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Late Holocene potting traditions in the far western Pacific: Evidence from the Raja Ampat Islands, 3500–1000 BP

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Abstract

The question of where Lapita groups derived from, immediately prior to their appearance in the Bismarck Archipelago, is a perennial one; it is a question that remains largely unaddressed owing to a dearth of research in West Papua. This chapter describes two pottery sequences from Waigeo Island in the Raja Ampat group, off the Bird's Head of New Guinea. Mololo Cave preserves pottery from 3100–2700 years ago and possibly 3800–3500 years ago. Some of the sherds are red-slipped and incised, with similarities to Island Southeast Asian Neolithic ceramics, while other sherds share morphological similarities with Lapita plainware. However, intricate decorations like dentate stamping and lime infilling, characteristic of the earliest Island Southeast Asian and Lapita ceramics, are absent. Manwen Bokor Cave preserves pottery from 1300–1000 years ago, with fewer instances of red slip, but more intricate decorations including circle stamping, impression and incision. These later ceramics share affinities with pottery from eastern Wallacea and northern New Guinea, showing a more restricted sphere of influence later in time; that is, there was a process of network contraction and regionalisation between c. 3500 and 1000 BP.

Introduction

The challenge that Glenn Summerhayes set archaeologists at the beginning of this century was to model the nature of maritime colonisation and interaction that could account for the rapid and widespread appearance of Lapita pottery in the western Pacific from about 3350 years ago (Summerhayes 2000:1). Not content to sit about and let the challenge linger, Glenn's ongoing field projects in the Bismarck Archipelago and on the New Guinea mainland, undertaken alongside numerous students, Papua New Guinean archaeologists and local stakeholders, have dramatically refined our understanding of these processes (e.g. Summerhayes 2007b, 2010, 2022). It is now apparent that Early Lapita pottery was produced primarily by Austronesian speakers that established enclaves on the offshore islands of the Bismarcks and maintained high levels of interconnectivity during

initial periods of colonisation (Summerhayes 2001), introducing to the region distinctive settlement patterns (Summerhayes, Szabó, Leavesley et al. 2019), domesticated animals (Summerhayes, Szabó, Fairbairn et al. 2019) and visual communication systems (Summerhayes 2007a).

The clarity of this research legacy in the east, in large part generated by Glenn's unparalleled drive to piece together the Lapita puzzle, starkly contrasts the archaeological record to the west. The islands off the Bird's Head Peninsula of West Papua may have formed a staging post immediately prior to Lapita movements into the Bismarck Archipelago (Bellwood 1998); this is supported by linguistic, bioarchaeological and genetic evidence that indicates ancient people from nearby north-east Wallacea were closely related with Lapita groups in Remote Oceania (Bulbeck 2019; Oliveira et al. 2022; Pawley and Ross 1993). However, owing to an almost total lack of archaeological research in the area, several outstanding questions remain. Did a cohesive 'Far, Far Western Lapita' or 'Proto Lapita' province exist in the islands of West Papua prior to movements into the Bismarck Archipelago? Alternatively, did early Lapita cultures in the Bismarck Archipelago emerge from disparate influences in eastern Indonesia (Ono et al. 2019), New Guinea (Summerhayes 2019) and perhaps even Micronesia (Carson et al. 2013), prior to becoming interlinked with indigenous Island Melanesian practices? Moreover, did interconnectivity between West Papua and the Bismarck Archipelago persevere, and how was this reflected in changes to pottery-making traditions?

To take up these questions, this chapter presents crucial pottery data from the Raja Ampat Islands, off the Bird's Head of West Papua. One of the goals of our archaeological project in these islands was to empirically bridge the well-established traditions of research in Papua New Guinea and the wider Pacific with that in Indonesia. As such, the chapter begins by summarising the characteristics of ceramics from Wallacea, New Guinea, the Bismarck Archipelago and the Marianas. It then presents a summary of the Raja Ampat area including 2018–2019 excavations at Mololo Cave and Manwen Bokor Cave on Waigeo Island. The ceramic finds from each site are then laid out in detail, with especial focus on which vessel forms, decorations and fabrics were discarded in different chronostratigraphic contexts. These results are discussed in a regional context with the aim of describing similarities and discontinuities with other circum-New Guinea ceramic traditions.

Early ceramics in Island Southeast Asia and the western Pacific

The Island Southeast Asian Neolithic

The pottery trail that leads from Southeast Asia to Near Oceania is so far a discontinuous one (Figure 17.1). The early ceramics of the Batanes and Philippines are primarily red-slipped plainware, reflecting their connections with Taiwan from about 4000 years ago (Hung 2005); later dentate, lime-infilled, circle-stamped and incised sherds date to sometime between 3800 and 3300 years ago (Bellwood et al. 2013; Hung 2008). Strong similarities exist between the ceramics of the northern and central Philippines and those excavated at Unai Bapot on Saipan, in the Mariana Islands (Carson and Hung 2017:104; Hung et al. 2011). Although the dating of the Unai Bapot pottery remains debated (Carson 2014, 2020; Petchey et al. 2018; Petchey and Clark 2021), it is likely that pottery makers of the Philippines, the Marianas, Wallacea and the Bismarck Archipelago were interconnected, whether directly or indirectly, by voyaging networks between 3500 and 3000 years ago. This is evident by the similar dentate, circle-stamped and lime-infilled pottery recovered from open sites like Kalumpang in the Karama Valley and at Mansiri, Sulawesi, dating to about 3500–3400 years old (Anggraeni et al. 2014; Azis et al. 2018) and at Bukit Tengkorak on Borneo, where initial pottery dates sometime between 3300 and 3000 years old (Bellwood and Koon 1989; Chia 2016).

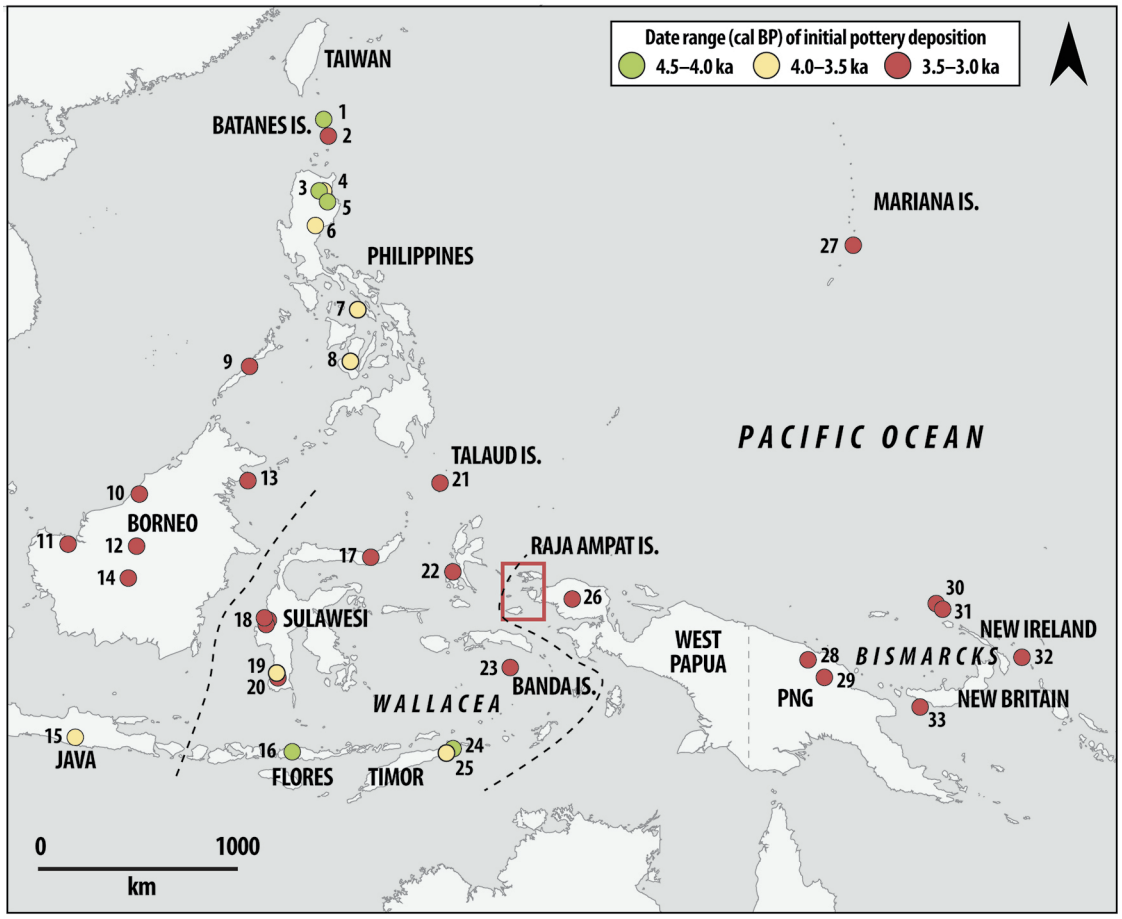

Figure 17.1: Map of circum-New Guinea islands showing key early pottery sites.

Notes: (1) Torongan; (2) Sunget; (3) Rabel; (4) Andarayan; (5) Dimolit; (6) Pintu; (7) Batungan; (8) Edjek; (9) Manunggul; (10) Niah; (11) Gua Sireh; (12) Liang Kaung; (13) Bukit Tengkorat; (14) Nangabalang; (15) Song Keplek; (16) Liang Bua; (17) Mansiri; (18) Kalumpang; (19) Ulu Leang 1; (20) Leang Burung; (21) Leang Tuwo Mane'e; (22) Uattamdi 1; (23) PA1; (24) Lene Hara; (25) Uai Bobo 2; (26) Toé; (27) Unai Bapot; (28) Kowekau; (29) Wañelek; (30) Talepakemalai; (31) Tamuarawai; (32) Kamgot; (33) Apalo.

Source: Authors' illustration.

The earliest known ceramics in eastern Wallacea are predominantly characterised by red-slipped globular vessels, and are similar to plainware sherds from Sulawesi and Borneo. In the Talaud Islands, red-slipped sherds from Leang Tuwo Mane'e date by association with a marine shell to 3690±70 BP (Bellwood 1976; Tanudirjo 2001). When calibrated using a new ΔR of –129±47 from the nearby Raja Ampat Islands (Gaffney 2021:168), this date suggests the sherds were deposited anytime between 3850 and 3350 years ago (cal. BP), with 95.4 per cent probability. The Talaud vessels are very similar to those at Uattamdi 1 on Kayoa Island, where red-slipped sherds date to no earlier than about 3500–3050 years ago, although more convincingly begin around 3350 years ago (Bellwood 2019). However, it should be noted that Leang Tuwo Mane'e and Uattamdi 1 are cave sites and so their pottery may be functionally and decoratively different from those used at open sites. PA1 in the Banda Islands provides the only open site with early ceramics in eastern Wallacea; the pottery dates by association with charcoal to sometime before 3350 years ago and possibly up to 3550 (Lape et al. 2018; Peterson 2015). In each of these sites, 'Neolithic Age' pottery came to be replaced by 'Metal

Age' ceramics dating to after 2300–2200 years old, and which were less frequently red-slipped, but were characterised by more elaborate decorations including incision, circle stamping and appliqué (Ono, Oktaviana et al. 2018).

Circum-New Guinea ceramics and the emergence of Lapita

Almost no pottery has been published from the West Papuan mainland. A small handful of sherds from Toé Cave on the Bird's Head Peninsula date to sometime around 3000 years ago or thereafter, perhaps having been produced in the Raja Ampat Islands (Pasveer 2004). Other ceramics described from the north coast either remain undated or were produced more recently in time (e.g. Miller 1950; Schmitt 1947; Solheim 1958, 1998). Around Jayapura and Lake Sentani, ongoing excavations by Balai Arkeologi Papua (Centre of Papuan Archaeology) are recovering red-slipped sherds dating after 2000 years old (Suroto in press).

In the eastern New Guinea region, in what is today Papua New Guinea, the only published pre-3000-year-old ceramics from the mainland occur inland at Wañelek (Gaffney et al. 2015) and Kowekau (Northwood 2015). Although most of these sherds were probably made around the foothills of the Sepik–Ramu Inland Sea (providing a similar geographical arrangement to Cenderawasih Bay and Lake Sentani in West Papua), some are red-slipped and tempered with beach sands indicating their manufacture around the northeast coast. These ceramics, although few in number, resemble plainwares from both eastern Wallacea (e.g. Bellwood 2019) and the Bismarck Archipelago (e.g. Kirch 1997:146). Additionally, two undated sherds recovered from the north coast of New Guinea are dentate stamped, and one was demonstrated to be locally produced (Golitko 2011; Terrell and Schechter 2007). A much more frequent red-slipped pottery manufacture occurred around the north coast of Papua New Guinea after about 2000 years ago (Terrell and Schechter 2011), which continued to intensify in the last millennium (Gaffney et al. 2018).

Notably earlier are 'Early Lapita' sherds from sites like Talapakemalai, Tamuarawai, Kamgot and Apalo in the Bismarck Archipelago, which were the result of local pottery manufacture commencing around 3350–3100 years ago (Kirch 2021; Kirch et al. 2015; Summerhayes et al. 2010; Summerhayes, Szabó, Leavesley et al. 2019; Summerhayes 2000). These sherds were usually red-slipped plainware, sometimes with minor decoration around vessel lips, although a small component were dentate-stamped, lime-infilled, circle-stamped and incised (Chiu and Sand 2005). Similarities in decoration and vessel form during this period suggest these pots were produced by people who were tightly interconnected (Summerhayes 2001); assuming that these pottery makers were female and matrilocal (Jordan et al. 2009), but sometimes moving long distances during voyaging (Bentley et al. 2007), it implies that they had learned potting traditions from parent communities. However, the extent to which Early Lapita groups (or the Far Western Lapita province) interacted with home communities in Island Southeast Asia is limited to a few known instances of exchange (Harlow et al. 2012; Summerhayes 2017). Where these parent communities to the west were located, and how they were connected with communities in the east, will now be examined with new data from the Raja Ampat Islands, West Papua.

The Raja Ampat excavations

The Raja Ampat Islands

The Raja Ampat archipelago lies just off the north-western coast of New Guinea (Figure 17.2). In the last few centuries, the islands were a key location mediating the transfer of goods and people between Island Southeast Asia and the Pacific (Sollewijn Gelpke 1994; Warnk 2010). Today, Raja Ampat is home to speakers of several Austronesian languages belonging to the South Halmahera – West New Guinea branch of East Malayo-Polynesian (Arnold 2020; Kamholz 2014).

Earthenware pottery is made by Ambel speakers in Waigeo's Mayalibit Bay, and by Biak speakers around the north coast of Batanta; both groups produce rectilinear sago flour ovens, but globular pots for cooking or water storage are not commonly used or known about (Gaffney and Tanudirjo 2019). In 2018, the Raja Ampat Archaeological Project surveyed the northern islands—Waigeo, Gam, Batanta and offshore satellites—locating several promising cave sites and open locations with surface pottery. This was subsequently followed by systematic excavations in 2018–2019, targeting cave sites (Gaffney 2021).

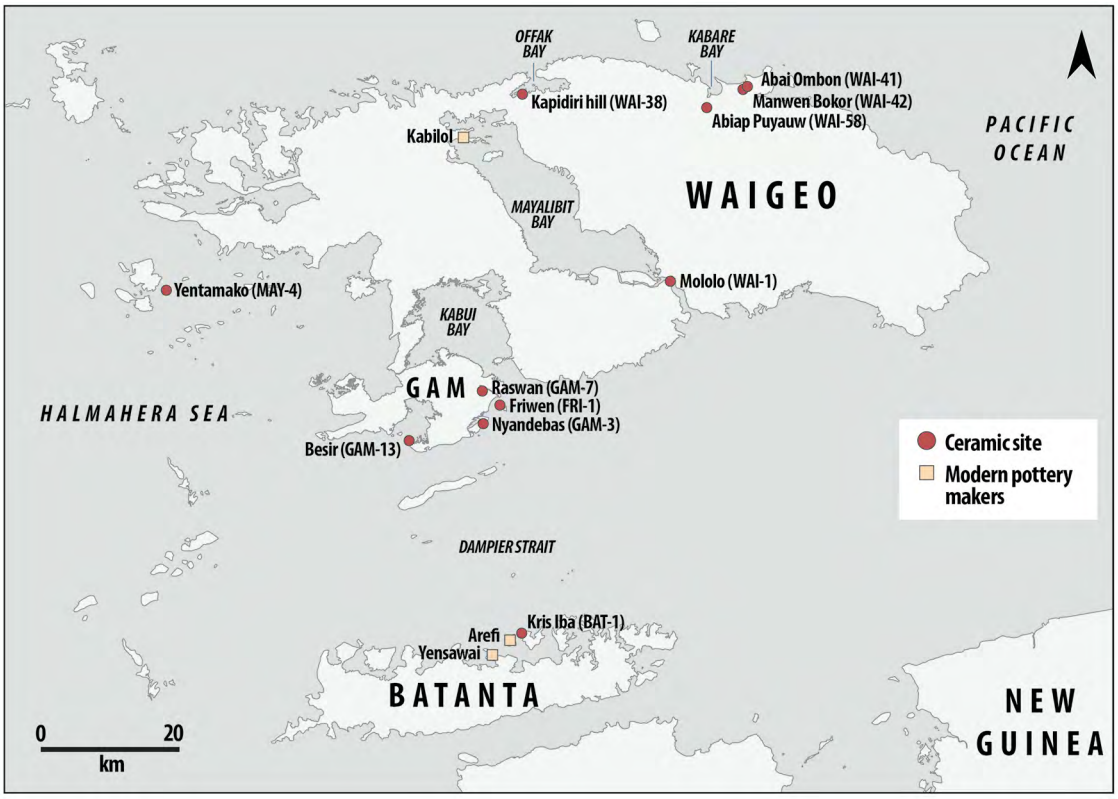

Figure 17.2: The northern Raja Ampat Islands.

Note: This map shows location of ceramic sites, including key excavated sites, Mololo at the entrance to Mayalibit Bay, and Manwen Bokor on the north coast of Waigeo.

Source: Authors' illustration.

Excavations at Mololo Cave

Mololo Cave (WAI-1 in the Raja Ampat Archaeological Project database) is located at the entrance to Mayalibit Bay, the large water body that almost bisects Waigeo (Figure 17.3). It is a limestone system comprised of a light outer chamber, exposed to sunlight but sheltered from rain, and a dark inner chamber that is home to several bat colonies. The 2018 excavations focused on two parts of the outer chamber (Area 1 and Area 2), where 0.5 × 0.5 m test pits were followed by 2 × 1 m trenches. Trench excavations followed stratigraphic boundaries, constrained by 50 mm spits. A 0.5 × 1 m test pit was also excavated in Area 3, at the edge of the dark inner chamber, but this recovered sparse archaeological evidence.

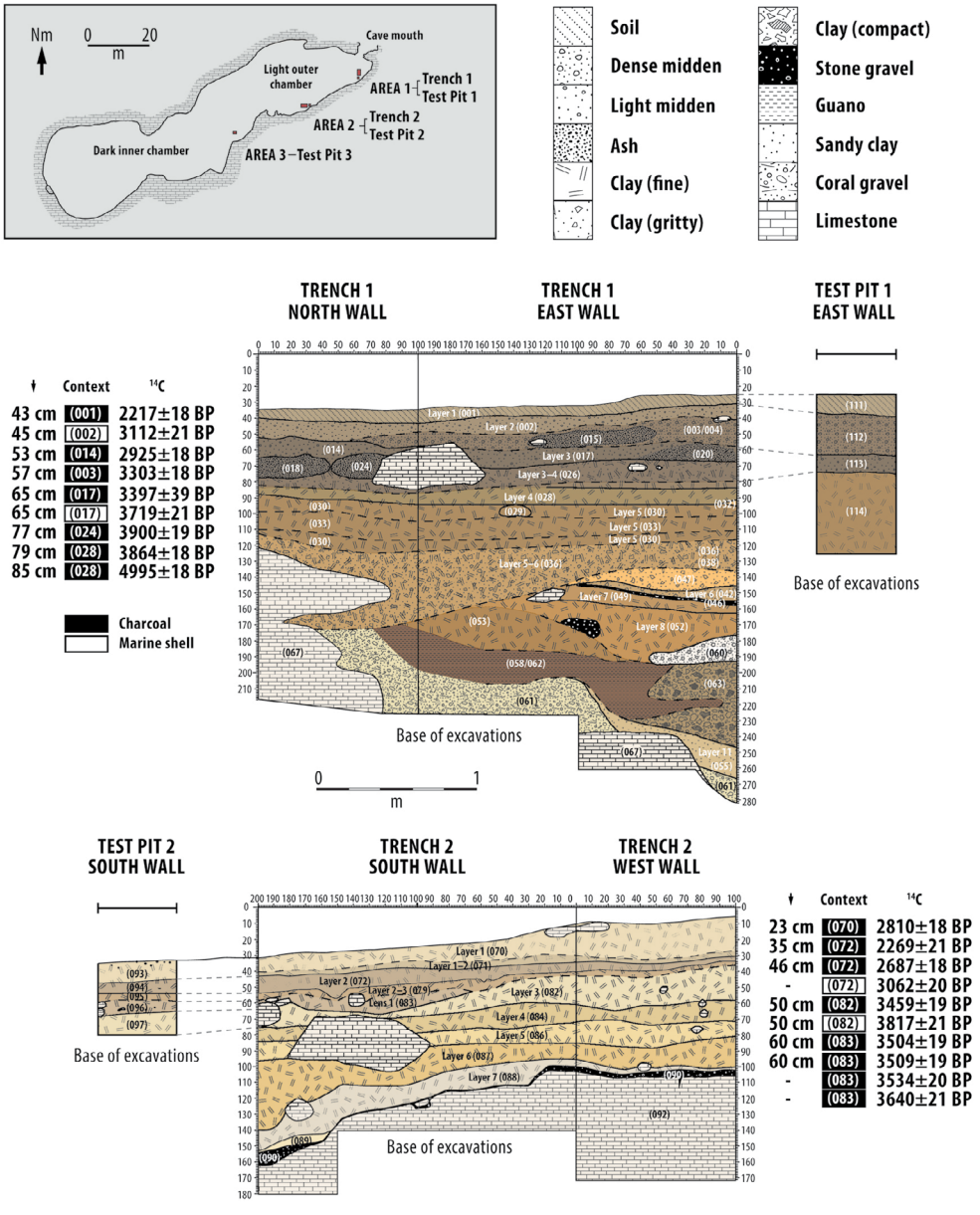

Figure 17.3: Mololo Cave (WAI-1) site plan and excavation sequence showing Late Holocene radiocarbon determinations.

Source: Authors' illustration.

Table 17.1: Late Holocene radiocarbon dates from Mololo (TR1 and TR2) and Manwen Bokor (Unit 1 and TP2).

Lab code	Area	Quad	Spit	Layer	Context #	Material	X	Y	Z	Determination	d13C	Calibrated 2 sig	Cal curve
Mololo – TR1													
Wk-53106	B	SE	2	1	1	Charcoal	90	143	43	2217±18 BP	–	2320–2291 cal. BP (14.6%) 2271–2149 cal. BP (80.8%)	IntCal2020
OxA-39721	A	NW	3	2	2	Marine shell	23	66	45	3112±21 BP	0.35	3077–2721 cal. BP (95.4%)	Marine20
Wk-53110	B	NE	4	F10	14	Charcoal	82	185	53	2925±18 BP	–	3160–2998 cal. BP (95.4%)	IntCal2020
Wk-53108	A	NE	5	2	3	Charcoal	91	51	57	3303±18 BP	–	3565–3466 cal. BP (95.4%)	IntCal2020
OxA-40144	B	SW	7	3	17	Wood charcoal	100	109	65	3397±39 BP	–28.46	3821–3795 cal. BP (4.1%) 3762–3755 cal. BP (0.5%) 3724–3552 cal. BP (86.5%) 3533–3493 cal. BP (4.3%)	IntCal2020
OxA-39722	B	SW	7	3	17	Marine shell	100	109	65	3719±21 BP	1.14	3828–3444 cal. BP (95.4%)	Marine20
Wk-53107	B	SE	9	F17	24	Charcoal	100	115	77	3900±19 BP	–	4414–4286 cal. BP (87.1%) 4275–4249 cal. BP (8.4%)	IntCal2020
Wk-53109	A	SE	11	4	28	Charcoal	70	10	79	3864±18 BP	–	4406–4233 cal. BP (91.2%) 4198–4184 cal. BP (3.7%) 4166–4162 cal. BP (0.6%)	IntCal2020
Wk-53105	A	SE	12	4	28	Charcoal	51	2	85	4995±18 BP	–	5856–5827 cal. BP (8.9%) 5752–5654 cal. BP (83.5%) 5620–5607 cal. BP (3.1%)	IntCal2020
Mololo – TR2													
Wk-53103	A	NE	1	1	70	Charcoal	68	61	23	2810±18 BP	–	2960–2857 cal. BP (95.4%)	IntCal2020
Wk-53102	B	SE	4	2	72	Charcoal	183	15	35	2269±21 BP	–	2345–2301 cal. BP (50.8%) 2239–2158 cal. BP (44.6%)	IntCal2020
Wk-53101	B	SE	5	2	72	Charcoal	185	42	46	2687±18 BP	–	2848–2810 cal. BP (28.0%) 2792–2753 cal. BP (67.5%)	IntCal2020
OxA-X-3054-10	B	NE	5	2	72	Marine shell	–	–	–	3062±20 BP	2.01	3023–2681 cal. BP (95.4%)	Marine20
OxA-39444	B	NE	6	3	82	Wood charcoal	168	70	50	3459±19 BP	–27.2	3828–3789 cal. BP (28.6%) 3775–3740 cal. BP (15.4%) 3733–3684 cal. BP (38.5%) 3667–3642 cal. BP (12.9%)	IntCal2020
OxA-39723	B	NE	6	3	82	Marine shell	168	70	50	3817±21 BP	1.24	3960–3560 cal. BP (95.4%)	Marine20

Lab code	Area	Quad	Spit	Layer	Context #	Material	X	Y	Z	Determination	d13C	Calibrated 2 sig	Cal curve
OxA-39445	B	SW	8	Lens 1	83	Wood charcoal	107	51	60	3504±19 BP	–28.87	3838–3699 cal. BP (95.4%)	IntCal2020
OxA-39446	B	SW	8	Lens 1	83	Wood charcoal	107	51	60	3509±19 BP	–28.77	3842–3699 cal. BP (95.4%)	IntCal2020
Wk-53034	A	SE	10	Lens 1	83	Wood charcoal (Gymnosperm)	–	–	–	3640±21 BP	–	4079–4038 cal. BP (13.1%) 3995–3886 cal. BP (82.4%)	IntCal2020
Wk-53036	B	SW	10	Lens 1	83	Wood charcoal	–	–	–	3534±20 BP	–	3888–3818 cal. BP (45.6%) 3799–3721 cal. BP (49.9%)	IntCal2020
Manwen Bokor Unit 1													
OZZ-315	–	SW	–	1	1	Marine shell	42	26	62	1630±25 BP	0.8	1299–977 BP (95.4%)	Marine20
Manwen Bokor TP2													
OZZ-314	–	E	7	3	5	Wood charcoal	–	–	66	1290±35 BP	–27.3	1293–1173 BP (91.1%) 1159–1130 BP (4.4%)	IntCal2020

Source: Authors' data.

Late Holocene discard was focused in Area 1, near the entrance to the cave. This is indicated by large midden and ash contexts near the top of Trench 1 and Test Pit 1. These contexts, particularly Layer 2 and 3 and associated features, represent several discrete cooking and discard events between c. 4400–4250 and c. 2300–2150 years ago (Table 17.1). Contemporaneous layers were excavated in Area 2, although material was more sparse. In Trench 2 and Test Pit 2, Layer 2 and Lens 1 represent smaller-scale cooking events, dating from c. 4100–3900 to c. 2350–2150 years ago. At both Area 1 and 2, the middens predominantly contained mammal and fish bone, and marine and brackish water shell. Along with pottery that was found in small numbers (see below for further detail), shell ornaments, chert flake tools and bone point artefacts were extremely rare in these upper deposits.

Excavations at Manwen Bokor Cave

Manwen Bokor (WAI-42) sits near the end of the Rainkan River, which outflows into the Pacific along the north coast of Waigeo. The site itself is a cave and rock shelter at the base of a c. 100-m-high limestone escarpment (Figure 17.4). A small tidal creek runs through the western part of the cave and has created mudflats around most of the site. A dry sandy area with surface pottery is located in the east, near an ossuary of secondary burials. Similar ossuaries are present on a limestone boulder to the west of the creek, with bones having been placed inside small wooden coffins carved in the shape of marine animals, characteristic of Biak graves in Cenderawasih Bay (Corbey 2019).

The 2019 excavations included a 1 × 1 m pit (Unit 1) in the dry sandy part of the cave, excavated with 50 mm spits, along with two test pits (Test Pit 1 = 0.5 × 0.5 m, Test Pit 2 = 1 × 0.5 m) on the mud flats, excavated in 100 mm spits. Given the proximity of the excavations to human remains, custom leaders oversaw our research in the cave and made the area safe for our work.

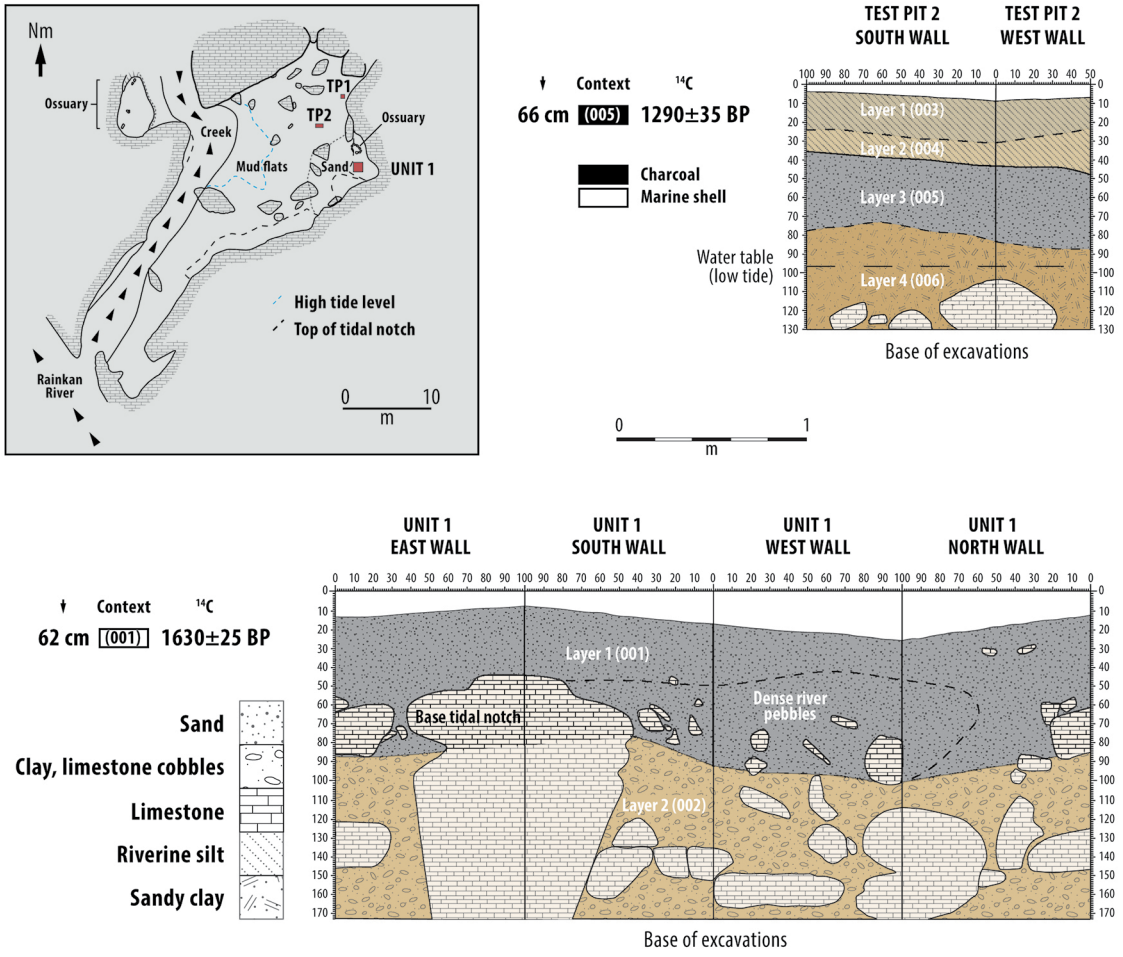

Figure 17.4: Manwen Bokor Cave (WAI-42) site plan and excavation sequence showing radiocarbon determinations.

Source: Authors' illustration.

Based on the excavated stratigraphy, the black sand in the east of the site had been covered by the mud flats, suggesting that the tidal creek is a recent incursion into the site. These changes likely occurred within the past millennium, because charcoal and marine shell in the black sand layer dates to c. 1300–1000 years old (see Table 17.1). The black sand is associated with shell and fish bone, along with pottery. Below the sand layer is a clay, densely packed with coral limestone cobbles toward the cave wall. In Unit 1, excavations captured the base of a tidal notch, which may have been carved out during Mid to Late Holocene high stands (Dickinson 2003), when the Pacific abutted the edge of the limestone escarpment. No archaeological material in primary deposition was recovered from the basal clay layer, although loose overlying sediment and periodic flooding likely accounts for occasional vertical displacement of material from above.

Ceramics at Mololo, c. 3500–2300 BP

Chronology

One hundred and fifty-six ceramics were recovered at Mololo (Table 17.2). Most sherds derive from contemporary habitation and midden deposits (Layer 2) at both TR1 and TR2, dating to the early third millennium before present. At TR1, most sherds (*n* = 73, 65.8 per cent) were recovered in Layer 2 (002), with many of those coming from Spit 2 (*n* = 43) and Spit 3 (*n* = 20). A marine shell from Spit 3, Layer 2 (002) dates to 3112±21 BP, c. 3100–2700 years ago at 95.4 per cent probability using a Mololo-specific ΔR of –129±47 (reported in Gaffney 2021:172), and provides the closest age estimate for these sherds. Thirty-four sherds come from the more recent Layer 1 (001), from both Spit 1 (*n* = 14) and Spit 2 (*n* = 20). A charcoal date of 2217±18 BP from Spit 2, Layer 1 (001), suggests these sherds date to c. 2300–2150 years ago or later. However, refitting shows that some sherds from Layer 1 (001) and 2 (002) derive from the same vessel and the Layer 1 (001) sherds may alternatively have been deposited earlier than 2300 years ago.

Only four plain body sherds from TR1 derive from pre-3000-year-old contexts, in Spit 5, midden context (003/004), and in Spits 5 and 7, Layer 3 (017). A charcoal date of 3303±18 BP, or c. 3550–3450 years ago, from Spit 5, midden (003/004), provides an estimate for one of these sherds. The deepest sherds from Layer 3 (017) are most closely associated with a wood charcoal date of 3397±39 BP from Spit 7, Layer 3 (017), or c. 3800–3500 years old. Each sherd weighs less than 2 g and was collected from the sieves; there is no evidence for downward displacement from overlying contexts, although owing to their small size this remains a real possibility.

Table 17.2: Number of ceramic fragments from excavated contexts at Mololo Cave.

			Rim		Neck		Carination		Body		Appliqué		Total	
Layer	**Cont.**	**Date ka**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Area 1														
TR1														
Layer 1	(001)	2.2	4	11.8	4	11.8	–	–	26	76.5	–	–	34	100.0
Layer 2	(002)	2.9	8	11.0	7	9.6	2	2.7	56	76.7	–	–	73	100.0
Midden	(003)	3.5	–		–		–	–	1	100.0	–	–	1	100.0
Layer 3	(017)	3.6	–		–		–	–	3	100.0	–	–	3	100.0
Subtotal			**12**	**10.8**	**11**	**9.9**	**2**	**1.8**	**86**	**77.5**	**–**	**–**	**111**	**100.0**
TP1														
Layer 1	(111)	–	–	–	–	–	–	–	2	66.7	1	33.3	3	100.0
Layer 2	(112)	–	–	–	–	–	–	–	2	100.0	–	–	2	100.0
Subtotal			**–**	**–**	**–**	**–**	**–**	**–**	**4**	**80.0**	**1**	**20.0**	**5**	**100.0**
Area 2														
TR2														
Layer 2	(072)	2.8	–	–	–	–	–	–	31	100.0	–		31	100.0
Lay. 2-3	(079)	–	–	–	–	–	–	–	6	100.0	–		6	100.0
Subtotal			**–**	**–**	**–**	**–**	**–**	**–**	**37**	**100.0**			**37**	**100.0**
TP2														
Layer 2	(094)	–	–	–	–	–	–	–	2	100.0	–	–	2	100.0
Lay. 2-3	(095)	–	–	–	–	–	–	–	1	100.0	–	–	1	100.0
Subtotal			**–**	**–**	**–**	**–**	**–**	**–**	**3**	**100.0**	**–**	**–**	**3**	**100.0**
TOTAL			**12**	**7.7**	**11**	**7.1**	**2**	**1.3**	**130**	**83.3**	**1**	**0.6**	**156**	**100.0**

Note: ka = thousand years ago; *n* = number of fragments; % = percentage by stratigraphic context.

Source: Authors' data.

At TR2, the majority of sherds (*n* = 29; 78.4 per cent) were excavated in Spit 5, Layer 2 (072), most closely associated with a date of 2687±18 BP, c. 2850–2750 years ago, from the same spit and context, making them contemporary with sherds from TR1, Layer 2 (002). Two sherds recorded in Spit 4, Layer 2 (072), associated with a date of 2269±21 BP, c. 2350–2150 years old, are contemporary with those from TR1, Layer 1 (001). The deepest sherds at TR2 derive from Spit 6, Layer 2–3 (079), which are related to mixing and vertical displacement from Layer 2 (072). These sherds were recorded in situ at 46 cm below the datum line, about 31 cm below the ground surface.

Ceramic technology

The minimum number of vessels at Mololo is four, and each vessel is a distinct technical class of globular pot with restricted neck (Table 17.3). Class 1 rims belong to a thick-walled globular pot with red slip applied to the interior and exterior of the rim (Figure 17.5).

The pot was discarded sometime in the third millennium before the present, but it is not possible to be more precise about its age because Class 1 sherds were found in both Layer 1 (001) and Layer 2 (002). The vessel was tempered with a mixed sand (Fabric A; Figure 17.6) and is incised with gashes around the neck. Linear incisions were also inscribed around the vessel shoulders forming zones for combining decorative configurations into motifs involving diagonal incisions, wavy lines, and ovoids (see 'incision and fingernail incision' in Figure 17.7).

Class 2 rims belong to a thin-walled globular pot with everted rim that lacks red slip surface treatment. The shoulder has a slight corner point, suggestive of paddle and anvil construction, but it was not deliberately carinated during the forming stages. The vessel was produced with Fabric B and was probably discarded earlier than the Class 1 vessel, about c. 3100–2700 years ago.

Table 17.3: Formal and decorative description of pottery technical classes at Mololo Cave.

Class	Lay.	Cont.	Spit	Form	Rim direction	Rim profile	Rim course	Lip profile	Lip feature	External finish	Internal finish	Rim thickness (mm)	Neck thickness (mm)	Ø (mm)	Decoration
1	1 2	(001) (002)	1–2 2		Everted	Parallel	Straight	Flat sharp edge	Absent	Red slip	Red slip	A: 6.8–8.3	?	180	Fingernail impression around exterior of neck
2	2	(002)	2–3		Everted	Parallel	Straight	Flat round edge	Asym. thick interior	Absent	Absent	A: 4.8–6.2 B: 3.6–5.8	3.5–4.5	210	?
3	2	(002)	2–3		Everted	Conver. gradual	Straight	Flat sharp edge	Absent	Absent	Absent	A: 2.4 B: 4.4	?	?	Diagonal groove incisions around exterior rim and below neck
4	2	(002)	2		Outcurving	Parallel	Convex	Flat sharp edge	Impressed	Absent	Absent	A: 6.6–6.8 B: 5.9–5.9	?	c. 200	Circular impressions around exterior lip

Note: Silhouettes show hypothetical reconstructions of complete vessels based on available data.
Source: Authors' data.

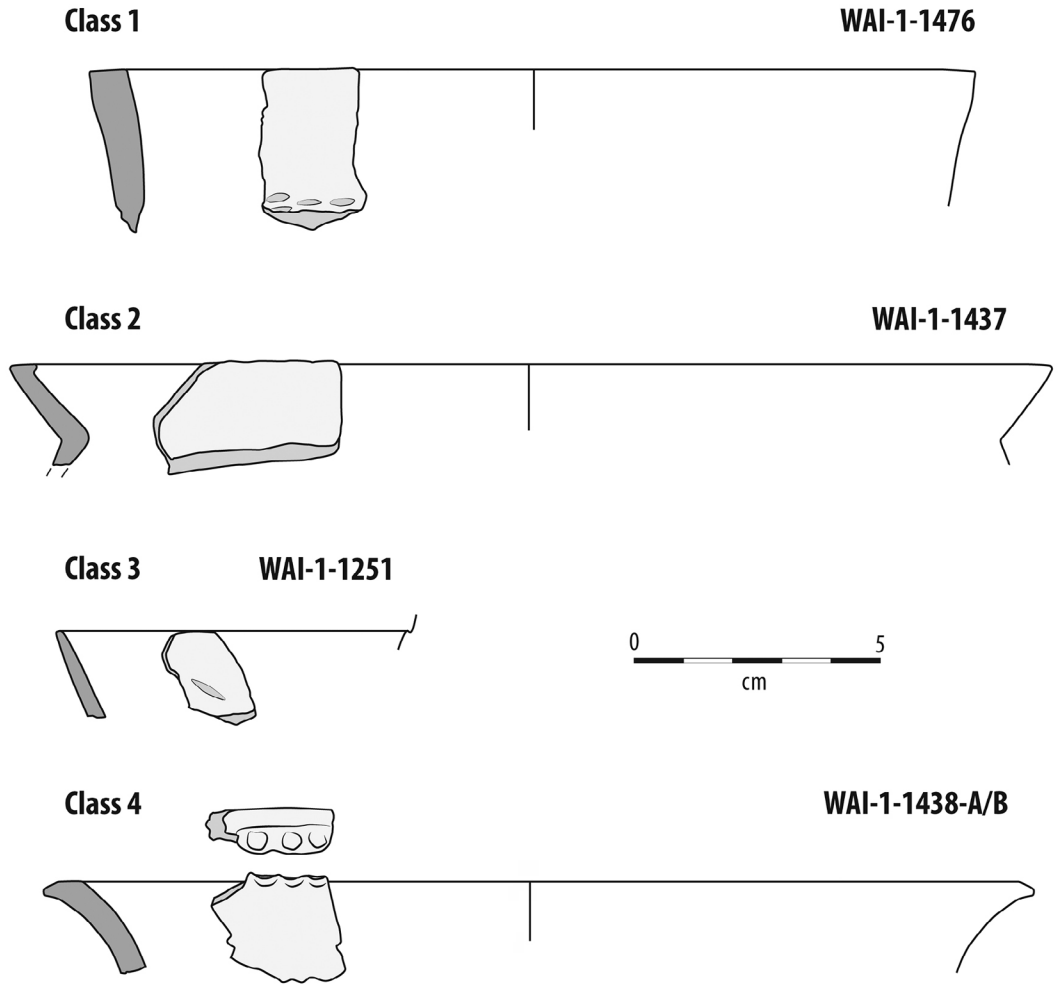

Figure 17.5: Rims from Mololo Cave, Trench 1.

Notes: Class 1 rim (WAI-1-1469) with gash incision from Spit 1, Layer 1 (001); Class 2 rim (WAI-1-1437) from Spit 2, Layer 2 (002); Class 3 rim (WAI-1-1251) with diagonal groove incision on exterior rim from Spit 2, Layer 2 (002); Class 4 rim (WAI-1-1438-A refitted with WAI-1-1438-B) with lip impressions and shoulder carination from Spit 2, Layer 2 (002).

Source: Authors' illustration.

The Class 3 vessel was deposited at a similar time and is represented by four sherds from Layer 2 (002). It may be technologically related to the Class 2 vessel, in that it is a thin-bodied, globular pot with an everted rim. Surface treatment is absent, and it was formed from Fabric C. However, it lacks the asymmetrical thickening at the lip and has a carinated shoulder. The vessel was incised with diagonal grooves around the exterior rim and below the neck. Specimen WAI-1-1687 (Figure 17.6) is made from the same paste (Fabric C) and appears to be a broken coil with parallel grooves produced with a blunt point or a comb, possibly suggesting that Class 3 vessels involved initial coil formation followed by paddling.

The Class 4 vessel is represented by three sherds from Layer 2 (002) and likely dates to about c. 3100–2700 years ago (Figure 17.5). The pot had an outcurving rim with circular impressions around a flat lip made with a blunt point rather than a hollow stamp. The shoulder was carinated and it was formed from Fabric I. One non-slipped appliqué piece was also recovered in Spit 1, Layer 1 (001), produced from Fabric E, but an association with vessel form cannot be determined (see 'appliqué' in Figure 17.7).

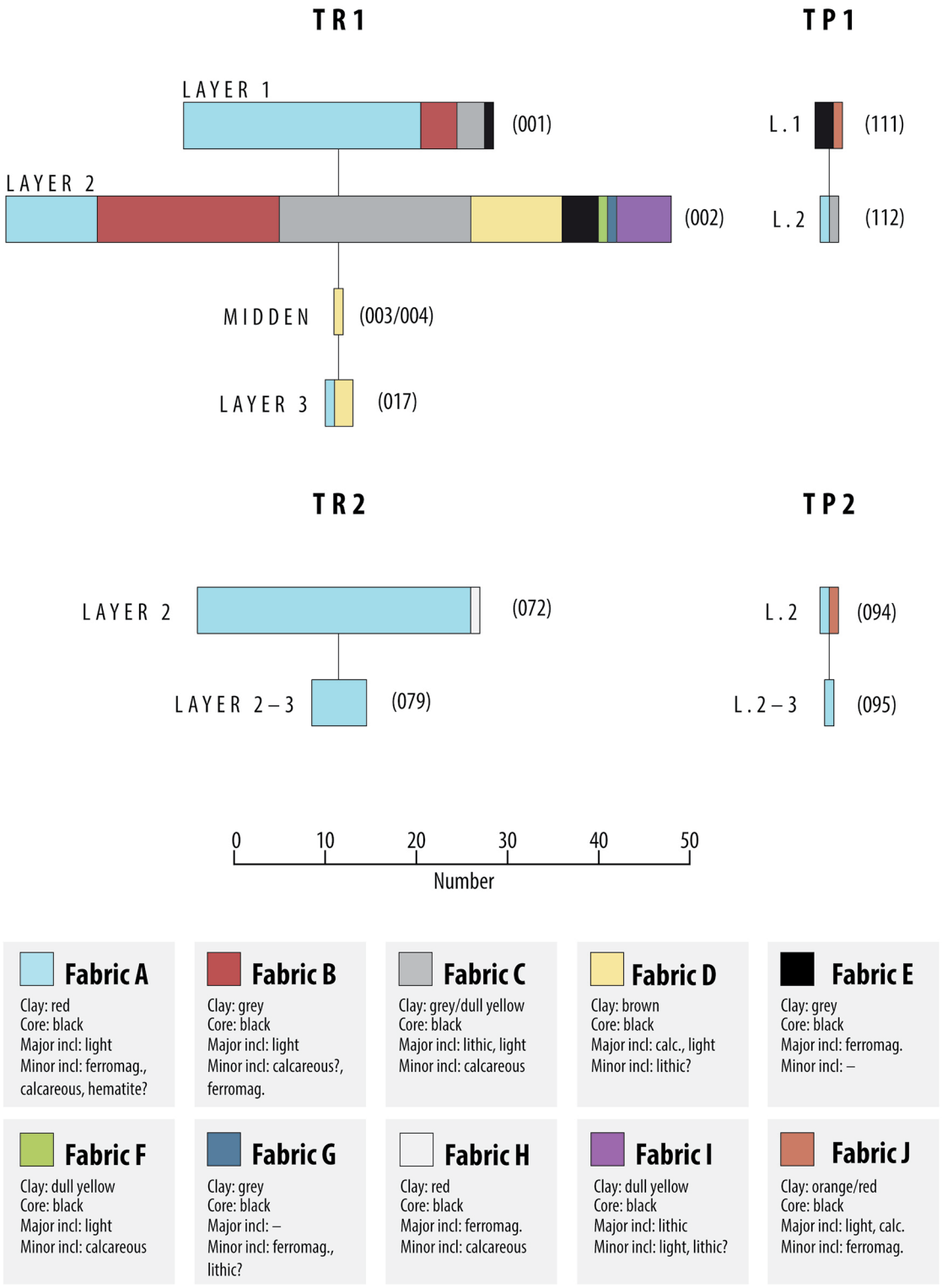

Figure 17.6: Harris matrix showing number of sherds per fabric group in each stratigraphic context at Mololo Cave.

Source: Authors' illustration.

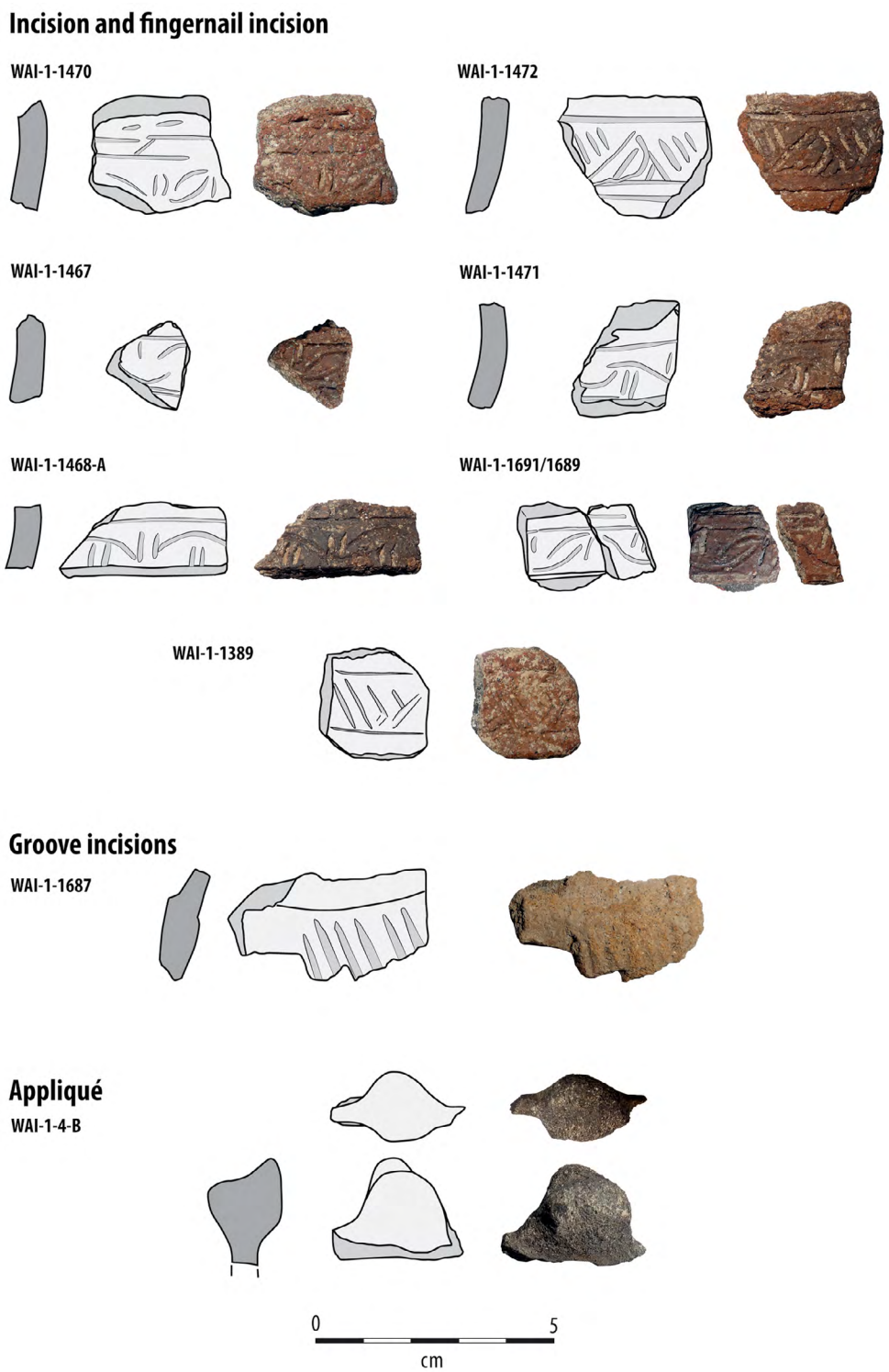

Figure 17.7: Decorated sherds from Mololo Cave.

Notes: Incised and fingernail-incised body sherds, WAI-1-1470, WAI-1-1472, WAI-1-1467, WAI-1-1471 and WAI-1-1468-A from TR1, Spit 2, Layer 1 (001); WAI-1-1691 refitted with WAI-1-1689 from TR1, Spit 2, Layer 2 (002); WAI-1-1389 from TR1, Spit 1 Layer 1 (001). Groove-incised (comb marked) coil, WAI-1-1687 from TR1, Spit 2, Layer 2 (002). Appliqué fragment from TP1, Spit 1, Layer 1 (111).

Source: Authors' illustration.

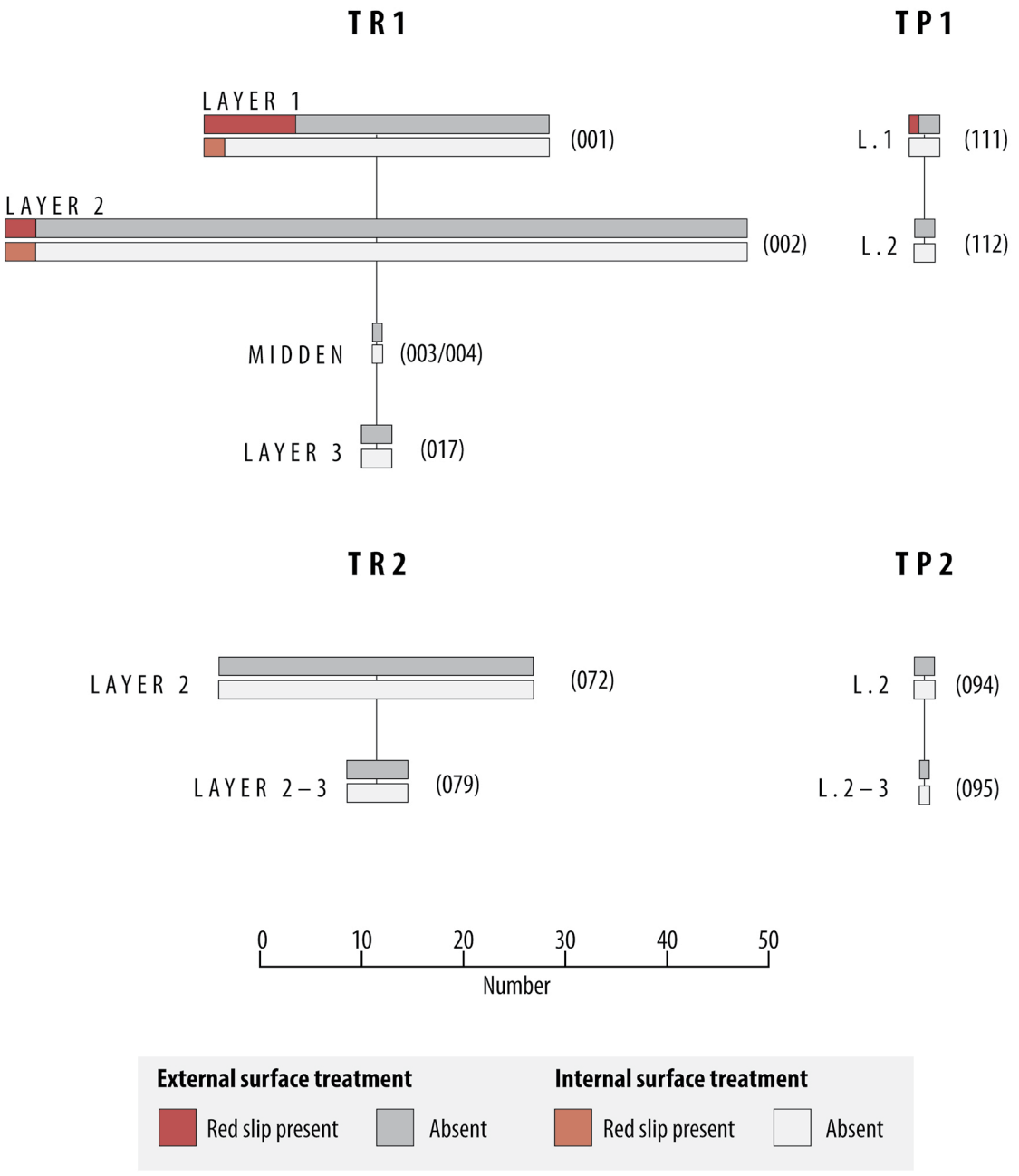

Figure 17.8: Harris matrix showing number of sherds with surface treatment in each stratigraphic context at Mololo Cave.

Source: Authors' illustration.

A small number of sherds retain surface treatment applied following the decorating stage. Red slip is rare, but more common in the most recent contexts at TR1 and TP1 (Figure 17.8), particularly in Layer 1 (001) associated with Class 1 rims and incised body sherds. No plain sherds from the earliest contexts at TR1—midden (003) and Layer 3 (017)—are slipped, and no sherds display slip at TR2 or TP2.

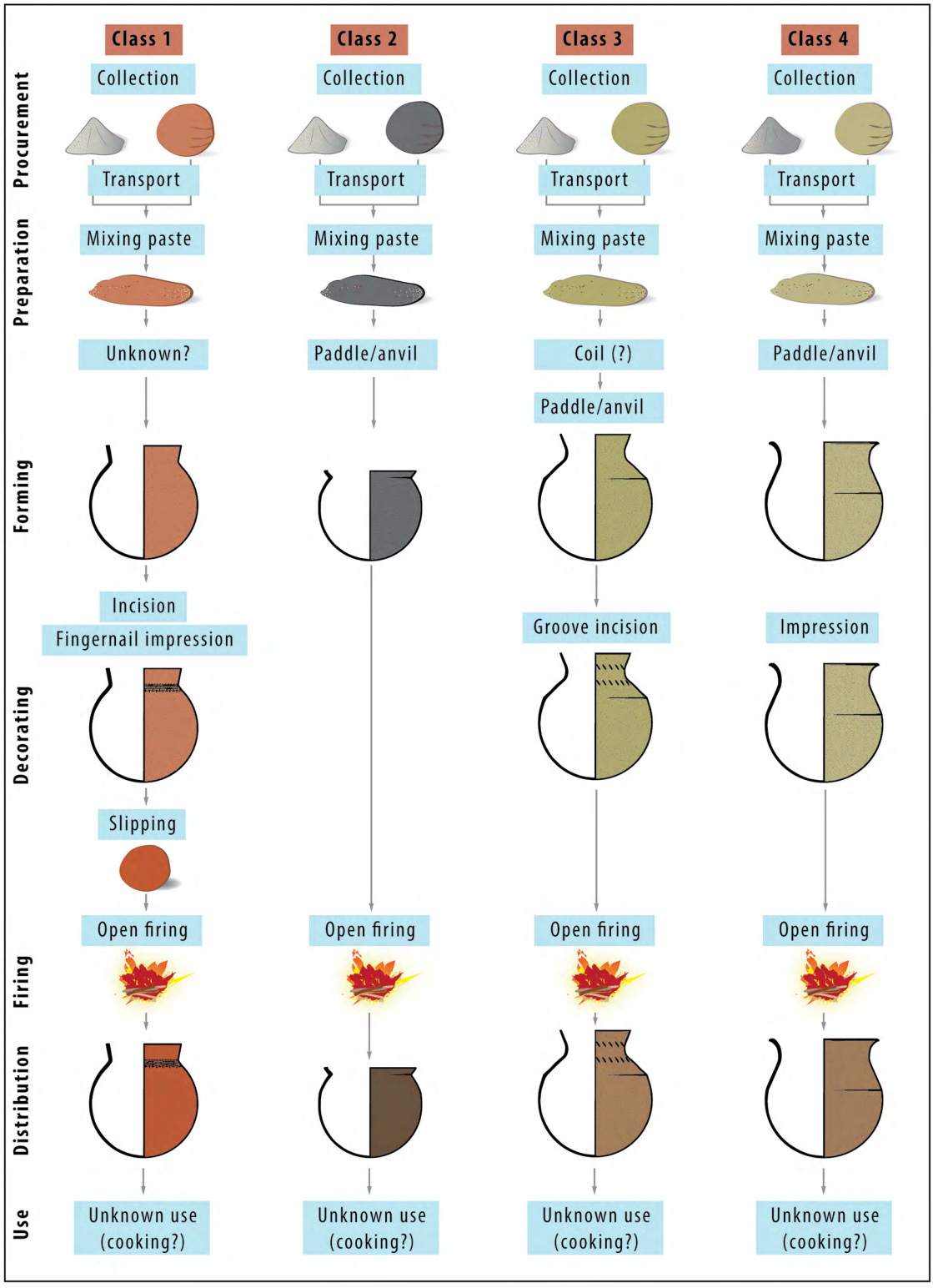

Figure 17.9: Provisional *chaînes opératoires* for four ceramic technical classes at Mololo Cave.

Notes: Several techno-fabric groups and technical variants based on decorating could not be reconstructed owing to small sample sizes. The lack of technological variation within each class almost certainly reflects small sample sizes.

Source: Authors' illustration.

Based on technological analysis, Figure 17.9 presents very provisional *chaînes opératoires* to illustrate how the Mololo pots were produced. It should be noted that owing to very limited sample sizes, representing a small number of vessels, these remain hypotheses that will be revised.

Ceramics at Manwen Bokor, c. 1300–1000 BP

Chronology

In total, 50 pottery sherds were recovered from the Manwen Bokor excavations (Table 17.4). At Unit 1, all ceramics were recovered in Layer 1 (001), in which there is a relatively low density distribution of sherds across Spits 1–14 (each spit contains between one and four sherds). A marine shell date of 1630±25 BP from Spit 11 provides an approximation of c. 1300–1000 years old for these sherds (calibrated with Mololo ΔR). At TP1, only three sherds were recovered, both from the sandy Layer 2 (008) that connects with Unit 1, Layer 1 (001), as well as in Layer 1 (007), which represents more recent sedimentation forming the mud flats. At TP2, pottery was recovered in low numbers in each layer; half of all sherds were excavated in Layer 3 (005), which again links with Unit 1, Layer 1 (001), and dates by association with wood charcoal to 1290±35 BP, c. 1300–1150 years old. At each excavation unit, it remains unclear whether all sherds represent a single depositional event with subsequent redeposition in secondary contexts; the absence of sherds that could be refitted suggests that there has been substantial horizontal displacement. Alternately (or additionally), the sherds might represent an aggregation of ceramic traditions spanning several centuries.

Table 17.4: Number of ceramic fragments from excavated contexts at Manwen Bokor Cave.

			Rim		Body		Total	
Layer	**Cont.**	**Date ka**	***n***	**%**	***n***	**%**	***n***	**%**
Unit 1								
Layer 1	(001)	1.2	10	27.0	27	73.0	37	100.0
Subtotal			**10**	**27.0**	**27**	**73.0**	**37**	**100.0**
TP1								
Layer 1	(007)	–	–	–	2	100.0	2	100.0
Layer 2	(008)	–	–	–	1	100.0	1	100.0
Subtotal			**–**	**–**	**3**	**100.0**	**3**	**100.0**
TP2								
Layer 1	(003)	–	1	50.0	1	50.0	2	100.0
Layer 2	(004)	–	–	–	2	100.0	2	100.0
Layer 3	(005)	1.2	3	60.0	2	40.0	5	100.0
Layer 4	(006)	–	1	100.0	–	–	1	100.0
Subtotal			**5**	**50.0**	**5**	**50.0**	**10**	**100.0**
TOTAL			**15**	**30.0**	**35**	**70.0**	**50**	**100.0**

Note: ka = thousand years ago; *n* = number of fragments; % = percentage of stratigraphic context.
Source: Authors' data.

Ceramic technology

The earthenware rims at Manwen Bokor were classified into five technical classes (Table 17.5; Figure 17.10). Unlike at Mololo Cave, no attempt is made to illustrate reconstructions of vessel form because of a dearth of formal sherds belonging to the same vessel. Long-distance import porcelain and white glazed ceramics (*n* = 5, 10 per cent of total assemblage) were not assigned a classification.

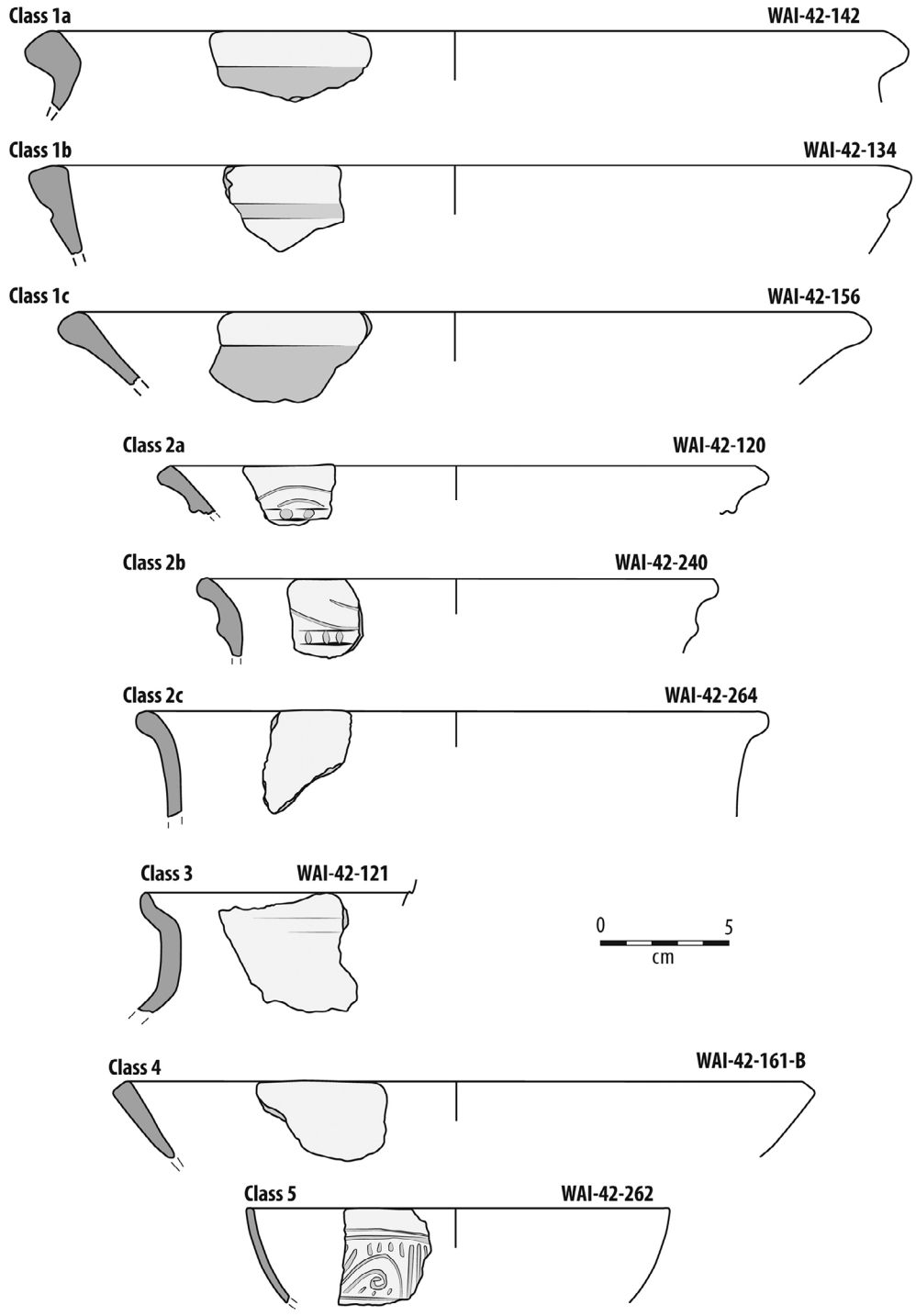

Figure 17.10: Rims from Manwen Bokor.

Notes: Class 1a rim (WAI-42-142) from globular pot, Unit 1, Layer 1 (001), Spit 9; Class 1b rim (WAI-42-134) from bowl or globular pot, Unit 1, Layer 1 (001), Spit 8; Class 1c rim (WAI-42-156) from bowl, globular pot or pedestal in Unit 1, Layer 1 (001), Spit 10; Class 2a rim (WAI-42-120) from Unit 1, Layer 1 (001), Spit 7; Class 2b rim (WAI-42-240) from Unit 1, Layer 1 (001); Class 2c rim (WAI-42-264) from TP2, Layer 3 (005), Spit 5; Class 3 rim (WAI-42-121) from Unit 1, Layer 1 (001), Spit 7; Class 4 rim (WAI-42-161-B) from Unit 1, Layer 1 (001); Class 5 incised rim (WAI-42-262) from TP2, Layer 3 (005), Spit 5.

Source: Authors' illustration.

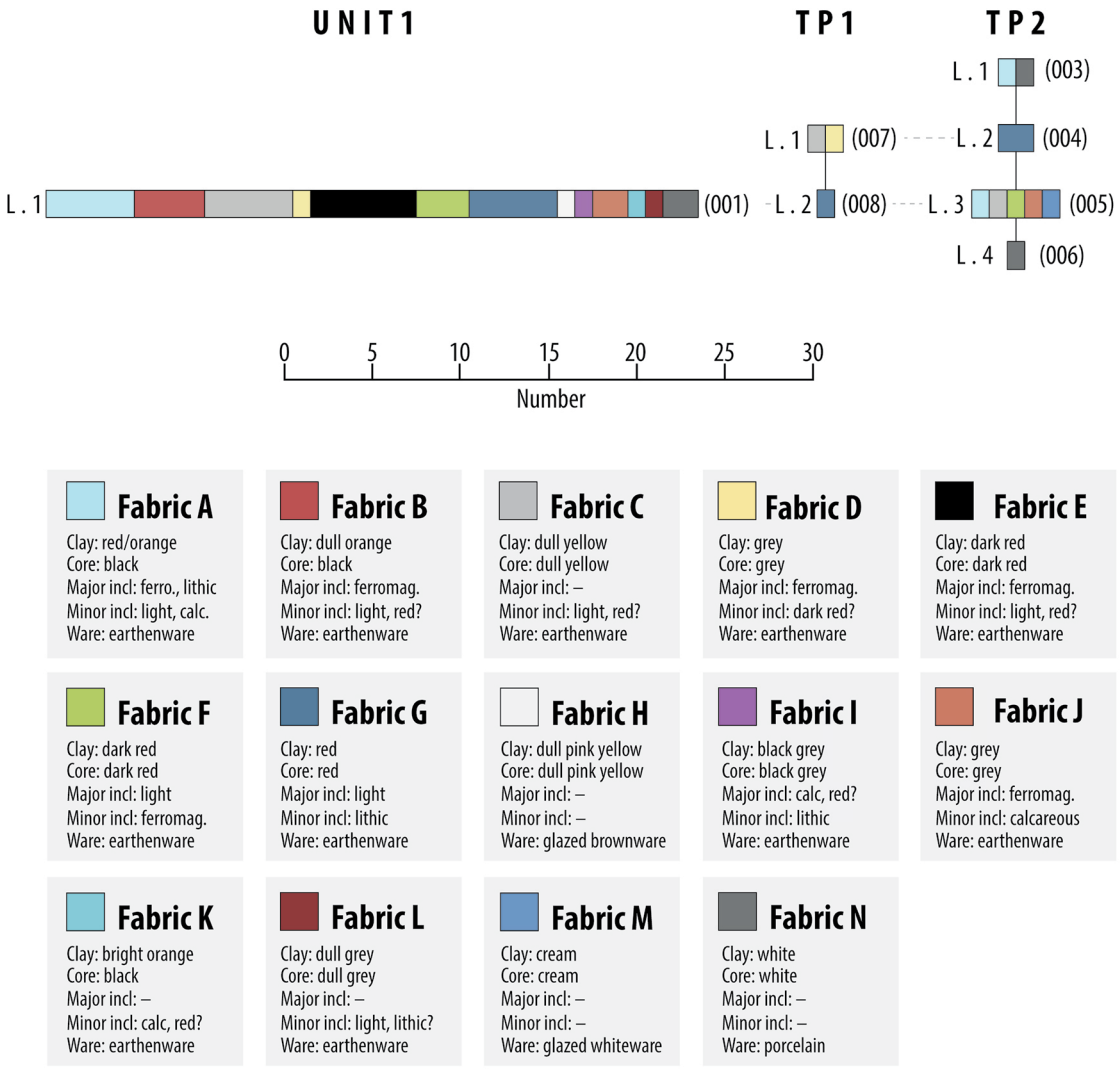

Figure 17.11: Number of sherds per techno-fabric group in each stratigraphic context at Manwen Bokor Cave.

Source: Authors' illustration.

Class 1 rims are thick-rimmed, red-slipped/burnished globular pots with a wide orifice and asymmetrically thickened exterior lips (Figure 17.10). Within Class 1, variant 1a is plain with an everted rim, variant 1b is a collared everted rim with a sub-lip bevel, and variant 1c is a plain direct rim. All Class 1 variants were formed from Fabric G (Figure 17.11). Class 2 rims are thin-walled pots with asymmetrically thickened exterior lips and sub-rim grooves. Within Class 2 rims, variant 2a is a plain direct rim, variant 2b is a curved everted rim with external and internal red slip and 2c is a collared everted rim. On Class 2a–b vessels from Unit 1, Layer 1 (001), a wave was inscribed around the sub-rim groove, coupled with circular impressions around the sub-rim ridge (see Figure 17.12). These variants were produced from Fabric B, while variant 2c was made from a similar paste, Fabric A.

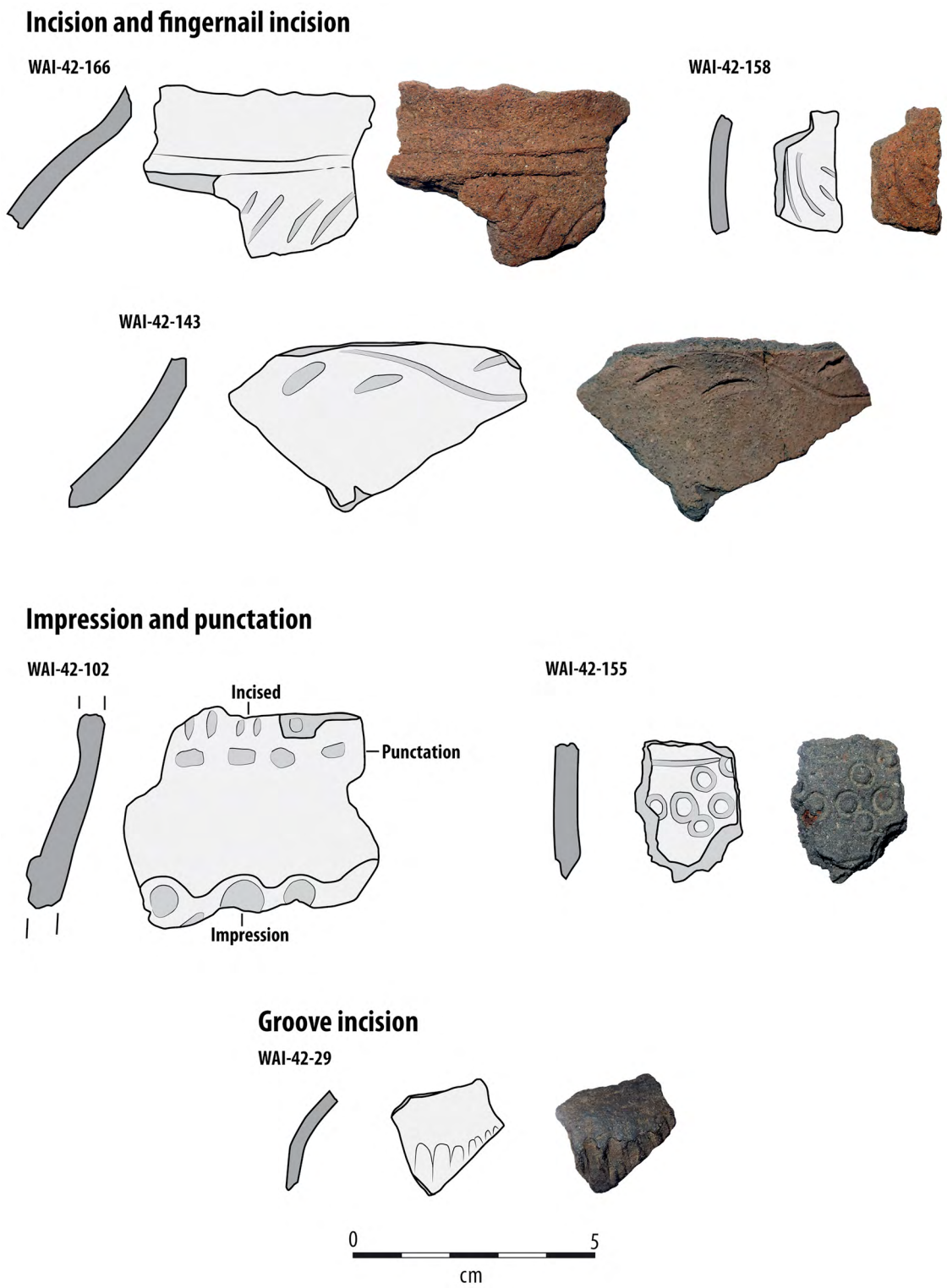

Figure 17.12: Decorated potsherds from Manwen Bokor Cave, Unit 1, Layer 1 (001).

Notes: Incision: WAI-42-166, Spit 11; WAI-42-158, Spit 10; WAI-42-143, Spit 9; impression: WAI-42-102, Spit 6; WAI-42-155, Spit 10; groove incision: WAI-42-29, Spit 8.

Source: Authors' illustration.

Table 17.5: Formal and decorative description of pottery technical classes at Manwen Bokor.

Class	Unit	Lay.	Cont.	Spit	Form	Rim direction	Rim profile	Rim course	Lip profile	Lip feature	External finish	Internal finish	Rim thickness (mm)	Neck thickness (mm)	Ø (mm)	Decoration
1a	1	1	(001)	9	Globular pot	Everted	Divergent gradual	Convex	Flat rounded	Asymmetrically thickened exterior	Red slip, burnish	Red slip, burnish	A: 16.1 B: 10.6	4.9	320	–
1b	1	1	(001)	8	Globular pot or bowl	Direct (or everted)	Divergent abrupt	Straight	Flat rounded	Asymmetrically thickened exterior	Red slip, burnish	Red slip, burnish	A: 15.4 B 10.3	6.3	320	–
1c	1	1	(001)	10	Bowl, pot or pedestal	Direct (or everted)	Divergent gradual	Straight	Flat rounded	Asymmetrically thickened exterior	Red slip, burnish	Red slip, burnish	A: 13.3 B: 9.6	?	300	Impression around exterior lip
2a	1	1	(001)	7	Globular pot or bowl	Direct	Divergent gradual	Straight	Flat rounded	Asymmetrically thickened exterior	Absent	Absent	A: 8.6 B: 6.0	3.4	230	Incision on sub-rim groove and impression on sub-rim ridge
2b	1	1	(001)	–	Globular pot(?)	Outcurving (or everted)	Parallel	Convex	Rounded	Asymmetrically thickened exterior	Red slip	Red slip	A: 7.7 B: 6.6	5.5	200	Incision on sub-rim groove and impression on sub-rim ridge
2c	TP2	3	(005)	5	Globular pot	Outcurving (or everted)	Parallel	Convex	Rounded	Asymmetrically thickened exterior	Red slip	Red slip	A: 8.8 B: 8.1	?	240	–
3	1	1	(001)	7	Globular pot	Everted	Convergent gradual	Concave	Rounded	Absent	Absent	Absent	A: 4.3 B: 6.9	8.4	?	–
4	1	1	(001)	–	Bowl	Direct	Divergent gradual	Concave	Flat sharp edge	Absent	Absent	Absent	A: 8.5 B: 6.1	?	260	–
5	TP2	3	(005)	5	Bowl or pedestal	Incurving	Parallel	Concave	Flat sharp edge	Absent	Absent	Absent	A: 3.7 B: 3.0	?	160	Incision on body

Note: All rims derive from the black sand layer at the site: Unit 1, Layer 1 (001) and Test Pit 2, Layer 3 (005).

Source: Authors' data.

The Class 3 sherd has a long, collared neck and internally concave rim, and was formed from Fabric K. The Class 4 rim is direct and gradually divergent with a flat lip that may derive from a bowl or everted rim. This rim was assigned to Fabric L. The Class 5 rim has parallel sides and an internally concave rim course, indicating it derives from a small bowl. An intricate motif was incised with spirals and horizontal lines within the borders of linear incisions on the body (see Figure 17.10). This vessel was produced from Fabric J, which is also associated with a body sherd decorated with wavy linear incisions flanked by possible fingernail incisions (see WAI-42-143 in Figure 17.12).

Incised body sherds from Unit 1, Layer 1 (001), included one specimen with rows of diagonal incisions flanking linear incisions (see WAI-42-166 in Figure 17.12). The sherd was made from Fabric A and these decorations may therefore be associated with Class 2c vessels. Another sherd (WAI-42-29), possibly slipped or burnished on the interior and exterior, was marked with groove incisions in a similar manner to those at Mololo, possibly using a comb or blunt wooden tool. Finally, a single small body sherd (WAI-42-155) was marked with groups of circle stamps, probably made with bamboo or truncated long bone. This sherd was excavated in Unit 1, Layer 1 (001), Spit 10, one spit above the marine shell date of c. 1300–1000 years ago.

Discussion

Early ceramics: Connections with the Island Southeast Asian Neolithic and Lapita

The presence of ceramics at Mololo Cave from, perhaps, 3800–3500 years ago and, more abundantly, 3100–2700 years ago represents the earliest known movement of pottery makers into the West Papua area. Although it remains unclear whether these ceramics were made locally around the Raja Ampat archipelago, the technological analysis gleaned meaningful insights about the production of the Mololo pots. For instance, the presence of calcareous tempers in the earliest Mololo sherds may suggest that pottery produced before 3000 years ago was made around limestone zones or on offshore coral islands, whereas later ceramics with light (feldspathic and quartz) and ferromagnesian grains could derive from sedimentary and volcanic zones on mainland Waigeo or other large islands. Similarly, most early sherds at Uattamdi 1 and Leang Tuwo Mane'e were coral tempered (Bellwood 2019; Tanudirjo 2001:207). Geochemical and petrographic analyses, now underway, will provide further detail.

In terms of morphological comparisons, the plainware from Mololo overlaps with rim forms recorded at Island Southeast Asian and Lapita sites (Figure 17.13). In particular, the Class 4 vessel discarded at Mololo c. 3100–2700 years ago is very similar to Bellwood's (2019) 'inflected rim v' from Uattamdi on Koyoa Island; globular pots with an outcurving or flaring rim that have a generally 'Lapitoid' appearance (e.g. Gaffney et al. 2019; Kirch 2021:341; Summerhayes 2000:117). This vessel form is also similar to sherds from a surface collection made at Kapidiri hill (WAI-38) on the north coast of Waigeo, suggesting that the use of pottery by coastal groups was not restricted to Mayalibit Bay.

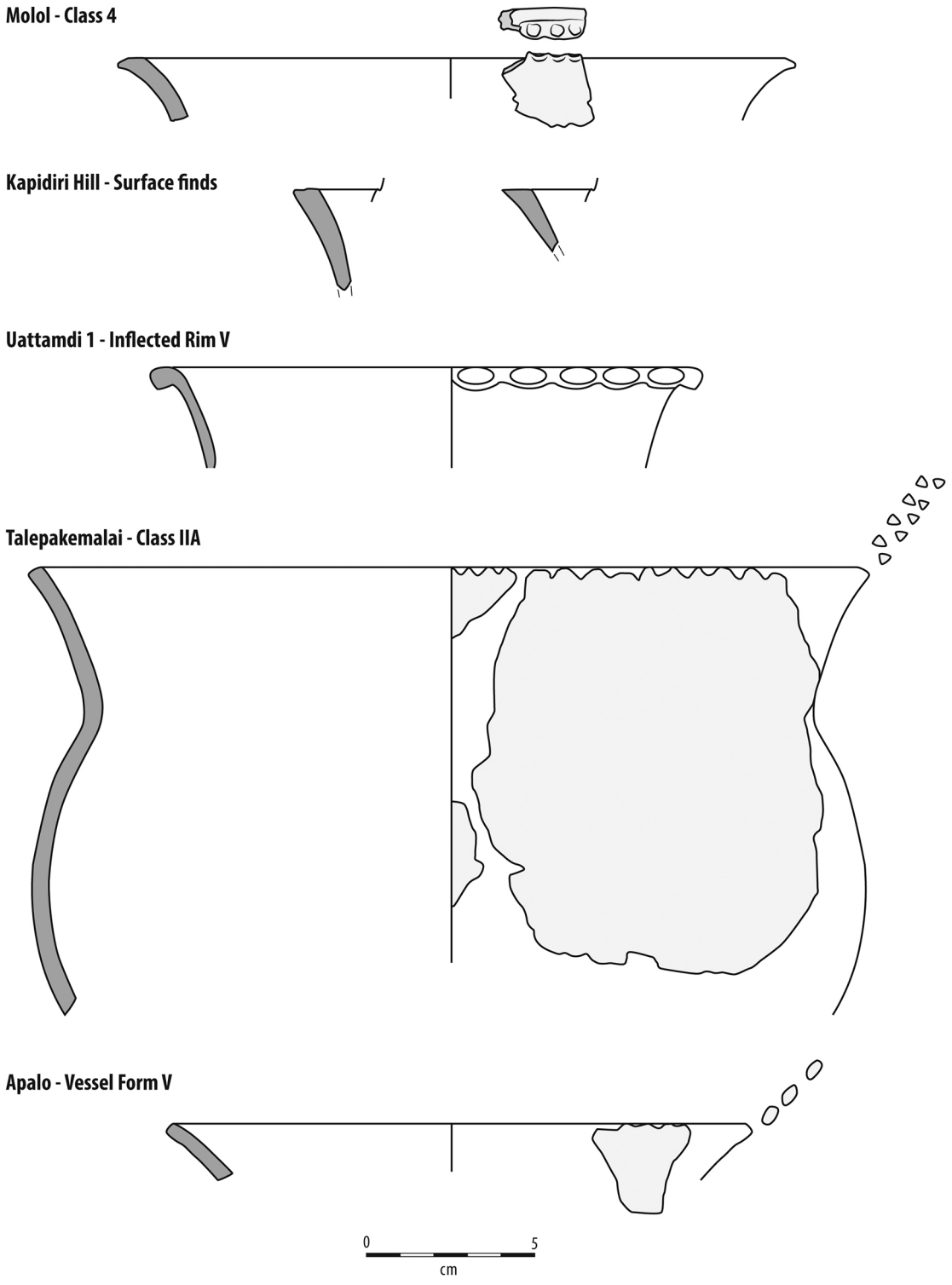

Figure 17.13: Rim form comparisons.

Notes: Class 4 rims at Mololo Cave, dating c. 3100–2700 years ago, in comparison with surface finds at Kapidiri hill, north Waigeo, and inflected rims from Uattamdi (Northern Maluku Is.), Talepakemalai (St Matthias Is.), and Apalo (Arawe Is.).

Sources: Redrawn from Bellwood (2019); Gaffney (2021); Kirch (2021:335); Summerhayes (2000:117).

When these Raja Ampat ceramics are considered alongside similar evidence from northern Maluku (Bellwood 2019), it seems likely that Lapita emerged from various influences in eastern Wallacea, New Guinea and possibly Micronesia, before becoming intertwined with extant communities in the Bismarck Archipelago. However, the sherds recovered from cave sites like Mololo may not represent large-scale settlements or ceramic production centres, and could have been occupied by non-pottery makers who obtained plain ceramics via trade (the same may not be true for Uattamdi, where larger numbers of ceramics have been recorded, see Ono 2022; Ono et al. 2021). Moreover, the earliest ceramics from these sites are contemporary with, but not earlier than, Early Lapita ceramics. As such, it is possible that open sites in the Raja Ampat Islands will provide more substantive evidence for a 'Far, Far Western Lapita' enclave occupied prior to 3350 years ago by people speaking Proto East Malayo-Polynesian (EMP) or dialects of Malayo-Polynesian that later evolved into the EMP languages upon contact with Papuan languages in the area. Future field excavations in the Raja Ampat and Cenderawasih Bay area will resolve this.

Changes to pottery making: Network contraction and regionalisation

Class 1 rims at Mololo are identical to Bellwood's (2019) red-slipped 'long rims' from Uattamdi Layer C. There is a large error range in the associated date (ANU-7775) that places the Uattamdi rims sometime between c. 3150 and 2300 years old, which corresponds with the date from Mololo. However, incised decorations associated with Class 1 rims are identical to 'inverted comma' designs described on pedestal bowls, lids and asymmetrically thick-rimmed pots at Aru Manara and Tanjong Pinang on Morotai Island dating to c. 2100–1900 years ago (Bellwood 2019; Ono, Aziz et al. 2018; Ono, Oktaviana et al. 2018), and carinated pots at Buwawansi 3 and 5 on Gebe Island (Bellwood 2019). If the incised motifs at Mololo are associated with the early Metal Age decorative complex in Maluku, then it implies the same decorations and associated Class 1 rims at Mololo are in situ in Layer 1 (001) and therefore date to c. 2300–2150 years ago. The appliqué piece recovered in Layer 1 (001) is also similar to moulded decorations on Metal Age ceramics from Maluku (Bellwood 2019; Ono, Oktaviana et al. 2018), and from Yenbekaki hill fort on Batanta (Galis and Kamma 1958).

The third millennium BP ceramics from Mololo are distinct from sherds recovered at Manwen Bokor, which date to 1300–1000 years ago and possibly thereafter. The Manwen Bokor ceramics show few similarities with contemporaneous potting traditions in the Bismarck Archipelago (e.g. Cath-Garling 2017; Spriggs 1991) and central Indonesia (e.g. Hasanuddin 2018; Plutniak et al. 2016). However, they do show similarities, of a more restricted range, with pottery to the east and the west. Class 1c and Class 4 rims are similar, but not identical, to bowls from Mare Island in North Maluku (Mahirta 2000). Class 3 rims resemble water pots from Ambon in Central Maluku (see Pétrequin and Pétrequin 2006:370). Many of the incised linear decorations on the Manwen Bokor sherds are common motifs around the north coast of New Guinea (e.g. Terrell and Schechter 2011), and Class 1a–b rims with sub-rim ridges and impressions are similarly characteristic of forming techniques found along the north coast of New Guinea (Gaffney 2020:214; Terrell and Schechter 2011), and resemble sherds recorded at Kaibatu near Jayapura (see Pétrequin and Pétrequin 2006:416). Notably, there is no evidence for the import of painted pots of the Banda, Kei and Aru Islands (e.g. Ellen 2019; Veth et al. 2005).

This process of regionalisation, or glocalisation, has been previously proposed by Tanudirjo (2006) for Island Southeast Asia and Allen (1985) for New Guinea. The presence of porcelain and glazed whiteware alongside earthenware at Manwen Bokor indicates that trade links (probably indirect) between mainland East Asia and the Pacific had been established about 1300–1000 years ago or slightly later. Therefore, although technological connections in earthenware pottery making were

compressed during the Metal Age, trade connections with new exotic pottery centres expanded. The exception to this trend is circle stamping, like on sherd WAI-42-155. This decorative method is widespread in the late Neolithic and early Metal Age of Island Southeast Asia. For instance, stamping occurs on ceramics from nearby Morotai Island dating to c. 2100–1900 years ago (Ono, Aziz et al. 2018) and the Banda Islands dating to c. 2700–2350 years ago (Lape et al. 2018), and further afield in the Batanes (Bellwood et al. 2013), Sulawesi (Mulvaney and Soejono 1972) and on Taiwan (Tsang 2000) particularly common around 2500 years ago. Stamping is present but less common in Late Lapita and Post-Lapita traditions (Cath-Garling 2017; Wu 2016). We suggest that these similarities result from a diffusion of design elements across a sphere of culture inherited from earlier pottery makers, rather than the mobility of potters themselves.

Conclusion

There is yet to be evidence for a cohesive Lapita occupation in the Raja Ampat Islands prior to its emergence in the Bismarck Archipelago. It is plausible that such evidence remains to be excavated at open sites around Raja Ampat and Cenderawasih Bay, or, alternatively, that Lapita developed in the Bismarck Archipelago from different strands of influence, some of which came from Raja Ampat. The Mololo Cave ceramics that date to 3100–2700 years ago (possibly even 3800–3500 years ago) show that the earliest known Raja Ampat ceramics are technologically related with contemporaneous pottery in Island Southeast Asia and the Bismarck Archipelago. However, the nature of these relationships needs to be clarified. Were the Early Lapita potters of the Bismarck Archipelago in direct contact with those around West Papua? Does Early Lapita pottery represent a daughter tradition, or offshoot, from parts of West Papua? Conversely, did Early Lapita potters emerge in the Bismarcks to become important ceramic producers that then influenced potters in West Papua?

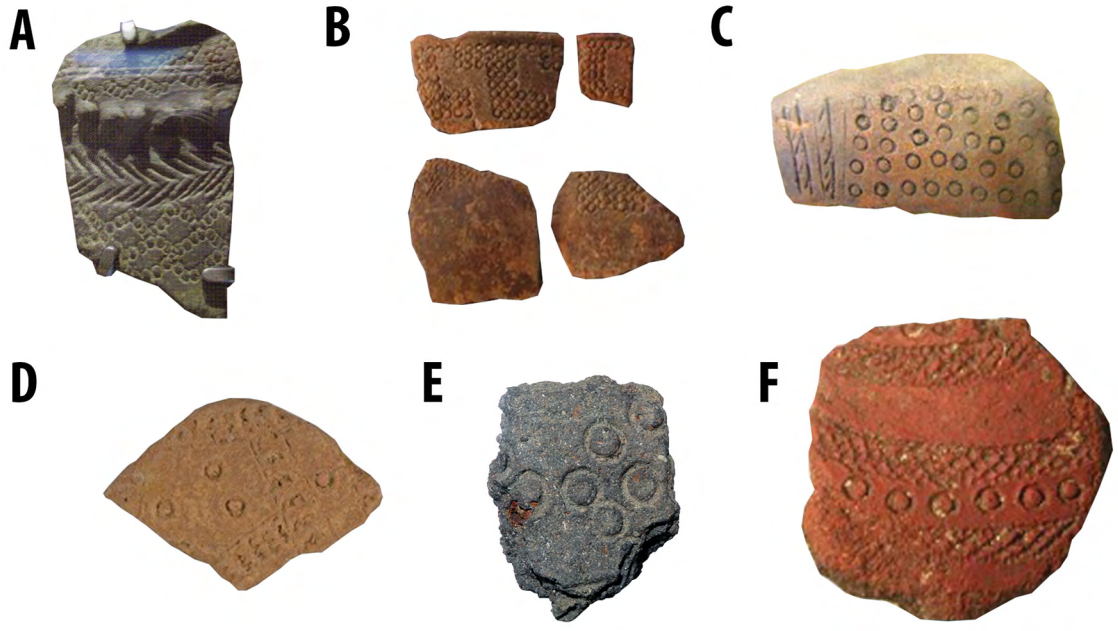

Figure 17.14: Circle stamp traditions from Island Southeast Asian late Neolithic and early Metal Age ceramics, alongside Lapita pottery.

Notes: (A) Ying Pu, Taiwan, c. 2500 BP; (B) Sunget, Batanes, c. 2500 BP; (C) Malawa, South Sulawesi; (D) Pulau Ay, Banda Islands; (E) Manwen Bokor, Waigeo, c. 1200 BP; (F) Lapita pottery.

Source: Authors' photographs.

The Manwen Bokor ceramics date to about 1300–1000 years ago and are distinct from those at Mololo. Decorative similarities with pottery from North Maluku and north New Guinea suggest a geographical contraction of the networks that potters operated within. Some instances of widespread decorations like circle stamping are suggestive of descent from common Neolithic and Lapita potters (Figure 17.14).

This process of regionalisation went hand-in-hand with a process of globalisation as Raja Ampat became connected, indirectly, with ceramic exporters in mainland East Asia. Lingering questions remain, however, about exactly when Southeast Asia – Bismarck connections began to fragment and how the mobility patterns of pottery makers changed accordingly. Asking these questions is just the first step; as Glenn Summerhayes' career has shown, it is only through years of survey, excavation, laboratory studies—and a bit of hard yakka—that we will come closer to resolving them.

Acknowledgements

We hope this article pays homage to Glenn Summerhayes' long career studying the ceramics of the Indo-Pacific; from his cutting-edge master's research on Javanese pottery to his later work pushing the boundaries of ceramic analysis in Papua New Guinea. Dylan Gaffney wishes to thank Glenn for 10 years of supervision, guidance and friendship. He is fortunate to have been taught ceramic analysis by Glenn during his MA at Otago, and remembers their fieldwork in Madang, Simbai and Karkar fondly. Daud Tanudirjo thanks Glenn for introducing to him a former student, Dylan, which led to the collaborative research project in Raja Ampat being set up. At The Australian National University, Daud often sought Glenn's advice about analysing and interpreting pottery collections from eastern Indonesia, and is grateful for their discussions about his PhD thesis. Glenn also provided his early writing on Javanese pottery which became a key resource, and his Lapita articles have become important touchstones for studying the archaeology of Indonesia.

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