– ARTICLE –

Pottery Production and Exchange in the Last Millennium in the Western Solomon Islands: a ceramic sequence for Choiseul

Charles J.T. Radclyffe[1*], Glenn R. Summerhayes[1], James M. Scott[2], & Richard Walter[1]

ABSTRACT

Introduced to the western Solomon Islands over two and a half millennia ago, pottery-making in the region has a long but patchily documented history. Previous research has focused predominantly on the earliest incised and applied relief ceramic wares associated with the arrival of Austronesian migratory groups in the Late to immediate Post-Lapita period (*ca.* 2800–2000 cal BP). Reported here are findings from stylistic and compositional analyses carried out on incised and impressed pottery recently recovered in the region which date to within the last millennium. Methods employed include a formal analysis (vessel form and decorative attributes) and a combination of macroscopic fabric analysis and geochemical analysis (SEM-EDS). Findings from the excavation and dating of newly discovered ceramic deposits in southeast Choiseul and the Arnavon Islands are also presented. The chronological data is drawn together with the pottery analyses to form a ceramic sequence for Choiseul. Overall, the study provides insight into the development of a poorly understood period of pottery production and exchange in the western Solomon Islands, and contributes towards reconstructing a more complete ceramic record for the region.

Keywords: Solomon Islands; incised and impressed pottery; plainware; geochemistry; interaction.

INTRODUCTION

A major focus over the last three decades of archaeological research in the western Solomon Islands has been on incised and applied relief pottery found in intertidal sites which date to the Late to immediate post-Lapita period (*ca.* 2800–2000 cal BP) (Reeve 1989; Sheppard *et al.* 1999; Felgate 2003, 2007; Summerhayes and Scales 2005; Findlater *et al.* 2009; Buhring *et al.* 2015; Thomas *et al.* 2020). Ceramic studies undertaken in this region, which will hereby be referred to as the Western Solomons (Figure 1), have shown that coastal communities during this period were highly interactive and were engaged in both regional and long-distance networks of exchange (Tochilin *et al.* 2012; Sheppard *et al.* 2015). They have also demonstrated that pottery-making was widely practiced and that a diverse array of fabrics were used, including volcanic beach sands, stream sands and less commonly, calcareous beach sands (Felgate and Dickinson 2001; Ramezanian-Abhari 2004; Findlater *et al.* 2009; Azémard 2011; Buhring *et al.* 2015; Thomas *et al.* 2020). In a recent paper, Thomas (*et al.* 2020) have put forward a likely proposition that this behaviour of adaptable, local procurement and heightened interaction was attributable to a pattern of increasing environmental knowledge, access and social connectivity characteristic of an early colonisation and dispersal phase into the Western Solomons.

Compared to our understanding of the Late to Post-Lapita ceramic record in the Western Solomons, little is known about the development of pottery production and exchange in the region during the last millennium. It has long been recognised that more simplified plainware and incised pottery were manufactured in the region some time during this period (Reeve 1989: 61). Although no ceramic sequence has been created and archaeological documentation of these wares has remained ill-defined. A major contributing factor to this is the lack of archaeological field research that has been carried out in parts of the Western Solomons, particularly Choiseul. Following recent field investigations carried out as part of the lead author's doctoral research in southeast Choiseul and on the nearby Arnavon Islands, a more refined chronology and assessment of the production and distribution of these ceramic wares has been generated.

This study aims to contribute towards addressing our lack of understanding about the development of pottery production and exchange in the Western Solomons in the

1 Archaeology, School of Social Sciences, University of Otago
2 Department of Geology, University of Otago, New Zealand
*Corresponding author: c_radclyffe93@hotmail.com
Submitted 25/1/21, accepted 8/4/21. First online 14/4/21.

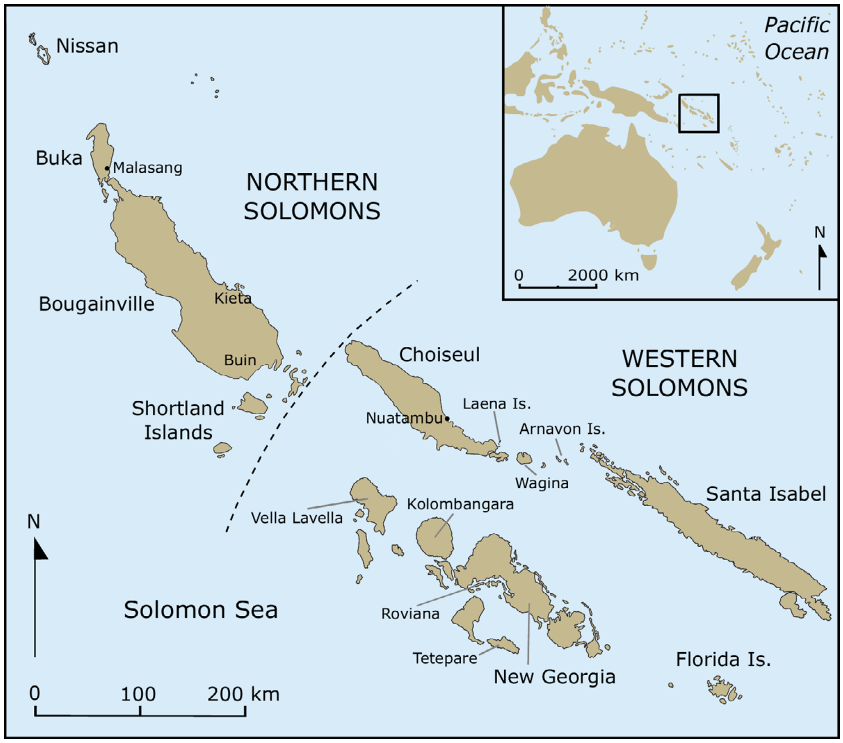

Figure 1. Map of western and northern Solomon Islands showing location of Choiseul, Arnavon Islands and other islands mentioned in text. Smaller map shows location of Solomon Islands in relation to the western Pacific.

last 1000 years. Stylistic and compositional findings from seven ceramic assemblages collected in southeast Choiseul and on the Arnavon Islands are examined. A ceramic sequence comprised of two traditions - an earlier incised and impressed tradition and a later plainware tradition - is presented for Choiseul that encompasses most of the last millennium. Factors leading to the emergence and decline of these ceramic traditions are discussed, and comparisons are made between the development of a pottery industry on Choiseul during this period to others documented in the Northern Solomons. Before the ceramic sites and findings from the pottery analyses are described, an overview is given of important cultural developments that arose in the last two millennia in the Western Solomons and ceramic traditions that developed from around 1500 to 1000 BP nearby in the Northern Solomons.

THE LAST 2000 YEARS IN THE WESTERN AND NORTHERN SOLOMONS

Following the phasing out of the Late to Post-Lapita ceramic sequence at around 2000 BP, it has been argued, for at least the New Georgia group, that pottery-making was abandoned (Walter and Sheppard 2017:141). This was followed by a large aceramic gap in the archaeological record between 2000–1000 BP. A generalised movement inland at this time has been proposed to explain the disappearance of ceramics on coastal sites in the New Georgia group (Thomas 2009:122). Although Walter and Sheppard (2017:141) have insisted that it was very likely that the prime settlement locations near passages and fresh water, which were the favoured intertidal site locations, were continued to be occupied after the ceramic tradition ended. This has been supported, they highlighted, by pollen records from Roviana Lagoon which indicated near-continuous burning from around 2600 cal BP to the present (Grimes 2003:143). Only one site has been dated to within this time period, a small pottery and midden deposit called Rofe Hill which is located on the mainland of northwest Santa Isabel (Carter *et al.* 2012:64). The earliest phase of occupation of the deposit was dated to 1880–1610 cal BP (Wk24901) and petrographic analysis carried out on the plain pot sherds suggested they were manufactured in Choiseul (Radclyffe and Carter in prep.). Pottery-making is therefore likely to have continued after 2000 BP in parts of Choiseul, although the lack of ceramic sites dating to this time period make any assessment of the scale or extent of its production and distribution challenging.

From around 800 cal BP, the archaeological record of the New Georgia group and across much of the Western Solomons is more visibly dominated by coral and stone religious sites, residential complexes and a wide range of shell rings and valuables (Sheppard and Walter 2000). In the New Georgia group, thin plainware and incised pottery has occasionally been found among these sites. For example, they have been recorded at Site 25 on the New Georgia mainland which dates to 550–330 cal BP (BP R-21360) (Buhring *et al.* 2015: 5) and at Site 730 on Nusa Roviana which is dated to around the seventeenth and eighteenth centuries AD (Wk-27364) (Nagaoka 2011: 180). Similarly in northwest Santa Isabel, they have been recorded in the upper cultural layers of two inland hillfort sites, Lokiha and Rofe Hill, which date to later than the sixteenth century AD (Radclyffe and Carter in prep.). The limited amount of petrographic and geochemical analyses that have been carried out on these assemblages have all demonstrated Choiseul to be the most likely point of manufacture (Dickinson and Shutler 1979: 1694; Dickinson 2006: 91–92; Nagaoka 2011: Appendix E). It has also been argued that pottery production during the last millennium became restricted to Choiseul and that transfer networks receded and became exclusively regional (Buhring 2011, *et al.* 2015). Importantly, prior to this study, no radiocarbon dating had been carried out on ceramic deposits in Choiseul therefore most of our knowledge about pottery made on the island was based on research done on pottery found in the New Georgia group.

Another significant cultural practice that arose on Choiseul sometime in the last millennium was the production of cylindrical shell rings called 'kesa'. These shell rings are distinctive to Choiseul, and traditionally large kesa were owned by chiefs and utilised for prestige purposes such as in brideprice marriage ceremonies or for the formation of alliances during warfare (Rooney 1912: 445). While smaller kesa were used as a medium of exchange and have been documented to have been traded for pottery in Chirovanga located in northwest Choiseul (Figure 2) as late as the mid-1960s (Itoh and Chikamori 1965: 15). One of the archaeological sites investigated as part of this study, Nuatambu which is located on the northern coast of central Choiseul, has been described in oral histories as the 'birthplace' of kesa (Piko 1976). The distribution of the shell valuable to islands in southeast Choiseul, including Laena Island, is likely to have coincided with inter-island trading of pottery, and this is discussed later in the article.

In the Northern Solomons, ceramic studies carried out by Specht (1969), Wickler (1990, 2001), Summerhayes (1987) and Spriggs (1991) have demonstrated that from approximately 800 cal BP a vibrant network of pottery production and exchange developed on Buka and encompassed Nissan and eastern New Ireland. This involved the production and trading of Malasang (800–500 BP), Mararing (500–300 BP) and Recent (<300 BP) pottery styles which were dominated by linear and comb incision (Wickler 2001: 131–33). Similarly in central Bougainville, a continuous ceramic sequence spanning the last 1500 years has been documented (Spriggs 1992, 2005). Spriggs (2005: 12) divided the sequence into three styles: Sivu (*ca.* 1500–1000 BP) which was a calcareous tempered plainware, Asio (*ca.* 1000–300 BP) which was decorated with lip notching and incision, and Pidia (*ca.* <300 BP) which was generally plain untempered

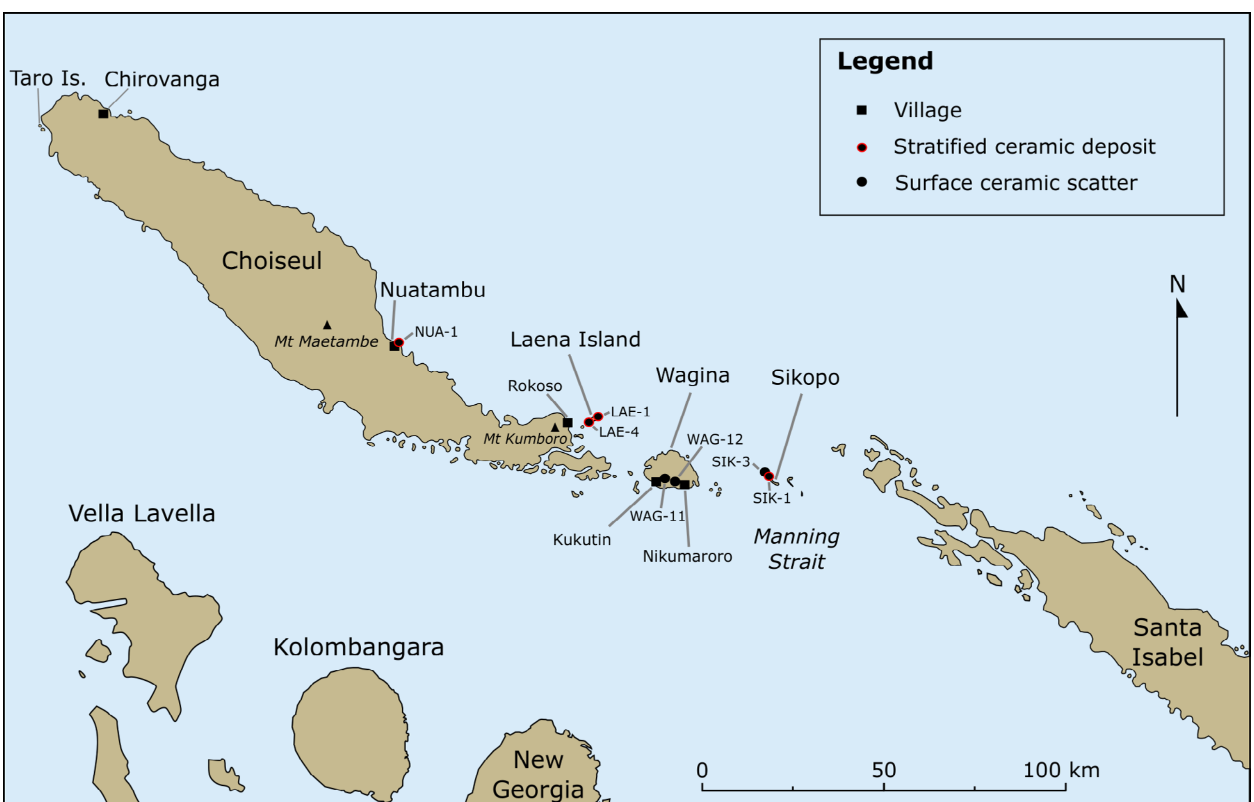

Figure 2. Map of Choiseul and neighbouring islands showing location of ceramic sites and other places mentioned in text.

thick ware with plain or notched rims. In Buin located in southern Bougainville, Terrell (1976) has also described a ceramic tradition almost exactly parallel to that of nearby Shortland Islands documented by Irwin (1972, 1974). In a joint study, Terrell and Irwin (1972) argued that this stylistic overlap, which is likely to trace back at least 1000 years, developed as a result of increasingly frequent interaction in the form of trading, intermarriage and warfare between Shortland Islands and Buin. This developing 'Bougainville Strait interaction system', named after the channel between southern Bougainville and Shortland Islands, they argued also encompassed parts of Choiseul (Terrell and Irwin 1972:340–41).

In Irwin's detailed formal analysis of pottery from Shortland Islands, he classified the ceramics into Early, Middle and Late Period ware, and produced one uncalibrated date for the Early Period pottery (1040 ± 95 BP, ANU-796) (Irwin 1972:100). The Early Period ware was plain, the Middle Period ware was dominated by incision and surface brushing, and carved paddle decoration was characteristic of the Late Period ware. In the Western Solomons, a 1.8 m deep stratified ceramic deposit investigated by Daniel Miller (1979) on Nuatambu provided some hint of similarly decorated pottery being produced. The deposit was not radiocarbon dated although Miller noted strong resemblances between the Nuatambu pottery and the Middle Period incised ware from Shortland Islands and suggested that it may be of a similar age. Pottery from Miller's excavation is included in this more comprehensive ceramic analysis.

CERAMIC SITES

Overviews of the surveying and chronology of the seven ceramic sites examined in this study are given below. The sites include a midden and ceramic deposit (SIK-1) and coral mound shrine containing pottery (SIK-3) recorded on Sikopo located in the Arnavon Islands, two ceramic scatters recorded on Wagina (WAG-11 and WAG-12), two shrine complexes containing pottery on Laena Island (LAE-1 and LAE-4) and a coastal village site located on Nuatambu (NUA-1) (Figure 2).

Sikopo

The Arnavon Islands are located in Manning Strait which is a roughly 70 km wide, deep-sea passage situated between northwest Santa Isabel and southeast Choiseul (Figure 2). They are made up of four small, raised coral-reef islands, of which Sikopo is the largest measuring approximately 2.3 sq. km in size. The island group is ecologically renowned as being the largest rookery of *Eretmochelys imbricata* (Hawksbill Turtle) in the South Pacific (Hamilton *et al.* 2015), and its inshore marine zone forms part of a marine conservation area. Apart from a conservation team who reside on Sikopo and the second largest island, Kerehikapa, seasonally to monitor turtle populations, the islands are uninhabited.

Archaeological investigations on the island group began in 2010 and were led by Southern Pacific Archaeological Research (SPAR) in partnership with The Nature Conservancy (TNC) and Arnavon Community Marine Conservation Area Management Committee (ACMCA). Coral mound shrines, rockshelters and a surface scatter of pottery measuring 700 sq. m in size were identified near the centre of Sikopo on a flatland located around two large, upraised coral outcrops. Following initial mapping and test-pitting of the pottery scatter in 2016, a $3 \times 3\,m^2$ excavation was carried out in the following year by a research team led by the lead author. It was placed within the highest concentration of the pottery which was located near an overhang created by one of the coral outcrops. The excavation exhibited a roughly one metre deep cultural deposit containing faunal remains, worked shell, pottery, flaked chert and a single obsidian flake which was sourced to Talasea in West New Britain (Radclyffe *et al.* 2019). In addition to this deposit, seven thick plain pot sherds were found approximately 150 m southeast of SIK-1 on the surface of a large coral mound shrine recorded as SIK-3. Examination of the sherds demonstrated they belonged to the same vessel and were most likely placed as an offering on the shrine alongside fragmented giant clam shell and *Trochus* shell. Interestingly, geochemical analysis of these sherds demonstrated them to be distinct from pottery recovered in SIK-1 and this is discussed later in the article.

The stratigraphy of SIK-1 consisted of two layers of brownish black soil and an underlying natural layer of marine sand identified at a depth of 85 cm (Figure 3). Layer 1 contained three sub-layers that were distinguished by their consistency, colour and the different features they contained. Layer 1a was a brownish black topsoil, loose and friable in consistency. Layer 1b was a continuation of the brownish black soil but was more gravel-like in consistency due to a higher concentration of coral and shell fragments. This layer contained dense clusters of burnt Trochus shells and Tridacna valves that appeared as discarded shell 'heaps'. Layer 1c was a black soil intermixed with fragmented coral, shell and was more abundant in charcoal than the upper contexts. Importantly, no shell heap features were distinguishable in this layer and it contained a possible floor surface feature at a depth of 65–70 cm.

A series of nine AMS radiocarbon dates were produced from charcoal and shell recovered in the excavation and from one of the initial test pits and these indicated two phases of prehistoric occupation (Table 1). The first dates to between 850–700 cal BP and is associated with a possible floor surface feature and nearby small clusters of charcoal and burnt shell identified in Layer 1c. The second dates to between 625–500 cal BP and is associated with the cooking and discarding of large quantities of shell that formed 'heaps' which were identified in Layer 1b. A paired sample were selected from the fourth test pit dug at SIK-1 following

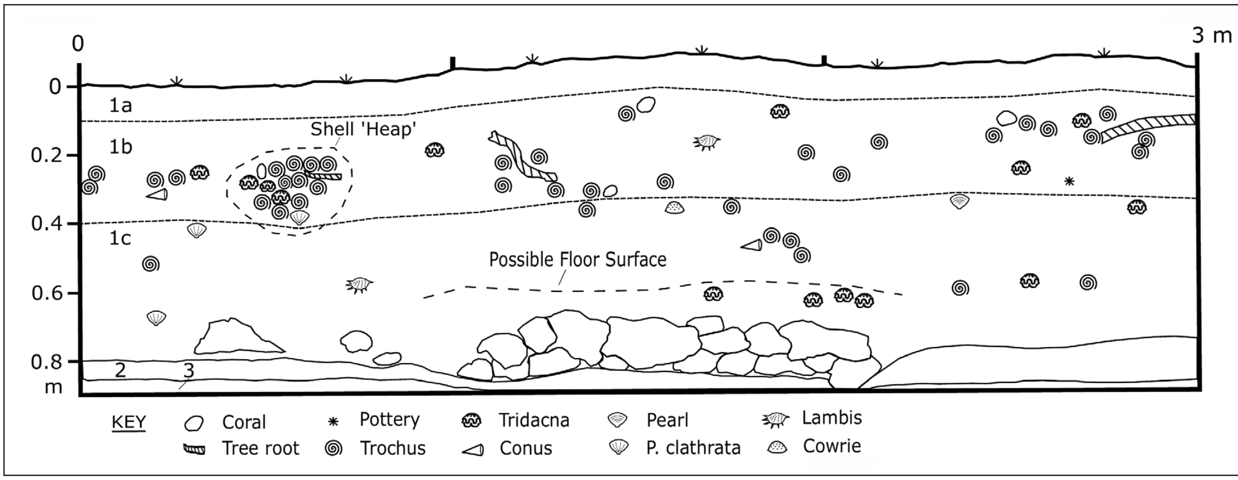

Figure 3. Stratigraphic profile of eastern section of SIK-1 excavation.

Table 1. *Radiocarbon dates produced from excavation of SIK-1. Calibrated age range and median determined using Oxcal 4.3.*

Lab Code	Material	Unit	Layer	Depth (cm)	Uncal. ^{14}C Age	CalBP Range (2σ)	CalBP Median
OZX440	Wood	I	2	80–90	900 ± 25	911 (45.4%) 841 835 (50%) 741	830
OZX441	Shell	H	2	80–90	1,055 ± 25	669 (95.4%) 555	628
OZX439	Nut	G	1c	70–80	855 ± 30	900 (7.4%) 867 824 (1.1%) 815 800 (86.8%) 692	760
OZX438	Nut	H	1c	70–80	805 ± 25	761 (95.4%) 680	714
OZX437	Wood	H	1c	60–65	845 ± 25	793 (95.4%) 694	751
OZX442	Nut	I	1b	30–40	540 ± 25	631 (24.9%) 600 560 (70.5%) 516	544
OZY103	Nut	F	1b	30–40	700 ± 25	686 (83.2%) 647 585 (12.2%) 566	665
OZX436	Wood	TP4	-	50–60	565 ± 25	640 (53.2%) 590 564 (42.4%) 528	600
OZX435	T. niloticus	TP4	-	50–60	1,025 ± 25	652 (95.4%) 542	601

the extraction of an unidentifiable charcoal wood fragment (OZX436) from the flotation of a *Trochus niloticus* shell (OZX435). This was done to assess what calibrated age ranges would be produced from these two materials and the results demonstrated close overlap between their age ranges. From this, it was determined that the shell sample (OZX441) found in Layer 2, which produced a younger calibrated age range than the wood charcoal found in the layer, is likely to have moved from higher in the deposit most likely from root disturbance.

Wagina

Wagina is located approximately 18 km west of the Arnavon Islands and forms the southeast tip of Choiseul (Figure 2). It is a large upraised coral reef island, measuring about 243 sq. km in size, and is characterised by a predominantly lagoonal reef and mangrove ecosystem which is similar to that of the Arnavons. There are two major villages on the island, Kukutin and Nikumaroro, which are located on its southern coastline. They are inhabited by Kiribati communities who were resettled by the British Colonial Administration in the 1950s and '60s (Tabe 2016).

Wagina has a reputation in local oral histories of serving as a battleground between head-hunting parties from Roviana and other parts of the New Georgia group, northwest Santa Isabel and Choiseul (Craven 1976; Miller 1979). For example, Miller documented from local informants during a survey of southeast Choiseul in the late 1970s that Wagina 'was uninhabited throughout the period of recorded history' and that its 'early inhabitants [had been] exterminated or driven away by Roviana head-hunters' (1979: 61). During a brief archaeological survey of the island, Miller recorded a few human burials and shrine sites that were likely to have been associated with the head-hunting tradition. He also recorded two small pottery scatters located near Kukutin which contained mainly plainware and some incised sherds.

More comprehensive surveying was carried out on Wagina as part of this study over three field seasons between 2017–2019. Unfortunately, no stratified ceramic deposits were identified although two large surface scatters were found. The first, WAG-11, was identified on the southern coast of the island on a high ridgeline behind Kukutin village. On the surface of a modern garden located on the ridgeline, pottery, chert flakes and oven stone were found which suggested it was likely a site of a village or hamlet. A low coral mound shrine which possessed shell arm rings was identified adjacent to the scatter, indicating an age of the site within the last 400 years (Thomas 2014).

The second scatter, WAG-12, was identified on a hilltop shrine complex located approximately one kilometre east of Kukutin. The shrine complex was located on top of a large coral outcrop and pottery found on its surface exhibited similar incised and impressed decoration as WAG-11. Artefacts were visible around the entire circumference of the outcrop as well as on the hilltop where large coral slabs had once been used as a burial place for shell valuables. A cranial fragment was found at the site as well as shell ring fragments, flaked chert, fish and shell remains, and a shell adze bevel fragment. The range of finds suggested the site was of a similar age to WAG-11, dating to later than 400 BP.

Laena Island

Laena Island is located about 4.5 km offshore the mainland of southeast Choiseul (Figure 2). The island is considerably smaller than Wagina, measuring approximately two sq. km in size, and is volcanic in origin. Its central peak, which exceeds 200 m asl, is likely to be a subsidiary cone of the nearby Mt Kumboro (Hansell and Wall 1976: 16). As is the case for much of mainland southeast Choiseul, Laena Island is underlain by basic and ultramafic volcanics which consist of andesitic breccia and tuff. Pockets of metamorphic rock – known as the Choiseul Schists formation – are also found throughout southeast Choiseul (Coulson 1985: 647). There are a few streams located on Laena Island although those containing fine, volcanic stream sands which were favoured in the production of pottery in the Western Solomons in the last millennium are more common on the mainland near the base of Mt Kumboro.

Laena Island was inhabited until the 1980s when the sole village there, known as Laena, was abandoned. Descendant families now live at the village of Rokoso located nearby on the mainland (Figure 2). The only archaeological surveying carried out on Laena Island prior to this study was a brief visit made by Miller (1979) who recorded a single ridgetop site near the old Laena village. Between 2017–2018, two field expeditions were carried out on the island as part of this study. Site coverage was prioritised as no systematic surveying had yet been undertake there. The surveying demonstrated that shrine complexes and ceramics were widespread on the island. Furthermore, as the pottery exhibited affinities with incised and impressed sherds from Wagina, the site was considered worth dating to provide a more robust temporal provenance for ceramics and shrines found on these islands.

Two sites were excavated and radiocarbon dated. The first was a coral wall shrine complex located at the far northern end of the island called Apuseva (LAE-1), named after an adjacent hill and sacred part of the island. The complex consisted of a coral stone altar located at its centre, an upper platform located behind it which skirted the bottom of Apuseva hill and two outer walls surrounding the altar. Two test pits were dug at the site. Test Pit 1 was placed directly adjacent to the stone altar to assess evidence of buried offerings and Test Pit 2 between the altar and inner stone wall. These revealed three cultural layers containing pottery, chert flakes, quartz used in the grinding of shell, pig tusk fragments and faunal remains, and a fourth natural white beach sand layer detected at a depth of about 60 cm. Radiocarbon dating conducted on two samples of burnt nutshell collected from the base of the cultural deposit of each test pit indicated occupation between 430–150 cal BP (Table 2).

The second site was a large rectangular coral slab structure that formed part of a shrine complex (LAE-4) located at the southern end of the island (Figure 4). The structure was constructed using over a dozen large coral slabs, some of which weighed in excess of 150 kg. Three test pits were excavated at the site. Test Pit 1 was placed within a surface scatter of pottery located in the southwest corner of the structure, Test Pit 2 in the centre of the structure to assess the presence of human burials or burial goods and Test Pit 3 was positioned directly adjacent to an upright coral slab to investigate the construction of the structure.

The test pits exhibited three upper cultural layers of dark brown sandy soil that varied in their degree of compaction, and an underlying friable to compact light brown soil that contained natural sedimentary stone. The natural layer was reached at a depth of about 130 cm. Few finds were made in these test pits compared to LAE-1, and the greater depth of this deposit was likely to have been due to the deeper removal of soil from the site to bury and position the coral slabs. Test Pit 1 exhibited the widest range of finds including pottery, oven stone, chert flakes and shellfish which were found in their highest density in the upper 50 cm. Two radiocarbon dates acquired from a nut or seed casing and soot scraped from a rim sherd, which was identified to belong most likely to the Myrtaceae family, collected near the base of the cultural deposits of Test Pits 2 and 3 suggested the construction of the structure was likely to have taken place between 650–550 cal BP (Table 2). The younger calibrated age of OZX444, which was produced from nutshell found at the same depth as a large oven stone in Test Pit 1, suggests it may have been

Table 2. *Radiocarbon dates produced from excavations of LAE-1 and LAE-4. Calibrated age range and median determined using Oxcal 4.3.*

Lab Code	Material	Site	Unit	Layer	Depth (cm)	Uncal. ^{14}C Age	CalBP Range (2σ)	CalBP Median
OZX445	Nut	LAE-1	TP2	3	40–50	260 ± 25	429 (20.6%) 375 324 (63.4%) 281 170 (11.4%) 151	302
OZX446	Nut	LAE-1	TP1	3	40–50	180 ± 30	298 (19.1%) 254 225 (51.9%) 136 115 (4.1%) 73 34 (20.4%) …	179
OZX450	Nut/seed	LAE-4	TP2	3	110–120	620 ± 30	659 (95.4%) 550	600
OZX443	Soot	LAE-4	TP3	3	80–90	660 ± 25	671 (47.5%) 632 599 (47.9%) 560	607
OZX444	Nut	LAE-4	TP1	2	40–50	415 ± 25	518 (88.5%) 451 445 (1.0%) 439 350 (5.9%) 334	490

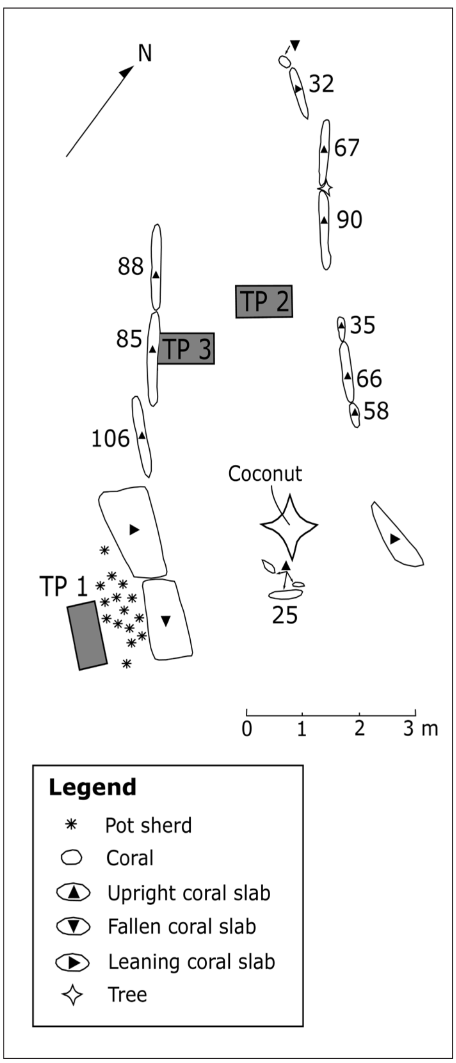

Figure 4. Plan of LAE-4 showing location of test pits. Numbers adjacent to upright coral slabs indicate height in cm.

deposited near the time of the structure's construction or is evidence of visitations made over succeeding generations. Overall, the radiocarbon ages from both LAE-4 and LAE-1 indicate the ceramic record and occupation of the island ranges to between 650–150 cal BP.

Nuatambu

Nuatambu is located on the northern coast of central Choiseul (Figure 2). It is a small islet measuring approximately 0.14 sq. km that is attached to another small offshore island by an intertidal sandbar. Most of the Seventh Day Adventist village that live in the area reside on the mainland although several families inhabit the southern beach of the islet where the densest concentrations of surface pottery and other artefacts lie (Figure 5). The underlying geology of this part of Choiseul is comprised predominantly of andesitic rock as well as extensively amphibolised basaltic rock created by Mt Maetambe (Ridgeway and Coulson 1987). Clay is available on Nuatambu and volcanic beach and stream sands are located nearby on the mainland.

Nuatambu translates to 'sacred island' in the local language of Kirungella. The island is highly revered in Choiseul as the birthplace of kesa and it has been described in oral histories that it was from the islet that these shell rings were first distributed to chiefs across Choiseul (Piko 1976: 100). In Rokoso, community members there described to the lead author that there was a historical connection between Laena Island and Nuatambu centred upon the mythological creation of kesa and voyaging along a coral reef 'road' that stretched between these islands. These community members believed that kesa was made by the god 'Bangara Laena' who collected shell-working tools from Laena Island initially before travelling to Nuatambu where he first began making kesa. No petrographic or geochemical testing of stone tools was carried out to explore this

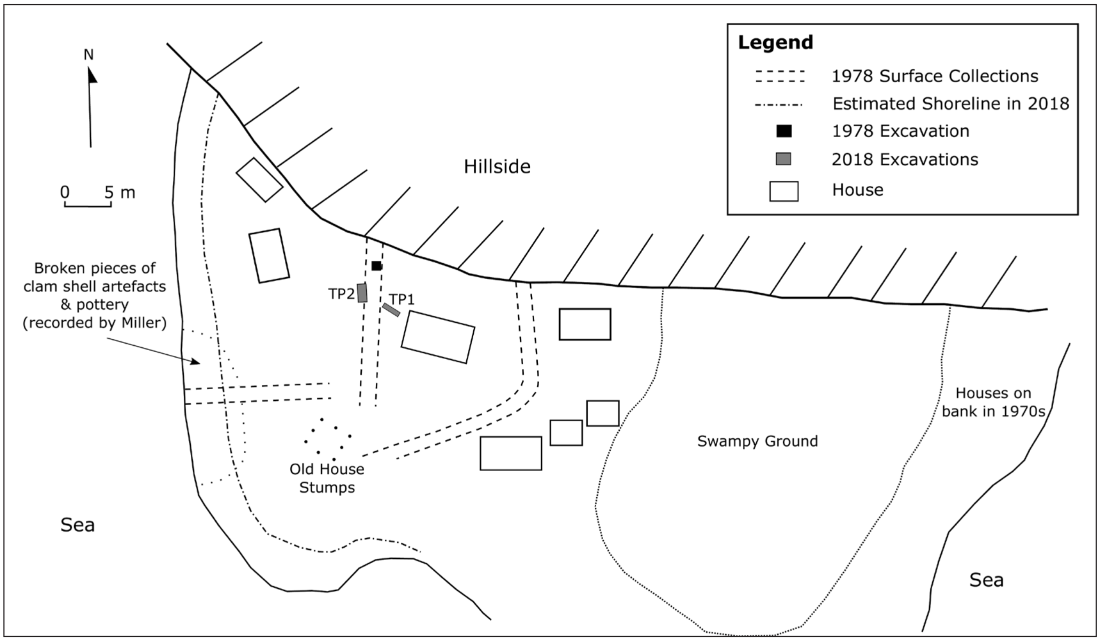

Figure 5. Plan of NUA-1 showing locations of Miller's (1979) excavation and 2018 excavations (adapted from Miller 1979: Fig. 4.1).

although evidence of the movement of pottery between these islands indicated by the geochemical results is discussed later.

Archaeological surveying on Nuatambu was first undertaken by Miller (1979) who recorded dense surface scatters of worked shell and pottery on the southern coast of the islet. He recovered over 350 pottery sherds from surface transect surveys and, as was mentioned earlier, revealed a 1.8 m deep cultural deposit in a test excavation. Since Miller's brief survey, the only other archaeological research that has been carried out on the island has been by the lead author and his fieldwork team who spent five days there excavating in 2018. Nuatambu was visited, however, in 2008 by Rhys Richards, ex-New Zealand High Commissioner to Solomon Islands, who documented observing hundreds of surface sherds of pottery including one [which appeared to be] of Late Lapita origin (Richards 2011: 139).

Visits made as part of this study resulted in similar observations of widespread surface scatters of pottery and worked shell on the islet. Unfortunately, excavations carried out during the 2018 field season were prematurely disrupted due to disagreements between local landowners. Consequently, no radiocarbon dating was able to be carried out and artefacts collected in the excavations were not able to be analysed. Instead, pottery originally collected by Miller are incorporated in the ceramic analysis. Before ceasing, the excavations revealed a similar stratigraphic layout described by Miller (1979: Fig. 4.2), with evidence of at least two successive phases of prehistoric settlement indicated by two distinct clay floor features identified at depths of 80 cm and 30–40 cm. The close similarities between the Nuatambu pottery and ceramics from Shortland Islands demonstrate that the site is likely to date within the last millennium. The presence, however, of a stylistically Late Lapita sherd found by Richards (2011) on the surface of Nuatambu suggests there may have been an earlier phase of occupation at the site which has been lost from coastal erosion or has not yet been identified.

METHODS

A formal analysis was carried out on the ceramic assemblages from each of the sites to assess variation between the vessel forms and decoration of the pottery. Following this, the fabrics of the pottery were analysed in two stages, first at a macroscopic level using a binocular microscope and then at a microscopic and geochemical level using a scanning electron microscope and energy dispersive x-ray spectrometer (SEM-EDS). Supplementary petrographic analysis and the same method of geochemical analysis was also undertaken on riverine sand samples collected from the mouth of Piripea River located about one kilometre north of Rokoso in southeast Choiseul (Figure 2). This was done to compare the mineralogical composition of the local riverine sands to the pottery fabrics.

Sample

Table 3 lists the total number of sherds collected from each site, the number of diagnostic sherds identified from each assemblage as well as the number of sherds that were sampled for the SEM analysis. 'Diagnostic' sherds refer to fragments of pottery that exhibit decoration or any indication of vessel shape (Shepard 1980). The most informative

Table 3. *Total number of sherds, diagnostic sherds and SEM sampled sherds from each site as well as the proportions of SEM samples in relation to Minimum Number of Vessels (MNV) calculated for each site using only rims.*

Site	Total	Diagnostic	SEM	% of rim MNV
SIK-1	856	135	17	47.1
SIK-3	7	–	1	100.0
WAG-11	525	114	5	71.4
WAG-12	459	157	10	60.0
LAE-1	182	30	4	30.0
LAE-4	417	186	12	60.0
NUA-1	694	246	21	45.0
Total	**3140**	**868**	**70**	**52.3**

sherds were those that exhibited both of these attributes, although it is common in archaeological assemblages for these sherds to comprise a small proportion of the total sherd haul.

Prior to selecting pottery samples to be geochemically analysed, diagnostic sherds from each assemblage were examined using an Olympus Microscope to assess the variation in fillers used to manufacture the pottery. This process involved examining the outer and inner surfaces as well as the cross sections of each sherd under 40 times magnification. Sherds were allocated into preliminary fabric groups based on a visual estimate of the most abundant types of mineral grains. Differentiating between these fabrics was done superficially on the appearance of the colour, size and shape of the inclusions as has previously been carried out on large ceramic assemblages in the Pacific (e.g. Summerhayes 2000; Wu 2016; Gaffney 2016). Although being a rudimentary process compared to petrographic analysis, the formation of preliminary fabric groups using this more time-efficient method served as a valuable first step before carrying out geochemical testing.

Sherds included in the SEM analysis were selected based on a hierarchical set of criteria that placed emphasis on targeting individual vessels, encompassing variation in fabric and decoration, and testing temporal and spatial patterns of pottery production and distribution. Rims were the preferred vessel portion to be selected and effort was made to ensure no two sherds from the same vessel were selected. Overall, the sites were sampled relatively equally to enable a comparable examination of the geochemical variability between pottery found on the islands (Table 3). The largest sample was taken from Nuatambu which demonstrated the widest range in decoration and fabric types identified from the formal analysis and macroscopic fabric analysis. Table 3 also highlights that although the number of sherds selected for SEM analysis represented a small proportion of each assemblage, over 50 percent of all vessels identified from rims collected from the sites were accounted for.

Formal Analysis

The method involved in the formal analysis of the ceramics, which is described in detail elsewhere (Radclyffe 2020: Chp. 6), drew from previous major ceramic studies that have been carried out in Solomon Islands (Specht 1969; Irwin 1972; Wickler 2001; Felgate 2003) and wider Island Melanesia (Irwin 1985; Summerhayes 2000). Emphasis was placed on the identification and comparison of similarities and variation within and between the ceramic assemblages with the aim to make inferences from these comparisons about prehistoric pottery production and distribution patterns.

Classifying the pottery into vessel forms involved assessing the entire variation in the shape of rim, neck, shoulder, carination and base sherds to identify reoccurring patterns in their form. This process began by working from the known – namely rims, large portions of pots and conjoined segments - then proceeding to the unknown, using smaller diagnostic sherds in combination with other attributes such as fabric and decoration. The most important factors in determining vessel form for this analysis were rim sherds and their orientation although all vessel portions were attempted to be integrated in the classification scheme.

The vessel forms are illustrated in Figure 6. Forms I and II include open bowls/pots possessing either outward orientated rims or direct rims, respectively. Form III, which are jars possessing horizontal rims, were not identified from the formal analysis of these assemblages but only in the examination of earlier Late Lapita assemblages from northwest Santa Isabel (Radclyffe 2020: 202–203). Form IV include outcurving pots, Form V are inverted and everted pots and Form VI include inward/direct restricted jars and pots. These vessel forms represent gross identifications of form, essentially 'vessel families', and are used to avoid the confusion of vessel typologies in which almost every variation of shape is categorised as a new vessel type (following Summerhayes 2000: 33).

Geochemical Analysis

Geochemical analysis was carried out on the pottery using a Hitachi Model TM3030 Tabletop Microscope with an attached Bruker Xflash Energy Dispersive X-ray Spectrometer (EDS) in the Otago Archaeological Laboratories. The software package used in the acquisition and processing of the EDS data was ESPRIT Compact, and ten elements were selected: Na, Mg, Al, Si, P, K, Ca, Ti, Mn and Fe. In preparation for analysis, the pottery samples were prepared in epoxy briquettes and carbon coated at the Centre for Electron Microscopy, University of Otago.

Analysing each sample using the SEM firstly involved examining its entire surface to visually assess the basic variation in the types of inclusions indicated by grain size, shape and atomic weight (grey to white shading). Backscattered electron images were then taken under 60 or 80 times magnification of an area of the sample which exhibited

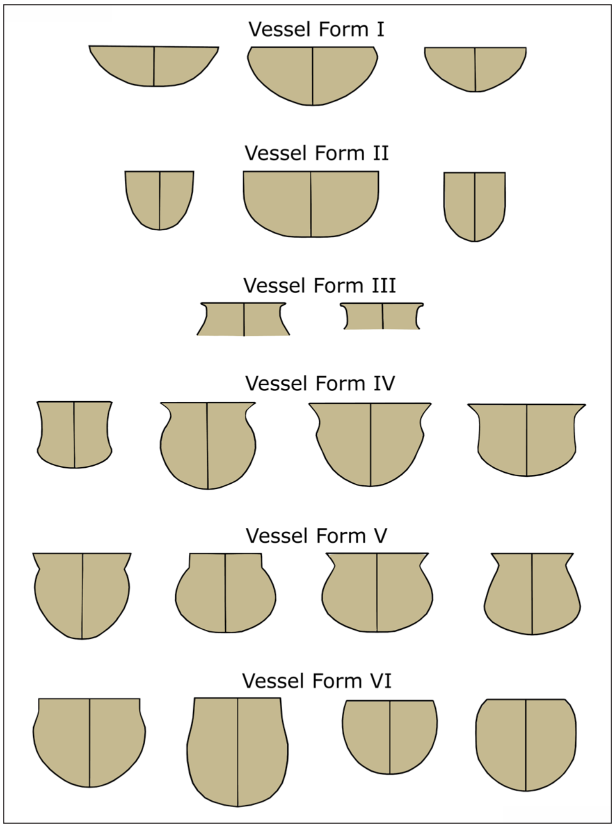

Figure 6. Vessel forms used in the classification of the ceramics.

the highest amount of variation in the types of inclusions. Map-scanning, which obtains a broad sweep of elemental compositional data of the entire electron micrograph, was carried out to assist in assessing mineralogical variation.

Following this, spot point analysis, which collects compositional data of a single point of the micrograph, was undertaken ideally on all minerals within the electron image. Occasionally when an excessive number of inclusions were present in the micrograph (>40 inclusions), the points were evenly distributed to sample as much variation as possible in the visual appearance (e.g. size, shape) and chemical colour-coding of the inclusions present in the backscatter and map-scan images. To assist in the identification of individual minerals, higher resolution images were occasionally taken between 300 and 600 times magnification to capture finer structural differences. Multiple spot points were also taken of composite inclusions identified in each sample and if determined to be a lithic fragment, the fragment was classified as either of volcanic, sedimentary or metamorphic origin.

Understanding the mineralogical variation of pottery assemblages is imperative to the classification of fabric groups and characterising them to regional geological zones. In this study, mineral identification was carried out by comparing the elemental composition of the inclusions, which were displayed in normalized stoichiometric concentrations, to elemental concentrations of geological reference samples in Deer *et al.* (1992, 2013) and the online Mineralogy Database (webmineral.com).

Supplementary Petrographic Analysis

Riverine sand samples collected in southeast Choiseul were petrographically analysed using thin sections. This was carried out to supplement mineralogical identifications made using the SEM which were sometimes made difficult due to different minerals possessing similar geochemical profiles. In previous ceramic studies in the Pacific, petrography has been demonstrated to be an effective way to characterise types of ceramic tempers in Oceania (Dickinson 2006) and has commonly been utilised in combination with SEM analysis and other geochemical techniques (e.g. Findlater *et al.* 2009).

RESULTS

Minerology of Sand Samples

Three sand samples, which were collected from the mouth of Piripea River located one kilometre north of Rokoso in southeast Choiseul (Figure 2), appeared moderately sorted with subrounded to subangular grains. The SEM analysis demonstrated they were homogenous in their mineralogical composition, comprised mainly of metamorphic lithic fragments, hornblendic amphiboles, Na-rich plagioclase feldspars (namely andesine and albite), epidote, iron oxides, chromite and titanite (Figure 7). Petrographic analysis verified the identification of these minerals.

Minor inclusions identified in the sand samples included quartz, alkali feldspars (orthoclase and sanidine), clinopyroxene (augite), phosphate and calcareous sands. Orthopyroxene (enstatite) was detected in one of the samples although these pyroxenes proved to be rare throughout the entire SEM analysis. Sporadically, 1 mm-sized lithic fragments were identified, although they typically ranged between 300–500 μ in size. The metamorphic lithic fragments were typically composed of epidote, plagioclase, titanite, actinolite and quartz. Geochemically, these clasts are characteristic of the Choiseul Schists formation found predominantly in southeast Choiseul (Coulson 1985: 634) and would classify as meta-volcanic using Dickinson's (2006: Table 4) grouping of Oceanic lithic fragments.

Minerology of Pottery

Table 4 presents results of the classification of the sherds into fabric groups and Table 5 exemplifies the types of mineral inclusions identified in a selection of sherds from each of the islands. Six main fabric groups were identified through the combination of the SEM and supplementary petrographic analyses. The calcareous fabric was identified from only one sherd from SIK-1 and the pyroxenic

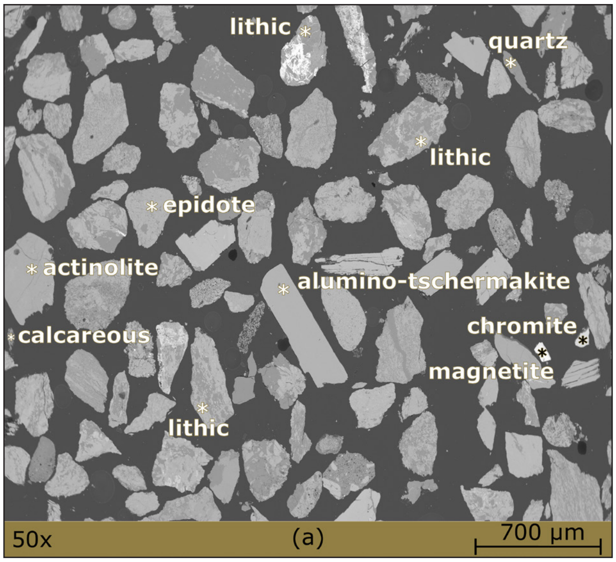

Figure 7. Electron micrograph of one of the Piripea River sand samples.

fabric was represented by two sherds from SIK-1 and LAE-4. The remaining fabrics were identified from all of the sites. No patterning was identified between the fabrics and vessel form, with open bowls, jars and pots all shown to be composed of a range of fabrics. Closer correlations were evident between the mineralogical composition of the assemblages and their most likely geological zone of origin or place of manufacture.

Calcareous

A single calcareous sherd identified from SIK-1 was dominated by shell and coral detritus, and contained minor amounts of titanium magnetite, plagioclase (andesine and labradorite), quartz and small (<100 µ) hornblende (Figure 8a). The small size and infrequency of the hornblende suggests it was likely to have been a natural clay inclusion.

Quartz and Feldspathic

Quartz and plagioclase feldspars, namely andesine, labradorite and oligoclase, were the most common mineral constituents for this fabric (Figure 8b). Minor variations between the sites included the Laena Island, Wagina and Sikopo sherds containing larger sized grains and a higher proportion of metamorphic clasts compared to the Nuatambu sherds. Metamorphic lithic fragments identified in the Nuatambu samples were composed mainly of ferro-actinolite-oligoclase-titanite-iron oxide. While the metamorphic fragments identified in sherds from the other three islands more closely resembled the mineral composition of the modern riverine sand samples. They were composed of albite, quartz, epidote, microcline or orthoclase, and titanite or chromite.

Amphibolic

Table 4 demonstrates that this fabric, which was composed mainly of calcic amphiboles, specifically actinolite and hornblende (Figure 8c), was the most dominant for all of the assemblages. The actinolite typically appeared sub-rounded to sub-angular while the hornblende was customarily prismatic in shape. The grains typically ranged in size between fine (<0.1 mm) to medium (0.1–2 mm), although particularly large hornblende appeared characteristic for some of the Nuatambu sherds with this fabric. Other important distinctions observed between the assemblages was the Nuatambu sherds containing minor amounts of calcareous inclusions, lower amounts of epidote and a higher proportion of igneous and sedimentary clasts than the remaining assemblages. Additionally, unlike the Nuatambu samples, a high proportion of the Laena Island, Wagina and Sikopo sherds contained a generally equal abundance of metamorphic lithic fragments and amphiboles.

Amphibolic and Feldspathic

This fabric was characterised by an equal abundance of amphiboles, namely actinolite and hornblende, and plagioclase feldspars, specifically andesine and labradorite (Figure 8d). Minor inclusions associated with this fabric varied between the assemblages, although it was common for iron oxides, ilmenite, quartz, epidote, clinopyroxene, and lithic fragments to be present. The lithic fragments were typically metamorphic and composed of albite/oligoclase-ferro-actinolite-titanite-iron oxide or epidote-oligoclase-orthoclase-gedrite-titanite.

Table 4. *Percentage of SEM samples from the sites assigned to each fabric type. Number of samples in brackets.*

Fabric	Sikopo	Wagina	Laena Island	Nuatambu
Calcareous	6% (1)	–	–	–
Quartz and feldspathic	11% (2)	7% (1)	18% (3)	10% (2)
Amphibolic	50% (9)	73% (11)	50% (8)	76% (16)
Amphibolic and feldspathic	21% (4)	13% (2)	13% (2)	4% (1)
Amphibolic hybrid	6% (1)	7% (1)	13% (2)	10% (2)
Pyroxenic	6% (1)	–	6% (1)	–

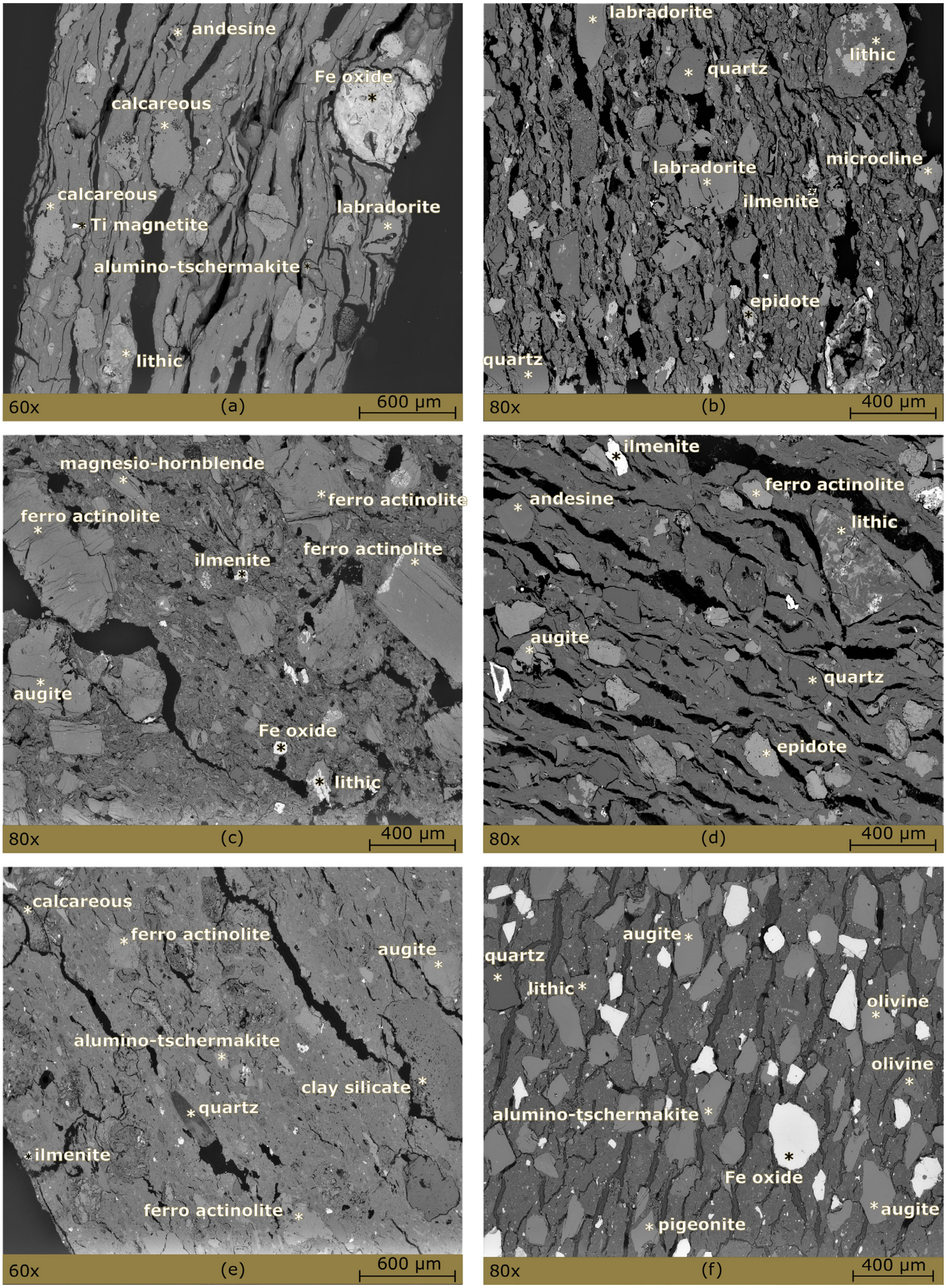

Figure 8. Electron micrographs of six fabric types with main minerals labelled. a) calcareous. b) quartz/feldspathic. c) amphibolic. d) amphibolic/feldspathic. e) amphibolic hybrid. f) pyroxenic. Sample a from SIK-1 and f from SIK-3; samples b, c and e from NUA-1; sample d from LAE-4.

Table 5. *Types of mineral inclusions identified in the main fabric groups. Fabric abbreviations: C = calcareous; QF = quartz/feldspathic; ; A = amphibolic; AF = amphibolic/feldspathic; AH = amphibolic hybrid; P = pyroxenic.*

Location	**Wagina**				**Laena Island**				**Sikopo**				**Nuatambu**					
Sample No	2534	3239	3166	3211	3371	3637	3576	4009	413	52	452	531	993	1511	944	1044	1547	1527
Fabric	QF	A	AF	AH	A	AF	AH	P	C	QF	A	P	A	A	FH	FH	AF	QF
Calcareous																		
Coral/shell detritus									X					X	X	X	X	
Amphiboles																		
Actinolite		X	X	X		X	X				X		X		X	X		
Magnesio-hornblende	X	X	X		X	X	X	X			X		X	X			X	X
Alumino-tschermakite				X	X		X		X		X	X	X	X	X	X		X
Cummingtonite																		X
Gedrite			X				X			X							X	
Clinopyroxenes																		
Augite	X	X	X	X	X	X	X	X		X		X		X	X			
Pigeonite	X		X					X				X						
Plagioclase feldspars																		
Albite	X	X			X	X	X			X								
Oligoclase	X	X	X		X	X	X			X	X		X	X	X	X	X	X
Andesine	X			X	X	X	X	X	X	X	X		X		X	X		
Labradorite	X		X			X	X		X					X		X		X
Bytownite	X					X												
Alkali feldspars																		
Orthoclase		X	X		X					X						X		X
Microcline	X									X								X
Anorthoclase		X	X											X			X	
Sanidine						X												
Other silicates																		
Epidote	X	X	X		X	X	X				X						X	X
Quartz	X	X	X		X	X		X	X	X		X		X	X		X	X
Olivine												X						
Oxides																		
Iron oxide		X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
Ilmenite	X	X	X	X		X	X				X		X	X	X	X		X
Ti magnetite	X		X			X	X	X	X			X	X	X	X		X	
Other																		
Sulphate										X								
Phosphate (apatite)					X	X												
Clay silicate				X											X	X		
Titanite	X				X		X											
Lithic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Amphibolic Hybrid

This fabric was characterised by a dominant amount of actinolite and hornblende as well as large (1–5 mm) white inclusions that were visible to the naked eye in cross section (Figure 8e). Geochemical analysis of these inclusions demonstrated them to be clay silicates. Table 4 shows that this fabric comprised a similar proportion of the samples from each site. Although, importantly, results of the macroscopic fabric analysis demonstrated this fabric to be the most dominant for the Nuatambu assemblage, with 19 percent of the diagnostic sherds being grouped in this fabric. The Laena Island, Wagina and Sikopo assemblages contrasted as only approximately 3.7 percent, 1.4 percent and 3.1 percent of the diagnostic sherds from these sites were classified in this fabric, respectively.

Pyroxenic

It was rare for the pottery to be composed almost exclusively of clinopyroxenes, and this fabric was identified from only one sherd from SIK-3 and one from LAE-4. The fabric of the Sikopo sherd was well-sorted and dominated by iron oxide and augite, and distinctively contained lesser amounts of olivine which was not identified in any of the other samples (Figure 8f). It closely resembled a pyroxenic fabric identified to be local to Roviana Lagoon (Ramezanian-Abhari 2004: 54) which suggests it may have been imported from the New Georgia group. The Laena Island sherd was similarly dominated by augite, pigeonite and iron oxides. It also may be exotic to Choiseul although as no olivine was detected it most probably derived from a different basaltic source to the SIK-3 sherd.

Ceramic Sequence

Following the stylistic and compositional analyses, the pottery was classified into three ceramic wares: Nuatambu Ware (*ca.* 1000–200 BP), Southeast Choiseul Incised and Impressed (SCII) Ware (850–200 cal BP) and Northwest Choiseul Plainware (*ca.* <200 BP). Grouping the pottery was based predominantly on the region in which they were most likely manufactured, vessel form and their decorative traits. Nuatambu Ware and SCII Ware belong to the same incised and impressed ceramic tradition that appears to have emerged in central and southeast Choiseul from around 1000 BP. This is supported by the temporal overlap of these wares and a fundamental stylistic commonality they share – the dominance of linear incision and single-tool impression. One decorative configuration that combined these techniques was particularly common for these two wares. It consisted of parallel linear incisions enclosing a series of short linear impressions that appeared on the shoulder of restricted vessels (Figure 9e, j–l and Figure 10d). The Northwest Choiseul Plainware represents a subsequent tradition that developed in the vicinity of Chirovanga as late as the last two centuries and was centred upon the production of more simplified plain open pots (Figure 10i–j). These wares are described in more detail below.

Nuatambu Ware (ca. 1000–200 BP)

Nuatambu Ware refers to pottery manufactured during approximately the last millennium at Nuatambu using local volcanic beach sands. The proposed date range is based on stylistic similarities observed between the Nuatambu pottery and Middle Period incised and brushed pottery from Shortland Islands which post-dates 1040 ± 95 BP (ANU-796) (Irwin 1972: 100). As Table 4 exhibited, the amphibolic fabric was the most dominant fabric for this ware followed by quartz/feldspathic and amphibolic hybrid. Large masses of calcic amphiboles, hornblende and plagioclase identified in these fabrics were characteristic of the Mt Maetambe-derived pyroclastic andesitic bedrock present in central Choiseul. Stylistically, this ware was characterised by the predominance of lip notching, linear incision, single-tool impression and the brushing or wiping of the vessel exterior (Figure 9). A few instances of comb incision were also identified (Figure 9n–o).

In contrast to the SCII Ware, the most dominant vessel form for the Nuatambu Ware were Form VI jars which possessed inward oriented spout-like mouths, an undefined neck, and narrow, gently shouldered bodies (Table 6). Form V everted and inverted globular pots were the second most dominant form for this ware and, notably, outcurving Form IV pots were relatively uncommon.

Southeast Choiseul Incised and Impressed Ware (850–200 cal BP)

SCII Ware refers to pottery found at SIK-1 and on the sites on Laena Island and Wagina which was made between 850–200 cal BP using stream or riverine sands local to the Kumboro region of southeast Choiseul. The date range is based on calibrated radiocarbon ages of SIK-1, LAE-1 and LAE-4. The amphibolic fabric was the most dominant fabric associated with this ware followed by quartz/feldspathic and amphibolic/feldspathic. An important distinction between the amphibolic fabric of this ware compared to the Nuatambu assemblage was the high proportion of metamorphic clastic-rich stream sands present which were characteristic of the Choiseul Schists formation.

Table 6 and Figure 10 demonstrate that in contrast to the Nuatambu Ware, SCII Ware was characterised by a predominance of Form IV outcurving pots with more noticeably flared rims. These vessels commonly appeared gently carinated or globular, although there was greater evidence for this ware compared to the Nuatambu Ware of sharply carinated outcurving vessels that were likely to have been as equally wide as they were tall (Figure 10h). Other distinctive traits observed for both the Laena Island and Wagina assemblages included the presence of inner

Table 6. *Minimum number of vessels (MNV) calculated for each site based mainly on rim data and inclusion of neck, shoulder and carination sherds where it was determined that they could not be associated with any of the rims. Sherds conjoined then counted as one.*

Site	I	II	IV	V	VI	Total MNV
SIK–1	1	–	10	–	10	21
SIK–3	–	–	1?	–	–	1
WAG–11	–	1	9	–	1	11
WAG–12	–	2	14	8	4	28
LAE–1	1	2	4	–	1	8
LAE–4	1	–	18	1	4	24
NUA–1	–	2	8	10	33	53

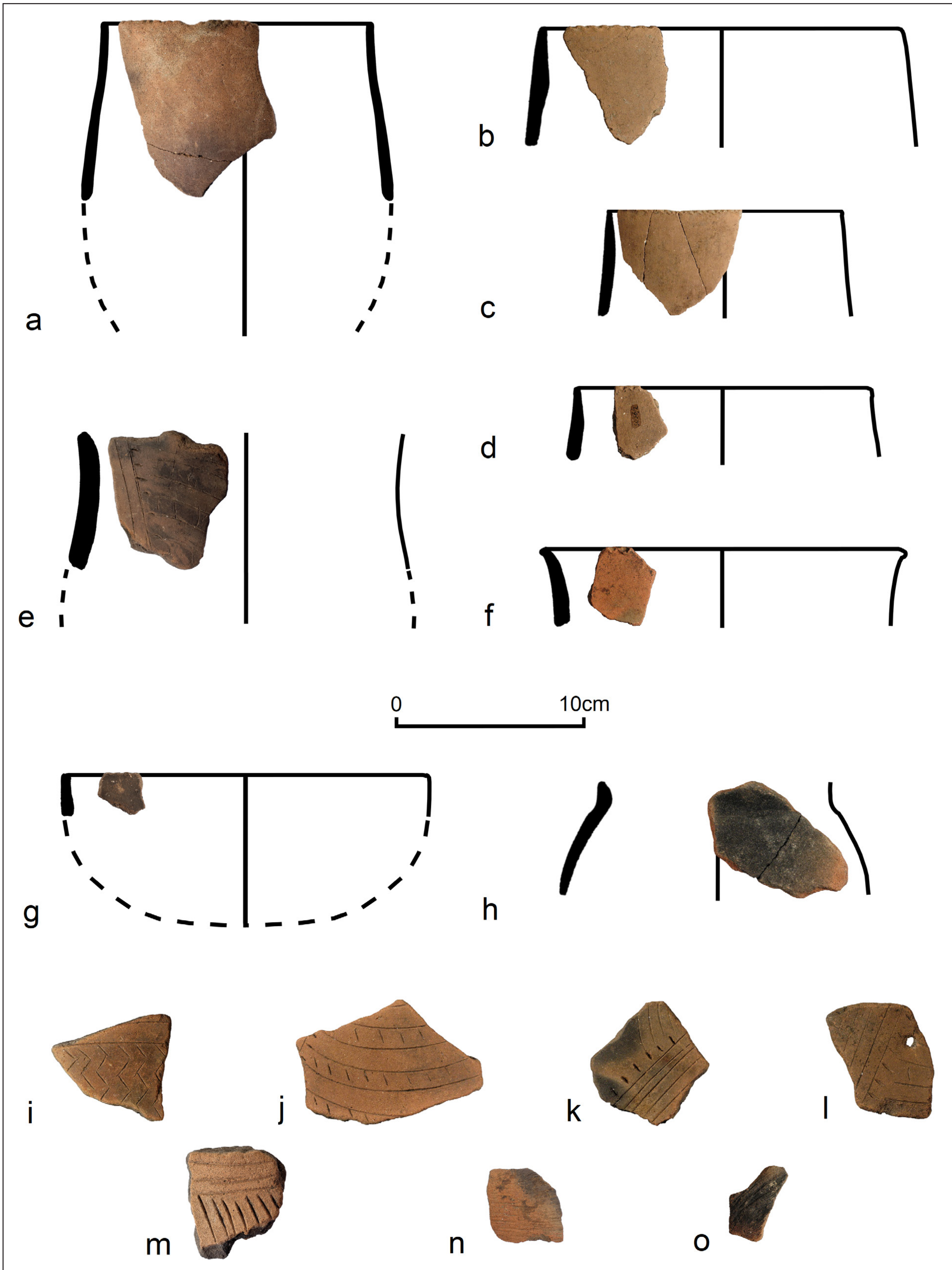

Figure 9. Nuatambu Ware exhibiting key examples of vessel forms and types of decoration.

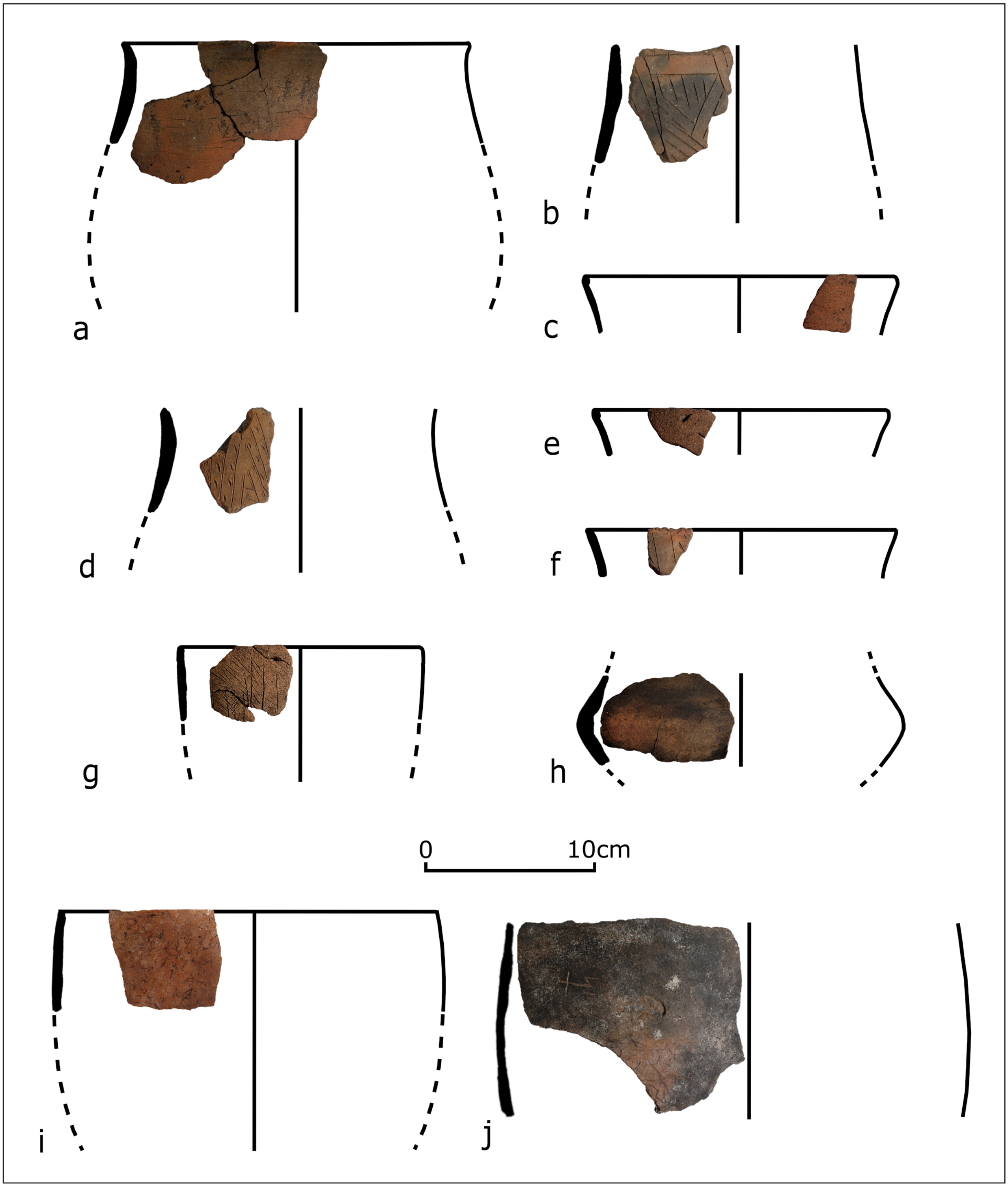

Figure 10. Southeast Choiseul Incised and Impressed (SCII) Ware (above scale) and Northwest Choiseul Plainware (below scale) showing key examples of vessel forms and types of decoration.

lips on several outcurving rims, created either through the application of thin strips of clay or the pressing of excess clay to the rim (Figure 10c, e). Additionally, unrestricted bowls and pots from both these sites were typically decorated with thickened outer lips and incised patterns running diagonally to the central vessel axis.

Northwest Choiseul Plainware (ca. <200 BP)

Northwest Choiseul Plainware refers to plain pots made in the last few centuries in northwest Choiseul, specifically in the vicinity of the historic potting centre of Chirovanga. The proposed date range is based on radiocarbon dating of similarly styled pottery recorded at Site 73 on Nusa Roviana which dates to around the seventeenth and eighteenth centuries AD (Nagaoka 2011: 180). This ware is greatly simplified compared to the previous styles, appearing plain apart from rim notching, very thin (2–5 mm) and bowl-like in form. Examples of this ware, such as the vessel found as part of this study at a skull shrine site in southern Wagina (Figure 10i–j), have been widely documented in the Western Solomons (Walter *et al.* 2004: 148; Nagaoka 2011; Carter *et al.* 2012). In northwest Choiseul, they have been historically documented at burial sites, used as interment vessels (Craven 2019).

No sherds positively classified to this ceramic style were geochemically analysed. Although the late William Dickinson has previously described petrographic characteristics of pottery manufactured in northern Choiseul. Based on his analysis of three plain sherds originally found by Douglas Yen on Kolombangara but which were deemed to have been imported from Choiseul, Dickinson (2006: 92) described that the 'presence of metamorphic detritus [rich in amphiboles and feldspars], coupled with a lack of detritus from ultramafic rock, suggests origin of the sherds from northern Choiseul rather than southern Choiseul'.

DISCUSSION

Three points of discussion can be raised from the results of the geochemical characterisation of the pottery and the formation of a ceramic sequence dating to within the last millennium in the Western Solomons. The first concerns the development of patterns of inter-island interaction in the region as seen from the characterisation of the pottery fabrics to their most likely geological zones. The second builds upon this, discussing the emergence and eventual decline of pottery-making on Choiseul against our current body of knowledge about major cultural developments that arose in the Western Solomons in the last 1000 years. Finally, the third point is a brief discussion centred on framing these findings from the Western Solomons against the development of other similarly aged ceramic traditions documented in the Northern Solomons.

Pottery Production and Distribution in Western Solomons in the Last Millennium

As has previously been found petrographically (Dickinson and Shutler 1979, 2000; Dickinson 2006, 2007, 2009), the Choiseul ceramic wares were typified by their close petrological and mineralogical similarities with calc-alkaline andesitic volcanic deposits that characterise most of the province. Findings from this study, however, contribute further insight into differentiating between two regional pottery manufacturing centres in Choiseul: central Choiseul (Nuatambu) and southeast Choiseul (Kumboro region).

The fabrics of the Nuatambu Ware were characterised by a predominantly volcanic-derived composition consisting of large masses of actinolite, hornblende and prismatic plagioclase. Igneous lithic fragments identified in these fabrics appeared characteristic of the Mt Maetambe-derived pyroclastic andesitic bedrock local to central Choiseul. Additionally, in contrast to the SCII Ware, the Nuatambu pottery contained minor amounts of calcareous grains which indicated that volcanic beach sands found locally near Nuatambu were used as fillers. The fabrics of the SCII Ware were characterised predominantly by calcic amphiboles and metamorphic constituents, namely foliated lithic fragments rich in epidote, quartz and plagioclase rich in Si (>60 percent) such as albite and oligoclase. This was characteristic of the metamorphic stream sands collected in Piripea River in southeast Choiseul which are associated with the Choiseul Schists formation (Coulson 1985: 634).

Northwest Choiseul, specifically the historic potting centre of Chirovanga, can be recognised as a third zone of pottery production on Choiseul. Ethnographic documentation of inter-village trading of Chirovanga pottery for kesa in the 1960s and for cash in the '70s has demonstrated it was widely distributed to most major villages located in the northwest half of Choiseul (Itoh and Chikamori 1965; Craven 1976). Exactly when Northwest Choiseul Plainware began to be intensively produced and widely distributed is not known. Although it is likely to have been within the last two to three centuries as is supported by the recovery of plainware petrographically sourced to Choiseul at Site 730 on Nusa Roviana which dates to within that timeframe. More intricately decorated ceramic styles were likely to have been made in this part of Choiseul prior to the production of Northwest Choiseul Plainware, although further field research would be required to test this.

Results of the compositional analyses of the pottery fabrics demonstrated evidence of both internal movement of pottery between communities in southeast Choiseul and external inter-island exchange. The amphibolic hybrid fabric, which was characterised by ferromagnesian minerals and large white clay silicates visible to the naked eye, was demonstrated to likely be distinctive to Nuatambu. Close similarities observed between the colour, texture and decoration of sherds possessing this fabric from across all seven ceramic sites indicated that they may have derived from a single manufacturing centre. It was found from the macroscopic analysis that this fabric was dominant for the Nuatambu assemblage. Additionally, closer examination of the fabric using the SEM exhibited that the amphibolic hybrid sherds sampled from all the sites shared a mineralogical profile that was most akin to the fabrics of the Nuatambu pottery. From this evidence and findings from the fieldwork, it is argued here that pottery made on Nuatambu was traded southeast to Laena Island, Wagina and reached Sikopo from about 650 cal BP. This exchange link, specifically between Nuatambu and Laena Island, is also likely to have coincided with the development of a strong cultural and historical relationship between these islands that was centred on the making of kesa and which survives in local oral tradition.

The pyroxenic fabric identified from the two sherds from SIK-1 and LAE-4 were noticeably different compared to the predominantly amphibolic-rich fabrics identified from the remaining pottery. The fabric of the undecorated body sherd from SIK-3 closely resembled Ramezanian-Abhari's (2004: 54) mafic 'Fabric B' which was determined by SEM and petrographic analyses to be of local origin to Roviana Lagoon. This vessel, therefore, was probably transported and deposited on the shrine site on Sikopo in the last few centuries by a visiting Roviana head-hunting party known in oral tradition to have frequented the island group. The mineralogical profile of the pyroxenic sherd from LAE-4 was different as it contained no olivine. Comparing it to pyroxenic sherds identified from Kolombangara (Findlater *et al.* 2009: 104), it is likely this island is its most likely geological origin. The nearby island of Vella Lavella, which also shares historical and exchange ties with Choiseul, is characterised by a hornblende-rich andesitic geological terrain similar to Choiseul. Further geochemical inspection of Vella Lavella pottery and both placer and riverine sand samples from the island would be required to examine the possibility of pottery found in southeast Choiseul deriving from pottery-making centres on Vella Lavella.

Emergence and Decline of Pottery-making on Choiseul

Following the emergence of an incised and impressed ceramic tradition in Choiseul possibly as early as around 1000 BP or at least certainly by 850 cal BP, it is clear from the compositional results that regional inter-island trading of pottery began intensifying over the succeeding centuries. By the time of European contact in the sixteenth century AD, Choiseul had developed into a regional hub of pottery production and wares made on the province were traded to multiple communities in the New Georgia group and on Santa Isabel. This is supported not only by this study but by petrographic and geochemical analyses carried out on incised pottery and plainware found across the New Georgia group and on Santa Isabel which date to within this period (Dickinson and Shutler 2000; Dickson and Felgate 2001; Nagaoka 2011: 178–183; Buhring 2011, *et al.* 2015). Archaeological and ethnographic research has shown that these wares were used as utilitarian exchange items but also served ceremonial purposes as urns and offerings placed on coral mound shrines (Craven 2019).

The escalation in the production and distribution of pottery made on Choiseul in the last millennium coincided with the development of a set of communally shared practices and beliefs in the Western Solomons. Specifically, these include monumental shrine construction (Nagaoka 1999; McKenzie 2007; Thomas 2014; Hurford 2017), head-hunting (Sheppard *et al.* 2000; Walter *et al.* 2004) and specialised production and exchange of shell valuables (Thomas 2003; Aswani and Sheppard 2003). Significantly, the development of these communally shared practices and spiritual beliefs has been recognised to have been instrumental to the formation and strengthening of regional identities and the growth of the rich cultural diversity that characterises the Western Solomons today (Thomas 2009: 141). Detailed examination of each of these developments and how an intensification in pottery-making on Choiseul in the last millennium impacted them is beyond the scope of this article. Although importantly, results of this study refine our understanding about the timing and extent of inter-island interaction that developed at this time between Choiseul, the Arnavon Islands and parts of the New Georgia group as seen through the movement of pottery.

Leading into the historic period, and specifically nearing the last two centuries, the necessity and act of decorating pots more intricately with incised and impressed configurations gradually declined. A factor that is likely to have contributed towards this was the diminishing ceremonial or socio-economic value placed on pottery as shell valuables and European-introduced iron goods became highly prized and more widely circulated. Simultaneously, an intensification in inter-clan warfare and head-hunting raids is likely to have disrupted the production and trading of pottery between coastal communities. Evidence of an intensification in coastal warfare in Choiseul developing by the eighteenth century AD is given by a historic account made by M. de Bougainville. Following a violent encounter with inhabitants from Choiseul Bay who attacked their ship in canoes, Bougainville surmised that their 'courage in attacking us, their custom of carrying arms, both offensive and defensive, and their skill in using them, prove that they are almost always in a state of war' (Fleurieu 1791: 95). Ultimately, by the mid-twentieth century, the demand of clay pots which was confined at this point to northwest Choiseul dwindled even further as iron pots became more widely available.

Inter-regional Comparisons

Several stylistic similarities are made evident when comparing the ceramic sequence presented here for Choiseul to other pottery styles documented nearby in the Northern Solomons. Two comb incised sherds that were identified from NUA-1 (see Figure 10n–o) resemble Middle Period brushed ware reported from Shortland Islands (Irwin 1972: Plate 44) and, to a lesser extent, Mararing comb incised pottery from Buka which dates to between 800–300 BP. The absence of comb incised sherds that have been recorded in the New Georgia group and on Santa Isabel indicates that this style of pottery is likely to have been confined to parts of the Northern Solomons, specifically Buka, Shortland Islands and Choiseul. Similarities can also be observed between the vessel forms of the Nuatambu Ware and Middle Period pottery from Shortland Islands, particularly between the shape and appearance of the Form VI jars and some of the Form IV pots (c.f. Irwin 1972: Figures 58–61). The mineralogical contents of one of the combed incised sherds found at Nuatambu suggested it was made locally on Choiseul. Therefore, it is possible this style of pottery was manufactured as far south as Nuatambu or that the combed ware was imported from northern Choiseul. Further field investigations and geochemical testing of ceramic assemblages from northwest Choiseul would be required to explore this further.

Comparing the Choiseul ceramic sequence with that of Buka and Shortland Islands also highlights a temporal overlap in the emergence of these ceramic traditions. Previously, Terrell and Irwin (1972) have argued that an interaction system developed in Bougainville Strait in the last 1000 years which was partly centred on the movement of pottery between Shortland Islands and Buin. In a similar fashion, Wickler (1990:151) has argued that 'the abundance of Buka-made pottery [found] on Nissan from the Malasang phase to the historic period indicates significant exchange between the two islands during the past eight hundred years'. The findings from this study suggest that a regional network of interaction began taking shape at around a similar time in the Western Solomons.

The growth of this network is likely to have been contributed to by increasing production and inter-island exchange of incised, impressed and plainware pottery made on Choiseul as well as other cultural phenomena that arose during the last millennium. These include shrine construction, head-hunting and the specialised production and exchange of shell valuables. Compared to the evolution of pottery-making at the villages of Malasang, Hangan and Lonahan on Buka (Specht 1972), the pottery industry that developed on Choiseul from around 850 cal BP operated at a smaller scale and its ceramic wares were not as widely distributed. Furthermore, it is likely that stylistic similarities observed between these ceramic traditions from Choiseul, Shortland Islands and Buka can be explained by the increasing frequency of social interactions that occurred at the peripheries of these regional networks. For Choiseul, the extent of this interaction appears to have been confined to the northern half of the province. While the southern half of the province maintained closer cultural and socioeconomic ties with the New Georgia group and northwest Santa Isabel.

CONCLUSION

Ceramic studies carried out on incised and applied relief pottery found in the Western Solomons which date to the Late to immediate post-Lapita period have contributed significantly to shaping our understanding about the nature of the prehistoric colonisation and early development of inter-communal interaction in the region. In the last millennium, the same cannot be said for our knowledge about pottery made during this period and, overall, our comprehension of this part of the ceramic record of the region has remained poor. The survey and radiocarbon dating results presented in this study from ceramic sites on Choiseul and the Arnavon Islands contribute towards addressing this and provide a foundation upon which our understanding of the entire ceramic record of the Western Solomons can continue to be refined. Importantly, the results from the pottery analyses and the ceramic sequence proposed in this study provide greater resolution to our understanding of production centres that operated on Choiseul in the last 1000 years as well as the shared and distinctive stylistic traits of wares dating to this period.

It was argued in the study that following the emergence of an incised and impressed ceramic tradition as late as 850 cal BP in Choiseul, the province developed into a vibrant, regional hub of pottery production and trade by the time of first European contact in the sixteenth century AD. This was demonstrated by compositional evidence of the transfer of pottery made on Nuatambu to Laena Island, Wagina and further abroad to the Arnavon Islands. Additionally, previous petrographic studies have argued Choiseul to be the most likely origin of plain and incised ceramic assemblages that have been recorded in several sites in the New Georgia group (Dickinson and Shutler 1979, 2000; Dickinson 2006, 2009).

Two sherds found on Sikopo and Laena Island possessing pyroxenic fabrics which were distinctive to the predominantly calcic-amphibolic and hornblendic fabrics characterised to Choiseul were argued to have most probably been manufactured outside of Choiseul. The plain body sherd from SIK-3 was characterised to Roviana Lagoon while the notched, outcurving rim sherd from LAE-4 was suggested to have possibly been manufactured in Kolombangara. As both SIK-3 and LAE-4 date to within the last six centuries, it is likely that pottery-making was practised in pockets of the New Georgia group at some point during this period and that the tradition was not completely abandoned after 2000 BP as has previously been argued (Walter and Sheppard 2017:141). Interestingly, this raises questions surrounding the nature of a possible revival of pottery-making in parts of the New Georgia group sometime in the last millennium which is recommended to be explored in future research.

Comparing the results of this study to ceramic studies undertaken in the Northern Solomons, it was argued that the overlap between the stylistic attributes and the timing of the emergence of an incised and impressed ceramic tradition on Choiseul with the pottery sequence from Shortland Islands (Irwin 1972) suggests close ties between these two pottery traditions. To date, no compositional evidence has been identified for the movement of pottery between these neighbouring islands. Therefore, future field research targeted at dating and investigating the evolution of pottery styles and distribution in the northwest half of Choiseul and in more detail on Shortland Islands would be valuable.

Importantly, this would provide further insight into understanding what social factors are likely to have contributed to a near simultaneous development of similarly styled ceramic traditions in this corner of Island Melanesia.

Acknowledgements

The authors are very grateful to the Solomon Islands National Museum (SINM), The Nature Conservancy (TNC), and the chiefs and communities of Nuatambu, Laena Island and Kukutin for supporting the research project. In particular, we thank Grinta Ale'eke-Bemama, Stephen Manebosa, Lawrence Kiko, Eddie Kopala, Frank Halette, Dolova Wilson, and the Arnavon Islands rangers for their committed assistance in fieldwork. *Tagio tumas!* Sincere thanks also to TNC facilitators Richard Hamilton, Willie Atu, John Pita and Henry Kaniki. Dr Liz Girvan provided assistance with carbon coating and the late Dr Peihua Wu generously assisted with SEM analysis and mineral identification. Nikole Wills assisted with plant charcoal identification and Jasminda Ceron with nut identification. The fieldwork was funded by the Royal Anthropological Institute (RAI), Royal Society of New Zealand and Archaeology Programme, University of Otago. Radiocarbon dating was awarded by Australia's Nuclear Science and Technology Organisation (ANSTO) under Grant AP11679. Geraldine Jacobson conducted the dating. Thanks also to the reviewers who provided constructive feedback and contributed to refining the final manuscript.

References

Aswani, S. and Sheppard, P.J. 2003. 'The archaeology and ethnohistory of exchange in precolonial and colonial Roviana: gifts, commodities, and inalienable possessions.' *Current Anthropology,* 44(S5): S51–S78.

Azémard, C. .2011. *Questionnements sur les céramiques Lapita des Îles Salomon: provenance et technologie.* Memoire, Université Michel de Montaigne Bordeaux 3.

Buhring, K. 2011. *Ceramic Production and Inter-island Interaction. Geochemical Analysis of Ceramic Assemblages from the Western Solomon Islands.* Masters thesis, University of Auckland.

Buhring, K.L., Azémard, C.S.and Sheppard, P.J. 2015. 'Geochemical Characterization of Lapita Ceramics From the Western Solomon Islands by Means of Portable X-Ray Fluorescence and Scanning Electron Microscopy.' *The Journal of Island and Coastal Archaeology,* 10(1): 111–132.

Carter, M., Roe, D. and Keopo, J. 2012. 'Recent recoveries of archaeological ceramics on Santa Isabel, central Solomon Islands.' *Journal of Pacific Archaeology,* 3(2): 62–68.

Coulson, F. 1985. 'Solomon Islands.' In *The Ocean Basins and Margins*, edited by A.E.M. Nairn, F.G. Stehli, and S. Uyeda. Boston: Springer, pp. 607–682.

Craven, A. 1976. *Choiseul, Solomon Islands*. Unpublished Field Notes.

Craven, A. 2019. 'Stone Funerary Urns in Northwest Choiseul, Solomon Islands.' *The Journal of the Pacific Arts Association,* 17(1): 29–56.

Deer, W.A., Howie, R.A. and Zussman, J. 1992. *An Introduction to the Rock-Forming Minerals* (2nd Ed.). London: Longman.

Deer, W.A., Howie, R.A. and Zussman, J. 2013. *An Introduction to the Rock-Forming Minerals* (3rd Ed.). London: Longman.

Dickinson, W. 2006. *Temper Sands in Prehistoric Oceanian Pottery: Geotectonics, Sedimentology, Petrography, Provenance*. Colorado, USA: The Geological Society of America.

Dickinson, W. 2007. 'Discriminating among volcanic temper sands in prehistoric potsherds of Pacific Oceania using heavy minerals.' *Developments in Sedimentology,* 58: 985–1005.

Dickinson, W. 2009. *Calcareous Tempers in Sherds from Choiseul, Solomon Islands*. Unpublished Petrographic Report WRD-280.

Dickinson, W.R. and Shutler, R. 1979. Petrography of sand tempers in Pacific islands potsherds. *Geological Society of America Bulletin*, 90: 1644–1701.

Dickinson, W.R. and Shutler, R. 2000. 'Implications of petrographic temper analysis for Oceanian prehistory.' *Journal of World Prehistory,* 14(3): 203–266.

Felgate, M.W. 2003. *Reading Lapita in Near Oceania: Intertidal and shallow-water pottery scatters, Roviana Lagoon, New Georgia, Solomon Islands.* Ph.D. thesis, University of Auckland.

Felgate, M.W. 2007. 'Leap-frogging or limping? Recent evidence from the Lapita littoral fringe, New Georgia, Solomon Islands.' In S. Bedford, C. Sand and S. Connaughton (eds.), *Oceanic Explorations*. Canberra: ANU Press, pp. 123–140.

Felgate, M.W. and Dickinson, W. 2001. 'Late-Lapita and Post-Lapita Pottery Transfers: Evidence from Intertidal-Zone Sites of Roviana Lagoon, Western Province, Solomon Islands.' In M. Jones and P.J. Sheppard (eds.), *Australasian Connections and New Directions: Proceedings of the 7th Australian Archaeometry Conference*. Auckland: University of Auckland, pp. 105–120.

Findlater, A.F., Summerhayes, G.R., Dickinson, W. and Scales, I. 2009. 'Assessing the anomalous role of ceramics in late Lapita interaction: a view from Kolombangara, western Solomon Islands.' In P.J. Sheppard, T. Thomas and G.R. Summerhayes (eds.), *Lapita Ancestors and Descendants*. Auckland: New Zealand Archaeological Association, pp. 101–117.

Fleurieu, C.P.C. 1791. *Discoveries of the French in 1768 and 1769, to the south-east of New Guinea: with the subsequent visits to the same lands by English navigators who gave them new names: to which is prefixed, an historical abridgement of the voyages and discoveries of the Spaniards in the same seas*. Printed for J. Stockdale.

Gaffney, D. 2016. *Materialising Ancestral Madang: Aspects of precolonial production and exchange on the northeast coast of New Guinea.* Masters thesis, University of Otago.

Grimes, S.L. 2003. *A history of environmental change and human impact since 3750 BP in the New Georgia Group, Western Solomon Islands.* Ph.D. thesis, University of Western Australia.

Hamilton, R.J., Bird, T., Gereniu, C., Pita, J., Ramohia, P.C., Walter, R., Goerlich, C. and Limpus, C. 2015. Solomon islands largest hawksbill turtle rookery shows signs of recovery after 150 years of excessive exploitation. *PloS one*, 10(4): 1–16.

Hansell, J.R.F., and Wall, J.R.D. 1976. *Land resources of the Solomon Islands Vol. 4 New Georgia Group and the Russell Islands*. England: Land Resources Division, Ministry of Overseas Development.

Hurford, J. 2017. *Houses, Shrines and the Social Landscape: a study of architecture on Tetepare, Solomon Islands.* Masters thesis, University of Otago.

Irwin, G.J. 1972. *An Archaeological Survey in the Shortland Islands, B.S.I.P.* Masters thesis, University of Auckland.

Irwin, G.J. 1974. 'Carved paddle decoration of pottery and its capacity for inference in archaeology: An example from the Solomon Islands.' *The Journal of the Polynesian Society,* 83(3): 368–371.

Irwin, G.J. 1985. *The emergence of Mailu: as a central place in coastal Papuan prehistory*. Canberra: Dept. of Prehistory, Research School of Pacific Studies, ANU.

Itoh, S., and Chikamori, M. 1965. *An Ethnological Note on the British Western Solomon Islands*. Unpublished manuscript, Solomon Islands National Museum.

McKenzie, A. 2007. *Ancestral skull shrines: Material dialogues of social interaction in the western Solomon Islands.* Masters thesis, University of Auckland.

Miller, D. 1979. *National Sites Survey Summary Report*. Honiara: Solomon Islands National Museum.

Nagaoka, T. 1999. *Hope Pukerane: A Study of Religious Sites in Roviana, New Georgia, Solomon Islands.* Masters thesis, University of Auckland.

Nagaoka, T. 2011. *Late Prehistoric-early Historic Houses and Settlement Space on Nusa Roviana, New Georgia Group, Solomon Islands.* Ph.D. thesis, University of Auckland.

Piko, G. 1976. Choiseul Currency. *Journal of the Cultural Association of the Solomon Islands*, 4: 96–110.

Radclyffe, C.J.T. 2020. *Prehistoric Settlement and Networks of Interaction in the Western Solomon Islands: A Survey of Manning Strait.* Ph.D. thesis, University of Otago.

Radclyffe, C.J.T., Summerhayes, G., and Walter, R. 2019. Discovery of Talasea obsidian in a post-Lapita deposit in Arnavon Islands, Solomon Islands. *Journal of Pacific Archaeology,* 10(2): 73–79.

Radclyffe, C.J.T. and Carter, M. in prep. *Prehistoric settlement and pottery exchange over the last two millennia in Northwest Santa Isabel, Solomon Islands*. To be submitted to Journal of Pacific Archaeology.

Ramezanian-Abhari, T. 2004. *Petrographic analysis of prehistoric ceramic tempers as a contribution to understanding the complex matrix of Oceanic prehistory. A case example: ceramics from Site 43, Ndora Island, New Georgia Group, in the Solomon Islands.* Masters thesis, University of Oxford.

Reeve, R. 1989. 'Recent work on the prehistory of the Western Solomons, Melanesia.' *Bulletin of the Indo-Pacific Prehistory Association,* 9: 44–67.

Richards, R. 2011. A probable Lapita site in the Western Solomon Islands? *Archaeology in Oceania*, 46(3): 139–141.

Rooney, S.R. 1912. Notes on Some Customs and Beliefs of Natives of Choiseul Island, Solomon's Group. *Australian Association for the Advancement of Science*, Report 13, 442–445.

Ridgeway, J. and Coulson, F.I.E. 1987. *The geology of Choiseul and the Shortland Islands, Solomon Islands. British Geological Survey.* Overseas Memoir 8. London: HMSO.

Shepard, A. 1980. *Ceramics for the Archaeologist*. Washington DC: Carnegie Institution of Washington.

Sheppard, P.J., Felgate, M., Roga, K., Keopo, J. and Walter, R. 1999. 'A Ceramic Sequence from Roviana Lagoon (New Georgia, Solomon Islands).' In J. Galipaud and I. Lilley (eds.), *Pacific from 5000 to 2000 BP*. Editions de IRD, pp. 313–322.

Sheppard, P.J., Walter, R., and Nagaoka, T. 2000. 'The archaeology of head-hunting in Roviana Lagoon, New Georgia.' *The Journal of the Polynesian Society,* 109(1): 9–37.

Sheppard, P.J., Walter, R., Dickinson, W., Felgate, M., Ross-Sheppard, C., & Azémard, C. 2015. A Solomon sea interaction sphere? In C. Sand, S. Chiu, and N. Hogg (Eds.), *The Lapita Cultural Complex in time and space: Expansion routes, chronologies and typologies*. Noumea: Institut d'archéologie de la Nouvelle-Calédonie et du Pacifique, pp. 63–80.

Specht, J. 1969. *Prehistoric and modern pottery industries of Buka Island.* Ph.D. thesis, Australian National University.

Specht, J. 1972. 'The Pottery Industry of Buka Island, T.P.N.G.' *Archaeology and Physical Anthropology in Oceania*. 7(2): 125–144.

Spriggs, M. 1991. 'Nissan, the island in the middle. Summary report on excavations at the north end of the Solomons and the south end of the Bismarcks.' In J. Allen and C. Gosden (eds.), *The Report of the Lapita Homeland Project*. Canberra: ANU Press, pp. 222–243.

Spriggs, M. 1992. 'Archaeological and linguistic prehistory in the North Solomons.' In T. Dutton, M. Ross and D. Tryon (eds.), *The Language Game: Papers in Memory of Donald C. Laycock*. Canberra: Pacific Linguistics, Research School of Pacific and Asian Studies, ANU, pp. 417–26.

Spriggs, M. 2005. 'Bougainville's Early History: An Archaeological Perspective.' In A.J. Regan and H.M. Griffin (eds.), *Bougainville before the Conflict*. Canberra: Pandanus Books, pp. 1–19.

Summerhayes, G.R. 1987. *Aspects of Melanesian Ceramics*. Masters thesis, University of Sydney.

Summerhayes, G.R. 2000. *Lapita Interaction*. Canberra: Australian National University.

Summerhayes, G.R. and Scales, I. 2005. 'New Lapita pottery finds from Kolombangara, western Solomon Islands.' *Archaeology in Oceania,* 40(1): 14–20.

Tabe, T. 2016. *Ngaira kain tari: We are people of the Sea. A study of the Gilbertese Resettlement to Solomon Islands*. Ph.D. Thesis, University of Bergen.

Terrell, J. 1976. *Perspectives on the Prehistory of Bougainville Island, Papua New Guinea: A Study in the Human Biogeography of the Southwestern Pacific*. Ph.D. Thesis, Harvard University.

Terrell, J.E., and Irwin, G.J. 1972. History and tradition in the northern Solomons: an analytical study of the Torau migration to southern Bougainville in the 1860s. *The Journal of the Polynesian Society*, 81(3): 317–349.

Thomas, T. 2003. *Things of Roviana: Material Culture, Personhood and Agency in the Nineteenth Century Solomon Islands.* Ph.D. thesis, University of Otago.

Thomas, T. 2009. 'Communities of Practice in the Archaeological Record of New Georgia, Rendova and Tetepare.' In P.J. Sheppard, T. Thomas, and G.R. Summerhayes (eds.), *Lapita: ancestors and descendants*. Auckland: New Zealand Archaeological Association, pp. 119–145.

Thomas, T. 2014. 'Shrines in the Landscape of New Georgia.' In T. Thomas and H. Martinsson-Wallin (eds.), *Monuments and People in the Pacific*. Sweden: Uppsala University, pp. 47–76.

Thomas, T. Mcstay, A., Sheppard, P.J., and Summerhayes, G.R. 2020. Interaction and Isolation in New Georgia: insights from the Nabo Point ceramic assemblage, Tetepare. *Archaeology in Oceania*, 0:1–20.

Tochilin, C., Dickinson, W.R., Felgate, M.W., Pecha, M., Sheppard, P., Damon, F.H., … Gehrels, G.E. 2012. Sourcing temper sands in ancient ceramics with U–Pb ages of detrital zircons: a southwest Pacific test case. *Journal of Archaeological Science*, 39(7): 2583–2591.

Walter, R. and Sheppard, P.J. 2000. Nusa Roviana: The Archaeology of a Melanesian Chiefdom. *Journal of Field Archaeology*, 27(3): 295–318.

Walter, R. and Sheppard, P.J. 2017. *Archaeology of the Solomon Islands*: Dunedin, New Zealand: Otago University Press.

Walter, R., Thomas, T. and Sheppard, P.J. 2004. 'Cult assemblages and ritual practice in Roviana Lagoon, Solomon Islands.' *World Archaeology,* 36(1): 142–157.

Wickler, S. 1990. 'Prehistoric Melanesian exchange and interaction: recent evidence from the Northern Solomon Islands.' *Asian Perspectives,* 29(2): 135–154.

Wickler, S. 2001. *The prehistory of Buka: a stepping stone island in the northern Solomons*. Canberra: Australian National University.

Wu, P. 2016. *What Happened at the End of Lapita: Lapita to Post-Lapita Pottery Transition in West New Britain, Papua New Guinea.* Ph.D. thesis, University of Otago.