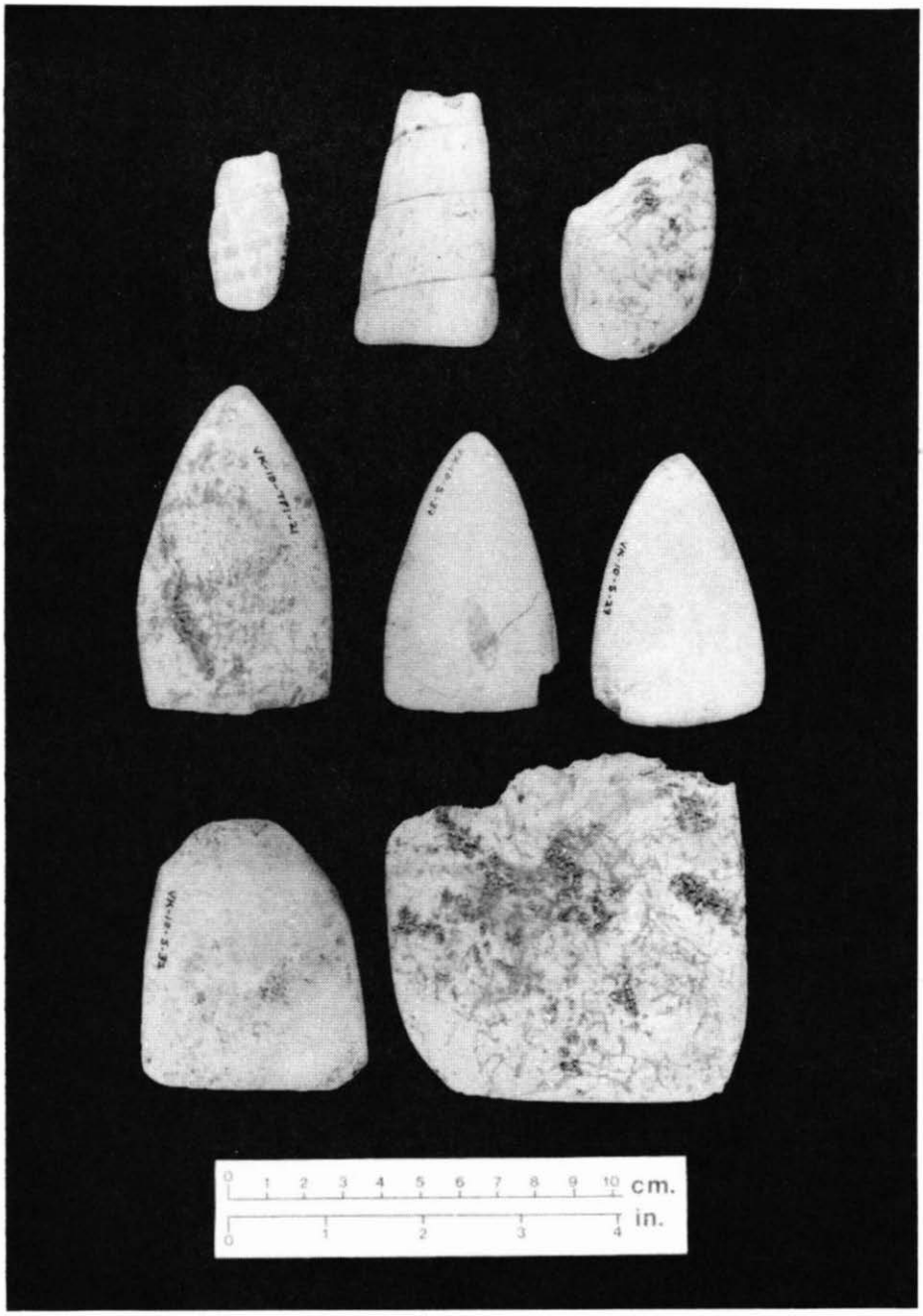

Figure 14: Front views of shell adzes from Vanikoro. Top row (l to r): *Mitra*-shell adze, *Terebra*-shell adze, bevel portion of Type 7 *Tridacna*-shell adze;
middle row: Type 4 *Tridacna*-shell adzes;
bottom row: Type 3 *Tridacna*-shell adze, bevel portion of unusually large *Tridacna*-shell adze from Site VK-10.

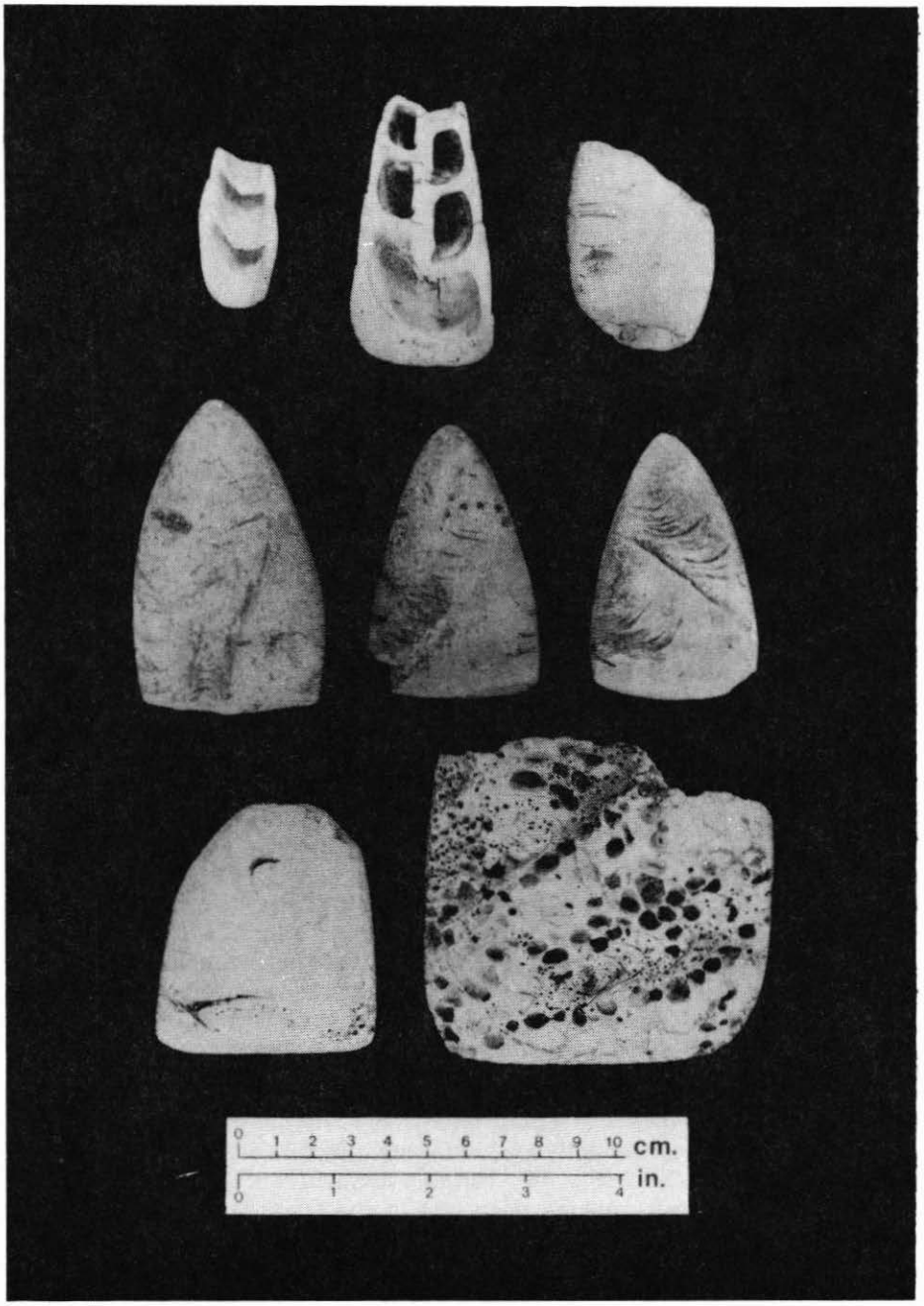

Figure 15: Back views of shell adzes from Vanikoro (see Fig. 14 for details).

The Vanikoro adzes (examples of which are illustrated in Figs. 14 and 15) fall within the range of variability described by Kirch and Yen (1982:206-32) for nearby Tikopia, and the Tikopia typology is used here for the Vanikoro specimens. It is remarkable, and of considerable significance, that all but three of the classifiable Vanikoro adzes (complete adzes or butt sections), a total of 34 specimens, are assignable to Tikopia Type 4, the most diagnostic feature of which is the sharply pointed butt. Bevel fragments are not classifiable as other than Type 3 or 4 (16 specimens), but most of these show tapering toward the butt and were most probably also of Type 4. These adzes are all reasonably well ground, some quite thoroughly ground on all faces and generally have oval cross sections. The bevels are evenly distributed between straight and curved varieties. A sample of ten complete Type 4 adzes from Site VK-10 has a mean length of 74.9 mm (s = 7.89) and a mean cutting-edge width of 45.6 mm (s = 9.78). Of particular note are two very large bevel fragments, both from the 125 to 150-cm level of Site VK-10, with cutting-edge widths of 64 and 59 mm, respectively.

Three adzes from Site VK-10 are of other types. There are two examples of Type 3 (one from the surface and one from the deepest excavated level), which differ from Type 4 in having a blunt or rounded butt. From the lowest level of the site we also excavated one bevel fragment of Tikopia Type 7, made from the hinge portion of the *Tridacna* shell. This particular adze has an oval cross section and is thoroughly ground.

The dominance of Type 4 adzes would seem to be of some significance for Vanikoro culture history. In Tikopia, Kirch and Yen found that Type 4 was "virtually a *fossille directeur* of the Sinapupu and Tuakamali Phases", dating from about 100 B.C. up until the time of European contact (1982:226). Type 4 appears rather suddenly in the Tikopia sequence and in direct association with Mangaasi-style ceramics. This type was reported by Garanger (1972) as frequently occurring in his Mangaasi phase sites in the central New Hebrides and by Ward (1979) at the Pakea site in the Banks Islands. As Kirch and Yen (1982:232) observed, Type 4 adzes are evidently closely associated with the Mangaasi cultural tradition throughout the entire New Hebrides and Santa Cruz Islands region.

TEREBRA AND MITRA-SHELL ADZES

Adzes made by longitudinal grinding of *Terebra* and *Mitra* shells (Fig. 14), and with characteristic curved cutting edges, were recovered from Sites VK-7 and VK-14. Those from VK-7 are clearly in late prehistoric to early historic contexts. Such adzes are also known from late sites on Santa Cruz Island and from the central New Hebrides, but they are absent on Tikopia. Further work may verify the hypothesis that such adzes were a late appearance on Vanikoro (none appear in the VK-10 assemblage).

ABRADING STONES

Twelve abrading stones, evidently used in the manufacture of small shell beads, were recovered from Site VK-10 (Fig. 16). The six excavated specimens were all from the upper 75 cm of deposit, making them one of the few item classes with discrete stratigraphic distribution in the site. Four of the abrading stones are of fine-grained block coral (*Porites* sp. ?), while the other eight are from a variety of slightly vesicular, porphyritic lava. The stones are round to oblong in plan view and have one or two well-abraded faces, with convex profiles. In size, they range from 52 to 95 mm long (x = 71.2, s = 13.6), from 40 to 71 mm wide (x = 53.4, s = 9.6), and from 7 to 27 mm thick (x = 15.9, s = 6.4). Each abraded face has one or sometimes two smaller depressions, with diameters ranging from 7 to 10 mm and

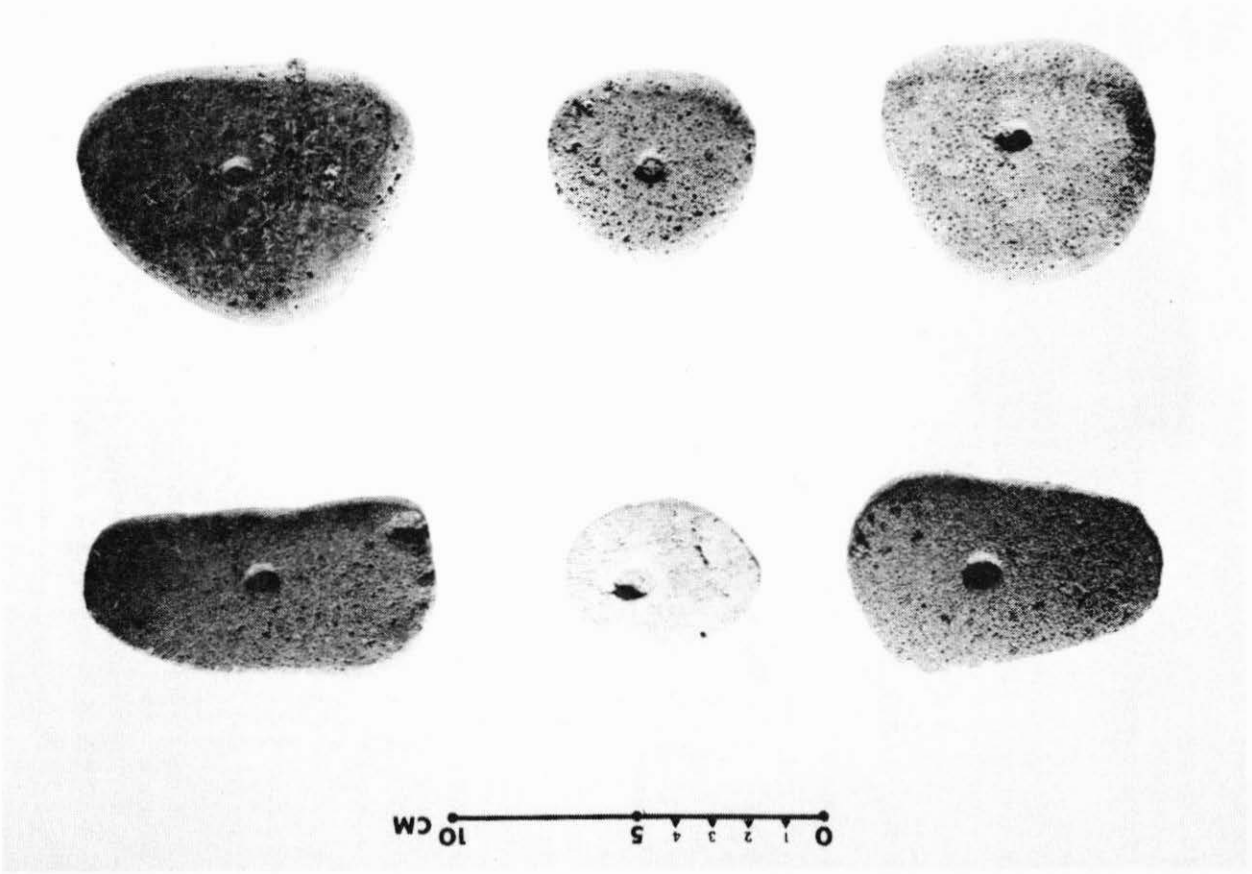

Figure 16: Abrading stones from Site VK-10. The middle specimen in the upper row and the left-hand specimen in the lower row are of coral.

depths of 1.5 to 3 mm. These abrading stones were evidently used by placing a small *Conus*-shell bead preform in the depression and then grinding the abrading stone against a large grindstone. The bead could be flipped over to grind the other side flat.

Abrading stones of this type were previously reported by Garanger (1972) from the central New Hebrides and had earlier been collected by Shutler during his southern New Hebrides survey (collections in Bishop Museum, Honolulu). Similar abrading stones were also excavated by F. Leach and J. Davidson in Taumako, Duff Islands (pers. comm. 1983).

ORNAMENTS

Trochus-Shell Armbands. Fragments of *Trochus*-shell armbands were the most common artefact type from Vanikoro, with some 200 examples excavated at Site VK-10, in addition to the specimens collected from the surface of five other sites. Such armbands, made from the body whorl of the large *Trochus niloticus*, are ubiquitous from sites throughout the southeastern Solomons (see Kirch and Yen 1982:249-50, fig. 101). One of the lithographs from d'Urville's voyage, by the artist de Sainson (Fig. 17), shows two Vanikoro men wearing such armbands, as well as round breast ornaments that appear to be shell disks, and earplugs (either of bone or shell).

Tectus-Shell Rings. A complete ring made from the body whorl of *Tectus pyramis* was excavated from the 75 to 100 cm level of Site VK-10. This ring has a diameter of 29 mm and a thickness of 4 mm. A fragment of a second ring was excavated from the 100 to 125 cm level. A similar *Tectus*-shell ring was excavated by Kirch and Yen from a Tuakamali Phase site on Tikopia (1982:250).

Conus-Shell Beads. Small beads ground from the spires of one or more species of *Conus* were excavated from Site VK-10 (where they occurred in all except the upper two excavation levels) and surface-collected at Site VK-20. Most of the beads from VK-10 are very thin, about 0.5 to 1 mm, and have diameters ranging from 9 to 12 mm. In contrast, the VK-20 beads are thicker (2 mm) and have diameters averaging 5 mm.

Conus-Shell Disks. Four disks made from the spires of *Conus* sp. shells were found at Sites VK-10 and VK-13. The excavated specimen from Site VK-10, from the lowest excavation unit, is ground flat on both sides and has a central perforation (Fig. 18); its diameter is 44 mm and thickness is 7.5 mm. The other three specimens are unfinished, with partial grinding. These disks may represent the breast ornaments illustrated in Plate 185 of d'Urville's *Atlas* (Fig. 17).

Shell Pendants. Two shell pendants were excavated from the central portion of the VK-10 deposit. One of these is of *Spondylus* shell and measures 25 mm long and 13 mm wide, with a perforation for suspension at one end. This pendant is of the same "biconvex" type described from the Tikopia Sinapupu Phase (Kirch and Yen 1982:245). The second specimen, a burned fragment, is probably of the same type and may also be of *Spondylus* shell. (Alteration due to burning makes identification uncertain.)

MISCELLANEOUS ARTEFACTS

Stone Sinker. A grooved sinker of volcanic stone, possibly for use as a net weight, was collected from the surface of Site VK-10. The sinker was made from an ovoid cobble, 86 mm long, with the groove pecked laterally around the cobble.

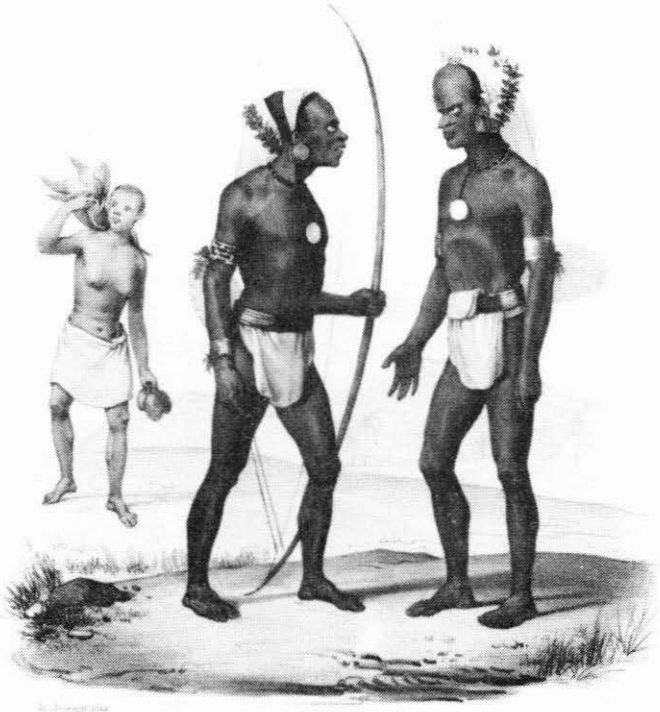

Figure 17: "Costumes des habitans de Vanikoro" by de Sainson, 1828. The two men are wearing *Trochus*-shell armbands, shell breast ornaments, and ear plugs (from D'Urville *Atlas*, P1. 185).

Figure 18: Miscellaneous artefacts from Vanikoro sites.
Upper row (l to r): *Conus*-shell beads, *Tectus*-shell ring, *Spondylus*-shell pendants, *Trochus*-shell armband fragments;
middle row: ground *Arca* shell, bone point fragments, *Conus*-shell disk;
lower row: slingstone, stone "knife", worked haematite pieces.

Slingstone. A roundish object of porphyritic volcanic stone, with a conical point at one end (Fig. 18), was probably used as a slingstone (length 55 mm, diameter 47 mm). This object was surface-collected at Site VK-10.

Bone Points. Two fragments of what appear to be spear or arrow points were excavated from the central portion of the VK-10 deposits. Both have been partially burned, and, although they are from different test pits, the fragments may be from the same original object. They are made of mammal bone and gradually taper toward a point.

Worked Pearl Shell. Fragments of worked pearl shell were recovered from Sites VK-10 and VK-20. The large pieces from VK-20 may have been part of a breast ornament.

Stone "Knife." A thin flake of porphyritic volcanic stone from Site VK-20 (70 by 44 mm) may have been used as a knife or scraper.

Worked Arca Shell. A valve of *Arca* shell, surface-collected at Site VK-21, has been ground down on its interior edges; it may be an unfinished ornament of some sort.

Worked Haematite. A number of small pieces of what appears to be haematite (or a similar reddish-brown volcanic weathering product), with evidence of grinding on one or more surfaces, were found at Sites VK-10 and VK-20. The ground haematite was probably used as a pigment.

European Objects. A few objects of European manufacture, such as iron fragments, a piece of ceramic, and two glass beads, were excavated from Site VK-7 and surface-collected from VK-20. It is not impossible that these derive either from the La Pĕrouse shipwreck or from trade with Dillon's or d'Urville's crews.

DISCUSSION AND CONCLUSIONS

As the pace of archaeological work in eastern Melanesia steps up, it is increasingly evident that the region has a complex prehistory, beginning with the intrusion of Austronesian speakers (presumably the Lapita potters) early in the second millennium B.C., and continuing with various later ceramic traditions (such as the Mangaasi of the Central New Hebrides and the Oundjo of New Caledonia). Based on the limited explorations undertaken in Vanikoro, we cannot yet present a clear outline of the island's prehistoric sequence or of its wider relationships throughout eastern Melanesia. Nevertheless, a few significant facts are beginning to emerge.

Given the presence of early Lapita sites in the Reef Islands and on Nendŏ Island (Green 1976c, McCoy and Cleghorn 1979), it would be surprising if one or more Lapita settlements do not turn up ultimately on Vanikoro. Sites containing Lapitoid plain ware are particularly likely. One can see Vanikoro from the central mountains of Nendŏ on a clear day, and these two islands, along with intervening Utupua, form an intervisible chain. Given the significant degree of subsidence on Vanikoro, the search for Lapita sites may prove difficult. In my view, the westerly part of Banie, with its extensive reefs and the possibility of a more stable shoreline, could well repay careful survey work.

With the possibility of an early Lapita phase still open, the Vanikoro sequence as known at present begins in the first two or three centuries A.D., with the cultural complex evidenced at the Emo Dune Site (VK-10). The Emo site materials are characterised by the presence of classic Mangaasi-style pottery, which does not appear to be locally manufactured but rather to be an imported item from the south, quite possibly from Espiritu Santo. Also present throughout the Emo site are *Tridacna*-shell adzes of Tikopia Type 4 (with distinctive pointed butts), abrading stones, a variety of shell ornaments (armbands, beads, disks, pendants), and several

other tools and implements. Subsistence during the phase represented by the Emo materials included an arboricultural element, indicated by the abundant *Canarium* nut remains. Both pig and chicken (presumably both domestic) are present, and wild fauna taken include fruit bats, the swamp hen, sea birds (Procellariidae), and turtle. Inshore fish are abundant throughout the midden.

Although we do not have terminal radiocarbon dates for the Emo Dune sequence, an age-depth curve suggests that the site may have been abandoned by the mid-second millennium A.D. There again appears to be a gap in the Vanikoro sequence, of perhaps as long as 500 years, for which there is at present no archaeological evidence. The other two excavated sites, VK-6 and VK-7, appear to have late prehistoric components, and these lack the Mangaasi ceramics, although Type 4 *Tridacna* adzes and *Trochus* armbands continue. To date, *Terebra* and *Mitra* adzes are restricted to these late sites. The evidence for subsistence suggests continuity from the earlier phase represented by Emo, with pigs, fruit bats, turtles, and inshore fishes represented in the midden.

In sum, we can at present define at least two phases of prehistoric occupation on Vanikoro, the first beginning early in the first millennium A.D. and probably extending to about A.D.1200, characterised by the importation of Mangaasi pottery. The transition between this "Emo Phase", as we may tentatively and provisionally term it, and the later, immediately pre-contact phase represented by the Epao and Pokobe-Mekimumule sites (provisionally the "Epao Phase") is as yet unclear. It seems likely, however, that there was a direct continuity of occupation on Vanikoro from the "Emo Phase" to the "Epao Phase", with the significant difference being the cessation of trade or exchange relationships with the northern New Hebrides and the possible initiation of exchange relationships with communities in the northern Santa Cruz group (see below).

At this point, some brief comparisons with the known prehistoric sequences of Tikopia and Santa Cruz may be instructive. The Tikopia sequence is at present the best known of any in the Santa Cruz area, and three major occupation phases have been defined by Kirch and Yen (1982). Occupation of the island began about 900 B.C. with colonisation by people using a Lapitoid plain ware; this Kiki Phase continued until about 100 B.C. A sharp transition occurred between the Kiki and succeeding Sinapupu Phases, marked in part by the cessation of local Lapitoid ceramic production and by the importation of Mangaasi-style pottery. This Sinapupu Phase, which is distinguished not only by the Mangaasi-style ceramics but also by the Type 4 *Tridacna*-shell adzes, "biconvex" pendants, and other objects, continued in Tikopia until about A.D.1200. The final prehistoric phase, the Tuakamali, witnessed the introduction of distinctly Polynesian elements to the island. Of particular relevance to Vanikoro is the Tikopia Sinapupu Phase, which corresponds in time quite closely with the tentative "Emo Phase" in Vanikoro. In both cases, the characteristic artefact types are Mangaasi ceramics, Type 4 adzes, and "biconvex" pendants. (Significantly, the Tikopia sites also contain Banks Islands obsidian, absent so far from Vanikoro.) Both the Tikopia and Vanikoro materials appear to be evidence of a period during which there were contacts with the northern New Hebrides, perhaps indicative of a formerly more extensive exchange network (Kirch 1982).

When we turn to the sequences of the Reef Islands and Nendö, the picture is somewhat different. The Reef Island sequence is not yet fully defined, although Green has excavated sites containing both classic Lapita pottery (such as RL-2, Green 1976c) and a later, largely plain ware, similar to that from the Tikopia Kiki Phase. Despite Green's extensive survey work on these small coral islands, no

evidence for Mangaasi pottery has ever turned up. On Nendö, work by Green and later by McCoy and Cleghorn (1979) has defined a long and continuous sequence, beginning with classic Lapita materials, continuing through a phase of Lapitoid plain ware similar to the Tikopia and Reef Island materials, and, in the first and second millennia A.D., through a series of aceramic horizons. Significantly, Mangaasi-style ceramics appear to be entirely absent on Nendö.

Work has also been conducted on several of the Duff Islands (Taumako) by F. Leach and J. Davidson (pers. comm.:1983). Though Lapitoid plain ware is present, there is no evidence of Mangaasi ceramics. However, the Duff Island sites do contain many examples of Type 4 adzes, as well as abrading stones identical to those from the Emo Dune site.

Despite some major gaps which remain in our knowledge (such as the large island of Utupua, between Vanikoro and Nendö), an outline of regional prehistory is beginning to emerge. Initial settlement by members of the Lapita Cultural Complex is known for the Reef Islands and Nendö and remains a possibility for Vanikoro and Utupua. A widespread Lapitoid plain ware phase follows, with representatives not only in the Reefs and Nendö but also in Tikopia and Anuta (Kirch, in press) and the Duffs. This plain ware subsequently disappears throughout the region about the end of the first millennium B.C. In the Reefs, Nendö, and the Duffs, it is evidently replaced by aceramic assemblages. In Tikopia and Vanikoro, however, the first millennium A.D. is marked by the intrusion of Mangaasi-style ceramics, indicating contact with the New Hebrides. It seems likely that the presence of Mangaasi pottery in these sites does not signal a cultural replacement but rather the initiation of exchange or trade relationships between Tikopia and Vanikoro with the Banks, Torres, and/or Espiritu Santo to the south. The exact nature of these relationships remains a significant problem for future investigations. (Were it not for the presence of Banks Islands obsidian in Tikopia and its absence in Vanikoro, one might propose that the Mangaasi pottery in Tikopia derived from contact between these two islands, rather than directly from the Banks. At this point, however, it seems more likely that both Tikopia and Vanikoro had direct contacts with islands to the south.)

In the case of Vanikoro, a major realignment of exchange relationships obviously occurred some time in the second millennium A.D. At the time of European contact—and well into the present century—Vanikoro formed the southern node of the well-documented red-feather money exchange system of the Santa Cruz Islands (Davenport 1962). Determining when the focus of Vanikoro's external relations shifted from the northern New Hebrides to the Santa Cruz Islands remains a problem for future investigation.

In sum, although we have as yet only glimpsed portions of Vanikoro's prehistory, and there may be another two millennia of sequence yet to define, the results obtained in our brief exploration have significant implications for regional prehistory. It is increasingly clear that, in eastern Melanesia, islands are *not* isolated microcosms and that the definition of external relationships will be critical to understanding the course of local cultural developments. The sphere of Mangaasi-style ceramics has been shown to extend outside of the New Hebrides proper to Vanikoro and Tikopia, with the implication of a formerly more extensive exchange network. Further definition of these networks, and of how they have changed and been realigned over time, are major tasks awaiting east Melanesian archaeology.

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APPENDIX A
LIST OF VANIKORO ARCHAEOLOGICAL SITES

SE-VK-1 Grindstone, Teanu Is.
SE-VK-2 Camp site, Teanu Is.
SE-VK-3 Fishtraps, Teanu Is.
SE-VK-4 Tetuwo camp site, Teanu Is.
SE-VK-5 Grindstone, Teanu Is.
SE-VK-6 Pokobe-Mekimumule village site, Teanu Is.
SE-VK-7 Epao village site, Nomianu islet, Teanu Is.
SE-VK-8 Vetele village site, Nomianu islet, Teanu Is.
SE-VK-9 Aneve village site, Nomianu islet, Teanu Is.
SE-VK-10 Emo dune site, Teanu Is.
SE-VK-11 Ngapiangga village site, Banie Is.
SE-VK-12 Nekusoe village site, Banie Is.
SE-VK-13 Vano village site, Banie Is.
SE-VK-14 Ngama village site, Banie Is.
SE-VK-15 Nemmawate village site, Manieve Islet
SE-VK-16 Manieve rockshelter, Manieve Islet
SE-VK-17 Bonobono village site, Banie Is.
SE-VK-18 Pwa Vono camp site, Teanu Is.
SE-VK-19 Tamate Cave Site, Nomianu islet, Teanu Is.
SE-VK-20 Muie village site, Teanu Is.
SE-VK-21 Kulavanu village site, Banie Is.
SE-VK-22 Fishtraps, Teanu Is.
SE-VK-23 Temopine village site, Banie Is.
SE-VK-24 Village site, Banie Is.

APPENDIX B
SAND TEMPERS IN SHERDS FROM VANIKORO

W. R. Dickinson

Four sherds collected by P. V. Kirch on Vanikoro in the Santa Cruz Group were examined in thin section. Although the compositions of the sand tempers vary somewhat (see Table 9), all are volcanic sands containing a variety of volcanic rock fragments and derivative mineral grains. The tempers resemble those observed in sherds from Tikopia that were probably imports there (see Dickinson in Kirch and Yen 1982). Furthermore, they closely resemble parts of the spectrum of temper sands observed in sherds from Santo, inferred to be indigenous there in the New Hebrides. Similarities among the three groups of sherds include comparable ranges of grain types overall, equivalent mixtures of wholly glassy or vitric and partly microlitic or pilotaxitic volcanic rock fragments, variable mixtures of pyroxene and hornblende among

the pyriboles, and a similar moderately sorted and subangular texture suggestive of origin as stream sand. Although none of these features is conclusively diagnostic of Santo as the origin of the tempers in sherds from Tikopia and Vanikoro, their combination is strongly suggestive of such an origin. Alternatively, the related sands may have come from geologically similar sources located in the three places. Given the variability in the compositions of each of the three sets of tempers, the petrographic evidence neither proves nor precludes essential identity of origin.

TABLE 9
FREQUENCY PERCENTAGES OF SAND GRAIN TYPES IN VANIKORO SHERDS (FROM TRAVERSE COUNTS OF 200 GRAINS)

Grain Type	S-19	S-20	TP-1-68	TP-1-81
Plagioclase feldspar	47	16	43	38
Volcanic rock fragments	39	58	38	38
Pyroxene grains	6	16	8	3
Hornblende grains	3	—	4	—
Opaque iron oxides	6	10	7	21

REFERENCES

Chappell, J. 1982. Sea levels and sediments: some features of the context of coastal archaeological sites in the tropics. *Archaeology in Oceania* 17:69-78.

Codrington, R. H. 1891. *The Melanesians: Studies in Their Anthropology and Folklore.* Clarendon Press, Oxford.

Darwin, C. 1851. *The Structure and Distribution of Coral Reefs.* University of California Reprint Edition (1962), Berkeley.

Davenport, W. H. 1962. Red feather money. *Scientific American* 206:94-103.

Davenport, W. H. 1964. Notes on Santa Cruz voyaging. *Journal of the Polynesian Society* 73:134-142.

Davenport, W. H. 1968. Social organization notes on the southern Santa Cruz Islands: Utupua and Vanikolo. *Baessler-Archiv* (N.F.) 16:207-275.

Davidson, J. W. 1975. *Peter Dillon ofVanikoro: Chevalier of the South Seas.* Oxford University Press, Melbourne.

Dennis, R. A. in press. Vanikolo. *In Geology of the Eastern Outer Islands.* Government Printer, Honiara.

Dillon, P. 1829. *Narrative and Successful Result of a Voyage in the South Seas . . . to Ascertain the Actual Fate of La Pērouse's Expedition . . .*(2 vols.). Hurst Chace, London.

Dumont D'Urville, J. S. C. 1833. *Voyage de la Corvette l'Astrolabe . . . 1826-9. Histoire du Voyage* (5 vols. + 2 atlas vols.). Tastu, Paris.

Gaimard, M. 1834. Vocabulaires des idiomes des habitans de Vanikoro. *In* J. S. C. Dumont D'Urville, *Voyage de la Corvett l'Astrolabe, Phiologie Part 2*: 165-174. J. Tastu, Paris.

Garanger, J. 1972. *Archēologie des Nouvelles-Hēbrides.* Publications de la Sociētē des Oceānistes, No. 30. Paris.

Green, R. C. 1976a. An introduction to the Southeast Solomon Islands Culture History Programme. *In* Green, R. C. and Cresswell M. M., (Eds), *Southeast Solomon Islands Cultural History*: 9-17. Royal Society of New Zealand, Bulletin 11, Wellington.

Green, R. C. 1976b. Languages of the Southeast Solomons and their historical relationships. *In* Green, R. C. and Cresswell, M. M. (Eds), *Southeast Solomon Islands Cultural History*: 47-60. Royal Society of New Zealand, Bulletin 11, Wellington.

Green, R. C. 1976c. Lapita sites in the Santa Cruz group. In Green, R. C. and Cresswell, M. M. (Eds), *Southeast Solomon Islands Cultural History*: 245-265. Royal Society of New Zealand, Bulletin 11, Wellington.

Green, R. C. and Cresswell, M. M. (Eds). 1976. *Southeast Solomon Islands Cultural History: A Preliminary Survey.* Royal Society of New Zealand, Bulletin 11, Wellington.

Green, R. C. and Davidson, J. (Eds). 1974. *Archaeology in Western Samoa, Vol. II.* Auckland Institute and Museum Bulletin, No. 7, Auckland.

Hughes, P. J. and Djohadze, V. 1980. Radiocarbon dates from archaeological sites on the south coast of New South Wales and the use of depth/age curves. *Occasional Papers in Prehistory No. 1.* Department of Prehistory, Australian National University, Canberra.

Hughes, P., Hope, G., Latham, M., and Brookfield, M. 1979. Prehistoric man-induced degradation of the Lakeba landscape: evidence from two inland swamps. In Brookfield, H. (Ed.), *Lakeba: Environmental Change, Population Dynamics, and Resource Use*: 93-110. UNESCO, Paris.

Jones, R. 1980. Different strokes for different folks: sites, scale, and strategy. *In* Johnson, I. (Ed.), *Holier Than Thou*: 151-171. Department of Prehistory, Australian National University, Canberra.

Kirch, P. V. 1981. Lapitoid settlements of Futuna and Alofi, Western Polynesia. *Archaeology in Oceania* 16:127-143.

Kirch, P. V. 1982. Mangaasi-style ceramics from Tikopia and Vanikoro and their implications for east Melanesian prehistory. *Indo-Pacific Prehistory Association Bulletin* 3:67-76.

Kirch, P. V. in press. A revision of the Anuta sequence. *Journal of the Polynesian Society.*

Kirch, P. V. and Rosendahl, P. H. 1973. Archaeological investigation of Anuta. *In* Yen, D. E. and Gordon, J. (Eds), Anuta: A Polynesian Outlier in the Solomon Islands: 25-108. *Pacific Anthropological Records* 21. B. P. Bishop Museum, Honolulu.

Kirch, P. V. and D. E. Yen. 1982. *Tikopia: The Prehistory and Ecology of a Polynesian Outlier.* B. P. Bishop Museum Bulletin 238, Honolulu.

Klein, J., Lerman, J. C., Damon, P. E., and Ralph, E. K. 1982. Calibration of radiocarbon dates: tables based on the consensus data of the Workshop on Calibrating the Radiocarbon Time Scale. *Radiocarbon* 24:103-150.

Leenhouts, P. W. 1955. *The Genus Canarium in the Pacific.* B. P. Bishop Museum Bulletin 216. Honolulu.

McCoy, P. C. and Cleghorn, P. L. 1979. Summary report of recent archaeological investigations on Santa Cruz (Nendö). Department of Anthropology, B. P. Bishop Museum, Ms. No. 020679, Honolulu.

Ray, S. H. 1926. *A Comparative Study of the Melanesian Island Languages.* Cambridge University Press, Cambridge.

Sanborn, C. C. 1931. *Bats from Polynesia, Melanesia, and Malaysia.* Field Museum of Natural History, Zoological Series Vol. XVIII, No. 2. Chicago.

Spriggs, M. 1981. Vegetable Kingdoms: Taro Irrigation and Pacific Prehistory. Ph.D. Dissertation, Australian National University, Canberra.

Tate, G. H. H. 1951. *The Rodents of Australia and New Guinea.* American Museum of Natural History Bulletin 97:189-430.

Taylor, R. C. 1973. *An Atlas of Pacific Islands Rainfall.* Hawaii Institute of Geophysics Data Report No. 25, University of Hawaii, Honolulu.

Tua, B. 1979. *Our Custom Way Vanikoro: The Custom Book.* P. C. Lincoln (Ed.). University of Auckland Bindery, Auckland.

Wall, J. R. D. and Hansell, J. R. F. 1976. *Land Resources of the Solomon Islands, Vol. 8, Outer Islands.* Land Resources Division, Ministry of Overseas Development, Land Resource Study 18, Surrey.

Ward, G. K. 1979. Prehistoric Settlement and Economy in a Tropical Small Island Environment: The Banks Islands, Insular Melanesia. Ph.D. Dissertation, Australian National University, Canberra.

Yen, D. E. 1974. Arboriculture in the subsistence of Santa Cruz, Solomon Islands. *Economic Botany* 28:247-284.

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