Archaeological Studies of the Middle and Late Holocene, Papua New Guinea

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Preface — *Jim Specht* 1–2

Part I — Ceramic sites on the Duke of York Islands
J. Peter White
3–50

Part II — The Boduna Island (FEA) Lapita site
Jim Specht & Glenn Summerhayes
51–103

Part III — The Lagenda Lapita site (FCR/FCS), Talasea area
Jim Specht
105–129

Part IV — Pottery of the Talasea Area, West New Britain Province
Jim Specht & Robin Torrence
131–196

Part V — Pre-Lapita horizons in the Admiralty Islands: flaked stone technology from GAC and GFJ
Christina Pavlides & Jean Kennedy
197–215

Part VI — Revised dating of Type X pottery, Morobe Province
Ian Lilley & Jim Specht
217–226

Part VII — The evolution of Sio pottery: evidence from three sites in northeastern Papua New Guinea
Ian Lilley
227–244

Part VIII — A preliminary study into the Lavongai rectilinear earth mounds: an XRD and phytolith analysis
Matthew G. Leavesley & Ulrike Troitzsch
245–254

Part IX — A stone tablet from Buka Island, Bougainville Autonomous Region
Barry Craig
255–261

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Archaeological Studies of the Middle and Late Holocene, Papua New Guinea Part III

The Lagenda Lapita Site (FCR/FCS), Talasea Area

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ABSTRACT. The FCR/FCS site has played a major role in defining the history of Lapita pottery in the Bismarck Archipelago region of Island Melanesia, but hitherto few details have been published about the site. As the site has been largely destroyed, information about it is dependent on surface collections only. The pottery includes a range of dentate-stamped and incised designs comparable with other Lapita sites of the region, particularly in the Arawe Islands of south New Britain. It lacks several features of form and decoration present in the surface collections of FEA on Boduna Island in the Talasea area and those excavated in Area B of the ECA site on Eloaua Island, Mussau group. The start and end dates for pottery use can only be defined by comparisons with other sites. These suggest a starting date of about 3300–3000 cal. BP and an end-date no later than 2900–2600 cal. BP, though several sherds may be of slightly later date.

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The site of FCR/FCS is the largest and richest Lapita pottery site so far found on the mainland of the Garua Harbour area of Willaumez Peninsula, in the West New Britain Province of Papua New Guinea (Fig. 1). When first located in 1973, quarrying of the underlying limestone platform for road surfacing materials had already destroyed the FCS part of the site, and little if any part of the FCR section seemed suitable for excavation (Specht, 1974: 303). By 1980, renewed quarrying had also severely damaged the FCR area. Some of the surface collections made in 1973–74 subsequently formed an important component of Anson's (1983, 1986, 1990) study of Lapita sites in the Bismarck Archipelago that led to the definition of an early ("Far Western") stage of Lapita pottery development in the Archipelago (Anson, 1986: 162). Despite this important contribution to the study of the history of Lapita pottery, the site has remained unpublished apart from the initial brief account (Specht, 1974). Here I describe the main finds, particularly the pottery, and discuss the site in relation to the FEA site on Boduna Island, the only other major Lapita site known at beach-level in the Talasea area.

The site is situated on the coastal plain in the Lagenda area of Bola village, facing Garua and Lagenda Islands across the southeastern entrance to Garua Harbour, and about 3 km from Talasea Station (Fig. 2). During the colonial era, this area formed part of Santa Monica coconut plantation, but the land is once again in village hands. Elsewhere, the site has been referred to as Tchobu beach (Specht, 1974; Anderson *et al*., 2001: table 1), but here the name Lagenda is preferred as the scatter of surface finds extended beyond Tchobu beach.

Initially, two "sites" were defined (FCR and FCS), but later these were combined into one complex, as there was no clear division between them. Indeed, the pottery localities recorded as FCQ at the old Santa Monica plantation wharf and FCP, several hundred metres to the north of FCQ, could also be treated as part of this complex, as these areas are separated from FCR by a reef flat covered with recent muddy sediments that could conceal a continuous distribution of sherds and other artefacts. For the present, however, they are treated as being separate.

The FCR area, to the north of FCS, extends along about 150 m of the muddy inter-tidal zone and beach (FCR/A). The inland extent of this area is not known, but crab burrowing has brought heavily weathered sherds to the ground surface up to about 10 m inland from the high tide mark (FCR/B). No test excavations have been carried out at FCR, but the degree of damage to deposits above high tide due to quarrying, the number of crab burrows, and the heavily weathered nature of the sherds revealed by the burrowing do not encourage hope of locating a reasonably undisturbed deposit. To the south of FCR is the FCS area, which has been quarried down to the water table to extract coral limestone for road surfacing. The FCS quarry pit is about 125 m long and extends inland for about 50 m, and is up to 1.5–2 m deep. Between the quarry pit and the sea there was a bank of mixed sand, tephra and soil about a metre high and about one metre wide. This bank was probably formed by the bulldozer pushing the overburden to form a barrier at the sea front to prevent flooding of the quarry at high tide. When the site was last visited in 1988, small trees and other vegetation were growing in the quarry pit, which was partially filled by sediments eroded from the surrounding exposures and the beach barrier. On the inland side of FCS exposed profiles up to three metres high showed that about half of the depth was bulldozer "push." The lower part of these profiles showed a basal deposit of brown clay or beach sand mixed with coral reef detritus covering a limestone platform that is probably of mid Holocene age. The clay and sand/reef detritus were locally sealed by reworked pumiceous tephra, which has not been related to the local tephra sequence. The palaeosol on the surface of this tephra was sealed in turn by undifferentiated brown soil, presumably derived from later tephras.

For collecting purposes, FCS was divided into five areas A to D, and F, with area E representing combined collections from areas A and B. Area A is the beach slope, inter-tidal zone and reef flat. Area B is the land above the beach and the sea barrier formed by the bulldozer. Area C is the inland floor of the quarry pit. Pottery, obsidian and various other stone artefacts were found in areas A to C. Area D represents the exposures on the inland side of the quarry. Several of these exposures were cleaned but only one sherd was found in a mixed soil and tephra deposit, though obsidian flakes were present in all of the sediments, including the reworked tephra, except the basal clay and sand/reef detritus. Inspection of the site in 1988 failed to locate sherds in the sediments from the collapsed exposures of area D, suggesting that the quarry pit extended beyond the inland limit of the Lapita site. Area F is a mudflat where two sherds were found to the south of FCR/FCS, near the mouth of the small river at Bola village.

Reconstruction of the context of the site during the Lapita pottery period is hampered by its present condition and post-Lapita tectonic activity in the Talasea area (cf. Boyd & Torrence, 1996; White *et al*., 2002). The site was probably situated on the sand- and reef detritus-covered coral reef platform, but it is not clear whether this platform formed part of the mainland or was a small offshore islet that subsequently became joined to the mainland. In the Mussau Islands, Kirch (2001a: 132) notes that at the time of the initial use of the ECA Lapita site, relative sea level was about 1 m higher than at present, and a similar situation might have obtained at FCR/FCS. If the site was originally on a small islet, the lowering of relative sea level and/or tectonic uplift could have linked the islet to the mainland, as has been suggested for the FCN/FCO Lapita site on Point Mondu at Talasea Station (Specht & Torrence, 2007). The land surface has also been built up by tephra falls subsequent to the Lapita use of the area. It is impossible to define the original size of the site as its inland extent is not known, and the spread of cultural materials over several hundred metres of beach and inter-tidal reef is probably the result of quarrying and sea action. A site area of about 10,000 m^2 is possible.

Stone artefacts

Obsidian. The most common stone artefacts were obsidian flakes and cores, and a total of 276 pieces weighing 5.45 kg was collected, mostly from the FCS area (229–4.2 kg). Many of these show edge damage possibly caused by bulldozer activity. Among the obsidian artefacts at FCS were two bifacially flaked points or stems and a broken Type 1 stemmed tool (Specht, 1974: fig. 3a). Three stem fragments and a complete Type 2 stemmed tool were found at FCR (Araho *et al*., 2002: fig. 13; Rath & Torrence, 2003; Torrence, 2004). These obsidian forms pre-date Lapita pottery in the Talasea area, though it is impossible to identify the sediment unit at FCR/FCS in which they were originally deposited.

Axe/adze blades. The relationship of other stone artefacts to the Lapita site is uncertain. Two flaked items of dacite (FCR/B) and grey quartzite or tuff (FCS/C) are stems of tools of uncertain form (Figs 3a–b). The FCR/B example is thick and short with a flat poll, and is made from a flake with unifacial flaking only. Its broken edge appears to have been re-used as a scraper or chisel (Nina Kononenko, pers. com.). The second item is thinner, has a pointed poll and is bifacially flaked. Similar broken stems have been found on Kaula Island (FEN), in Lambe Gully at Bitokara Mission (FQT), and on Garua Island (FEK and FAP). Some of these may be parts of butt-modified axe blades similar to the complete example recovered at FCN/FCO (Specht, 1974: fig. 4b). The FEK find is unusual as it was made from an orange-brown sedimentary chert similar to that used to produce waisted and stemmed tools of pre-Lapita age in central New Britain (Chowning & Goodale, 1966). The FAP and FEN items are made from a fine-grained black rhyolite or andesite, and the FQT tool from a medium-grained dark grey volcanic rock.

These items recall four finds on the south side of New Britain, where two broken stems have been found at sites with Lapita pottery: Kreslo (FNT) (Specht, 1991: 199, fig. 9d) and Aurarуo (FFS) on Apugi Island near Kandrian. A third broken stem of volcanogenic siltstone or tuff was found at site FJA about 10 km inland from Kandrian. The fourth item is a large, complete stemmed tool of rhyolite obtained on Apugi Island to the south east of Kandrian. This was found during gardening on the mainland opposite Apugi. These south coast finds are non-local in origin, as this region consists of uplifted reefal limestone (Ryburn, 1975). A north New Britain source, possibly on Willaumez Peninsula, is likely, as rhyolite is one of the major rock types of the Kimbe Volcanics (Lowder & Carmichael, 1970; Ryburn, 1975: table 1; Smith & Johnson, 1981). None of these tools has been found in a datable context, but the recovery of five at sites that also have Lapita pottery (FCN/FCO, FCR/FCS, FFS and FNT) raises the possibility that they were contemporary with Lapita. The FEK and FAP items were found with sherds but in re-deposited contexts. No pottery has yet been found at FEN on Kaula Island (Specht & Torrence, 2007).

Six fragments of flaked and ground axe and adze blades were made from a range of tuffs. Three fragments are too small to identify their original form, but three larger items have lenticular or plano-convex cross-sections and display extensive use damage on the cutting edge and sides (Figs 3c–d; Specht, 1974: fig. 3b). An unworked piece of chalcedony was found at FCS; the source of this piece is not known.

Pottery

Surface collecting during visits to the site in 1973, 1974, 1980 and 1988 yielded about 750 sherds (c. 6kg). Most sherds (c. 600) came from FCS, with 106 from FCR and 30 from the area between them. Anson (1983: 29, appendix III, table 1) included 58 "Talasea" sherds in his study of Bismarck Archipelago Lapita pottery (22 dentate-stamped, 6 incised, 30 plain rim and body). This sample included 57 sherds from FCR/FCS, and one incised sherd from FEA (Anson, 1983: fig. VIII.2; see Specht & Summerhayes, 2007: fig. 13g). Many more sherds are reported here, partly reflecting further collecting after Anson's study, and partly Anson's omission of sherds that were too small or weathered to contribute to his analysis. Anson does not report the provenance details area for his sample, but the dentate-stamped sherds must have come primarily from FCS, as few dentate-stamped sherds were recovered from FCR. Where a decorated sherd illustrated in the present paper can be confidently identified in Anson's sample (Anson, 1983: fig. VII.1, 3–6, plate VII), this is noted in the detailed captions of Appendix 1. As Anson illustrated plain rims and shoulders only in profile, it is impossible to identify these.

The analysis presented here includes 139 rims and body sherds with decoration, and 20 plain rims or shoulders; 110 of these are shown in Figs 4–10. The vessel exterior surface is on the left side of the sherd profile and the sherd plan is to the right of the profile. For rims and bases a horizontal line drawn to the right indicates the probable orientation. In some cases the orientation of the sherd is uncertain, as with three sherds that are shown as both rims and bases (Figs 6a–f), and the upper body sherd of Fig. 9a that could also be inverted. The orientation of small sherds reflects the most likely position according to the sherd curvature. Arrows pointing to the lip indicate the direction of lip notching. Where a design was definitely made by a dentate-stamp, the impressions are shown as a line of dots or short dashes. No attempt is made the represent accurately the size or number of the tooth marks, though closely spaced dots indicate very fine needlepoint impressions. Continuous lines indicate either linear incision or plain stamp impression; the latter are mostly small or wide diameter arcs. Circles indicate impressions made by a hollow tubular device, and solid black triangles indicate excised triangles. Shaded areas indicate that the sherd surface is damaged.

The sherds display various degrees of weathering. Those recovered from the beach and inter-tidal zone and around crab holes at FCR were heavily abraded and many no longer retain their original surfaces. Relatively fresh sherds, such as those from the inter-tidal zone and beach above high tide outside the bulldozer sea barrier at FCS probably represent items unearthed by the quarrying activity. While there are no conjoins, two sherds (FCS/A/62 and FCS/B/31; Fig. 5f) are from the same vessel and were probably dispersed by bulldozer activity.

The condition of the sherds limits discussion of vessel construction techniques. Several thick sherds, particularly rims, shoulders and a flat base, are from vessels that were formed by joining strips or slabs of clay. Most sherds have brown to red-brown surfaces, though there are several with dark brown or grey surfaces. A few sherds have black patches perhaps as a result of "smudging" during firing or from use in cooking.

Vessel forms. Seven of the eight vessel forms defined for the Arawe Islands on the south side of New Britain are definitely present (Summerhayes, 2000a: figs 4.1–4.3; 2000b: figs 3–5): forms I–III open bowls, cups and possible bowls with horizontal rims; form IV jars with restricted necks and horizontal rims; form V jars with outcurving rims and carinated shoulders; form VI pots with everted rims and globular bodies; and form VII flasks, narrow necked vessels and incurving bowls (Figs 4–7). Form VIII vessel stands may be present, depending on how some rim forms are interpreted (Figs 6a–f). Several sherds are from flat-based open bowls of form I (Figs 5a–c). Anson (1983: 35; 1986: 161) did not identify this form in his sample. Two small rim sherds (Figs 4m–n) are assigned to form I, though they could be restricted bowls of a type not recorded in Summerhayes' Arawe assemblages. Three other rims do not have counterparts in the Arawe corpus (Figs 6k–m). Vessel mouth diameters could usually be measured only within a general range (e.g., 200–240 mm, 280–320 mm). They are not shown on the figures, but are provided in Appendix 1. The smallest (FCS/B/54: 100 mm) and largest (FCS/A/85: 280–320 mm) diameters are form VII vessels (Figs 5w,x). Most rims have flat or slightly rounded lips. Several rims have an additional strip of clay added as a kind of collar or ledge to form a grooved or channelled lip (Figs 4m–n). Several shoulder-upper body sherds have an abrupt narrowing of the vessel wall that forms a narrow step or rebate (Figs 7k–m).

One modelled piece of slightly curved, tapering form with a flattened oval cross-section could be part of an appendage on a vessel or part of a figurine (Fig. 6n). No other piece like this is reported from other Lapita sites in New Britain.

Table 1. Distribution of decorative techniques by vessel part at FCR/FCS. In the columns for *rims* and *all sherds* five rims are counted twice, as they are have both exterior surface and lip modification. The actual number of sherds in each column is shown in brackets.

	rims	body/neck	shoulders	bases	all sherds
dentate stamp (D/S)	17	34	2	1?	54
D/S plus plain stamp	2	7	2	0	11
D/S plus circle stamp	0	5	0	0	5
D/S plus perforation	0	1	0	0	1
plain stamp	2	5	1	1	9
linear incision	1	13	4	2	20
fingernail impression	0	0	0	1	1
lip—single notching	26	*n.a.*	*n.a.*	*n.a.*	26
lip—double notching	5	*n.a.*	*n.a.*	*n.a.*	5
lip—scalloped	2	*n.a.*	*n.a.*	*n.a.*	2
lip—excised triangles	1	*n.a.*	*n.a.*	*n.a.*	1
lip—circle stamp	1	*n.a.*	*n.a.*	*n.a.*	1
lip—D/S	6	*n.a.*	*n.a.*	*n.a.*	6
lip—linear incision	2	*n.a.*	*n.a.*	*n.a.*	2
totals	65 (60)	65	9	5	144 (139)

Decorative techniques. Table 1 summarises the distribution of decorative techniques by vessel part on 139 sherds. The total of 144 occurrences indicates that five rims are listed twice, once under the main exterior decorative technique, and again under lip modifications; these include the two rims that might come from the same bowl. As will be seen from Figs 4–6, the most commonly decorated vessels are Forms I, II and VII, though frequencies have not been calculated. Rims of forms IV, V and VI are rarely decorated.

Several dentate-stamped and plain sherds have red slips (7.5R 5/8, 10R 4/8 and 10R 5/6 on the Munsell colour chart). Various compositional studies have concluded that the pottery was made from local clays and volcaniclastic sand tempers (Hollis, 1983; Anson, 1983; Lohu, 1983).

Surface modifications classed as decoration include red pigment or slip, dentate-stamping, plain line stamping, circular stamping, linear incision, fingernail impression, excised triangles, a perforation, notched lips and scalloped lips.

Dentate-stamping is the commonest technique, appearing on more than half of the decorated sherds, occasionally in combination with other techniques. The dentate-stamps include straight and curved forms. The nature of the dentate-stamping varies from extremely fine (<0.5 mm) needlepoint to large (≥1 mm) impressions. The number of impressions per 10 mm was counted on nine sherds where the surfaces are well preserved. They range from six (one example) to fifteen (one example) impressions per 10 mm, but most have eight to eleven impressions per 10 mm. The finest impressions are often groups of closely spaced short, straight lines with a plain arc stamp impression bracketing the ends of each group (Figs 7i, 8f–h). Two sherds with dentate-stamping have traces of a yellowish-white substance in the impressions that might be a deliberate application (Figs 8k, 8t). Another dentate-stamped sherd has a perforation, presumably for suspension or for attaching decorative elements such as feathers, leaves, etc. (Fig. 9j).

Linear incision and plain stamping are the next most common techniques, and both occur with dentate-stamping, though the weathered surface of many sherds makes it difficult occasionally to decide whether a particular set of impressions was made with a dentate or plain tool. Plain stamps include short and long arcs or semi-circles, and circles impressed by a hollow tubular tool (Figs 4a, 4g, 5f, 7i, 8e–h, 8m, 9a and 9f).

There is only one example each of excised triangles (Fig. 4e) and fingernail impressions (Fig. 8a). No sherds decorated with applied relief bands or knobs were recovered, though several carinated shoulders have a ridge on the angle where an extra strip of clay was added, possibly to strengthen the shoulder (Figs 5p–r).

Lip modifications include dentate-stamps, plain stamps, circle impressions, excised triangles, and angular or rounded notching. Single notching is the commonest form (26–43.3% of all rims), with double notching (5–8.3%) and wavy "scallop" (2–3.3%) as minor forms. Notching occurs with dentate-stamping on form I rims, but is more common on flat-lipped rims of forms IV, V and VI that otherwise lack decoration (Figs 4a–b, 5d). The scalloped rims are also plain.

Decorative elements. The poor condition and small size of many sherds prevent discussion of the whole vessel decoration. Figures 3–9 present interpretations of most of the decorated sherds. While other observers might differ on details, the broader structure of the designs would probably be acceptable. The sherds omitted are very small, and usually have only one or two lines of dentate-stamping or incision.

Anson (1983: table XII) recognized 16 motifs in his FCR/FCS sample: M1, M30, M37, M39, M120, M149, M167, M205, M206, M237, M260, M275, M327, M331, M430, M516. The sherds illustrated here have 46 definite and possible Anson motifs, and at least another ten not shown on Anson's table (the latter are not assigned motif numbers here). This increase in motif numbers partly reflects the larger sample used here, and probably also differing observer interpretations of some indistinct designs. The distribution of motifs is as follows:

1 Identified by Anson only (5): M30, M39, M260, M331, M516
2 Identified by both Anson and Specht (11): M1, M37, M120, M149, M167, M205, M206, M237, M275, M327, M430
3 Identified by Specht only (30):
• Definite match with an Anson motif (12): M3, M21, M35, M44, M207.1, M217, M272, M329, M378, M441, M443, M448
• Possibly part of an Anson motif (4): M2, M11, M429, M435
• Similar to one or more Anson motifs (14): M14, M16 or M496, M17, M107, M120 or M306, M129 or M131, M130, M155, M187 or M188, M199 or M207, M271 or M274, M271 or M274 or M276, M295, M345 or M351

Anson (1983: table XII) listed four motifs (M149, M205, M237, M430) as unique to FCR/FCS. Larger samples from more sites in New Britain now show that M237 is shared with FOH/D-E-F, FOH/G, FOJ, FNT and FNY in the Arawe Islands, and with FSZ and FEA in the Talasea area (Summerhayes, 2000a: table 10.5; Specht & Summerhayes, 2007: fig. 8n). Motif M430 is related to the widespread "labyrinth" design (Siorat, 1990: 62; Sand *et al*., 1996: fig. 163; Chiu and Sand, 2005: 142, 144), variations of which also occur in the Talasea area at FEA (Ambrose & Gosden, 1991: fig. 6.2; Specht & Summerhayes, 2007: figs 11a–b, 12a, 12c, 19c–e and 19g–h) and FQD (Specht & Torrence, 2007: fig. 7g). Motifs M149 and M205 currently remain specific to FCR/FCS.

Anson (1983: figs XIV.8–9, XVI.7–13) further identified five motifs (M30, M39, M260, M327 and M516) as "unshared motif types," but each is shared with at least one other site in his table XII. In addition, motif M30 (Anson, 1983: fig. XVI.11) is present at FOH/D-E-F in the Arawe Islands (Summerhayes, 2000a: table 10.5), and M260 (Anson, 1983: fig. XVI.10) occurs at FSZ (Specht & Torrence, 2007) and possibly FEA (Ambrose & Gosden, 1991: fig. 3.3) in the Talasea area.

The designs consist mainly of bands of repeated dentate, plain stamped or linear incised elements arranged horizontally around the vessel. These are sometimes separated by a band of rope-like impressions formed by closely placed, overlapping dentate-stamped or plain arcs (Anson's M35; the "rope" design of Specht, 1968: 129; cf. the restricted zone markers RZ2 and RZ3 of Mead, 1975: fig. 2.12), or rows of diagonal or criss-cross lines (Anson's M237 and M435) (Figs 6–8). Occasionally, it is difficult to determine how these bands were made. Some are clearly rows of overlapping dentate or plain arc stamps with a dentate line joining the ends of the arcs. Others could be formed by closely spaced diagonal or criss-cross straight-line plain impressions or incisions.

The lips of vessel forms I and II are often decorated with groups of dentate-stamped lines, rows of plain arc or circle stamps, and excised triangles (Figs 4e–k, 5f,h). The two sherds from the same form II vessel have a row of small, plain arc stamps on the flat lip (Fig. 5f). One of the two grooved rims has dentate-stamped designs (Fig. 4m).

There is only one clear face motif at FCR/FCS (Fig. 4e), similar to Anson's (1983: table XII) motif M345 or M351. This form I rim sherd has part of a rectilinear face of Type 2C or 2D (Spriggs, 1990: figs 26, 29, 1993: fig. 2.12) formed by dentate-stamped "rope" bands and oval "eyes." The lip has excised triangles alternating base-to-apex. There are no other sherds with obvious face designs, though two with rectilinear interlocking patterns (Figs 9d–e) recall the use of this design between Type 1 faces at the RF-2 site in the SE Solomon Islands (Spriggs, 1990: fig. 8).

Incised designs include a range of rectilinear and curvilinear lines, often more or less parallel or concentric (Figs 5a–b, 7b–e, 9i, 8m,n and 10a–f). There is one example of criss-cross incised lines (Fig. 10g).

Anson (1986: 160; cf. 1990) noted that triangles formed by dentate-stamped straight lines on Watom and at his "Far

Table 2. Thickness (mm) comparisons between plain and decorated sherds, dentate-stamped and incised sherds, and decorated and plain shoulders at FCR/FCS.

	n	mean	SD	df	*t*	P
maximum thickness						
plain	150	6.89	1.75			
decorated	90	7.95	2.24	238	4.09	0.0001
minimum thickness						
plain	150	6.01	1.58			
decorated	90	6.87	1.97	238	3.74	0.0002
maximum thickness						
dentate-stamped	61	8.46	2.16			
incised	22	6.62	1.79	81	3.57	0.0006
minimum thickness						
dentate-stamped	61	7.29	4.9			
incised	22	5.78	3.1	81	3.28	0.0016
maximum thickness						
plain shoulders	35	8.62	2.01			
decorated shoulders	12	11.44	2.97	45	-3.7	0.0006

Western" sites appear to vary non-randomly in terms of the apex angle, number of infill radial lines, and the manner in which the triangles are elaborated. Anson (1983: 58–63, tables I–III; 1990: table 1) recorded two triangles at FCR/FCS, both with a narrow apex angle (≤25°) and with one infill radial line (FCR/FCS/5, FCS/A/62). One example is elaborated with paired arcs linking alternate triangle apices (Anson, 1983: table XII, M205). This description, however, is incomplete, as there are five other sherds with triangles. Three (one of which is incised) have a single infill line (Figs 5f, 6e–f and 9i), two (Figs 6c–d, 7j) have two lines, one (Fig. 9j) has three and one has four infill lines that join to make V shapes inside the triangle (Fig. 4m).

Sherd thickness. While handling the FCR/FCS sherds there appeared to be differences in thickness between plain (including plain rims with notched or scallop lip modifications) and decorated sherds, particularly shoulders, and between dentate-stamped and incised sherds. Table 2 shows the descriptive statistics and Student's *t*-test (two tail) for five pairs of thickness measurements. In each pair-wise comparison, the differences are highly significant (P = <0.005). Decorated sherds are thicker than plain sherds, dentate-stamped sherds are thicker than incised sherds, and decorated shoulders are much thicker (c. 3 mm) than plain ones.

There would thus appear to be a set of decorated vessels that are thicker than plain ones, and among the decorated vessels those with dentate-stamped designs are thicker than linear incised vessels. These differences might reflect function, with the thin plain or incised vessels used for cooking or water storage, and the thicker dentate-stamped vessels used for other, perhaps less mundane purposes. The thickness variations at FCR/FCS echo Anson's (1983: 44, 48) observation that on Watom plain, fingernail impressed and relief-decorated sherds appeared to be thinner than those with dentate-stamping.

Comparison between FCR/FCS and FEA

The only other major early Lapita site in the Garua Harbour area is FEA on Boduna Island, about 6 km to the north of FCR/FCS at the northwestern entrance to the Harbour (Ambrose & Gosden, 1991; Torrence & White, 2001; White *et al*., 2002). Ambrose and Gosden (1991: 187) described the FEA pottery excavated in 1985 as "Western Lapita", but White *et al*. (2002: 106) later suggested that some surface finds should be included with FCR/FCS in Anson's "Far Western Lapita" grouping.

The FEA site covers the entire island and at the southwest beach extends to the inter-tidal zone and into permanently submerged contexts on the island's lagoon floor. Test excavations in 1980, 1985 and 1989 have revealed disturbance of the deposits, but there are vestiges of a pottery sequence (Specht & Summerhayes, 2007). Three radiocarbon dates on marine shells for layer 4 give ranges of 3340–3000 cal. BP (base) and a pooled mean of 3050–2750 cal. BP (mid-top) (ΔR 0±0 years; Specht & Summerhayes, 2007: table 1), though the duration of pottery use on the island is uncertain. The southwest beach, inter-tidal and underwater contexts have yielded rich collections of finds (Torrence & White, 2001; White *et al*., 2002).

The comparison between the pottery from FCR/FCS and FEA is in terms of vessel forms, decorative techniques and elements/motifs, and sherd thickness. For this purpose, the FEA collections are treated as two groups. The excavated materials from 1985 (Ambrose & Gosden, 1991) and 1989 (Specht & Summerhayes, 2007) form one group of about 8,000 sherds. The second group, hereafter referred to as the FEA "surface collection," includes about 260 sherds from the southwest beach, inter-tidal zone and lagoon floor; these were collected over many years and display a bias towards large decorated sherds (White *et al*., 2002). These two collections differ in several aspects of vessel forms, thickness and decoration, though it is not clear whether these differences relate to different activity areas, time or sample bias (Specht & Summerhayes, 2007).

The three data sets are far from ideal for detailed comparisons, as each suffers problems of association and chronological control, and they differ greatly in sample size. These size differences mean that while presence of an attribute in the FEA excavated sample but its absence from FCR/FCS could be sample bias, presence at FCR/FCS but absence from either collection at FEA is more likely to be significant.

Vessel forms. Both sites have vessels constructed by strips or slabs, and the use of red slips. They definitely share seven of the Arawe forms: I (including flat-based bowls), II, III, IV, V, VI and VII. Vessel stands of form VIII are present at FEA in both collections, including cylinder stands, but unequivocal examples are not confirmed for FCR/FCS (Figs 5a–f). FCR/FCS lacks sharply angled carinated shoulders of around 90–120° that produce a "ledged" effect, though this is not common at FEA. Both sites have grooved rims formed by the addition of a strip of clay to the rim to form a channel lip.

Decorative techniques. Dentate-stamping, linear incision, plain stamping (straight-lines, arcs, circles and half-circles), excised triangles, notched and scalloped rims are present at both sites. Excised triangles are common at FEA, where they occur on two rims and one body sherd in the excavated collection, and six rims in the surface collection (Specht & Summerhayes, 2007: figs 5a–b, 6m, 12a, 12d, 12e, 12h, 14a and 15d); there is only one example at FCR/FCS (Fig. 5e). One sherd at each site is perforated (Fig. 9j; Specht & Summerhayes, 2007: fig. 21c). Fingernail impressions occur on one sherd at FCR/FCS (Fig. 8a), but are absent from FEA; conversely, punctations are present on three sherds at FEA (Specht & Summerhayes, 2007: figs 14b, 18c and 19i), but not at FCR/FCS. Cut-outs and applied relief bands, knobs and "tattooed" heads are present at FEA (Torrence & White, 2001; Specht & Summerhayes, 2007: figs 17b–e, 18e–h), but not at FCR/FCS.

The assemblages seem to differ in the manner in which the various decorative techniques were applied, though the state of preservation of the sherds makes it difficult to express this quantitatively. The following observations, therefore, are only qualitative assessments. Fine needlepoint dentate-stamping is present at both sites, but seems to be more common at FCR/FCS and the FEA surface collections. Conversely, coarser dentate-stamping seems more common at FEA. The nature of plain stamped half-circles also seems to vary, with small versions of these appearing to be more common at FCR/FCS than at FEA. The size of the plain stamped half-circles and arcs may be related to the nature of

the dentate-stamping, as at FCR/FCS they are usually small and frequently used to link groups of closely spaced lines of very fine, narrow needlepoint dentate-stamping. There also seems to be a similar qualitative distinction between the incised lines of the two sites. FEA has bolder and deeper incision, including broad carved or grooved lines up to 3 mm wide (White *et al*., 2002: fig. 4), compared with more finely executed lines at FCR/FCS.

Decorative elements. At both sites decoration was applied to the lip, rim and upper body exterior down to the shoulder. Rarely does it appear to extend below the shoulder, and decoration on the rim interior occurs only rarely at FEA and is not recorded for FCR/FCS. Flat lips of forms I and II at both sites often have groups of dentate-stamped lines placed at right angles to or diagonally across the lip, or a row of small plain arc stamps, circle and half-circle stamps.

The main vessel exterior designs at both sites are horizontal bands of repeated elements around the vessel, sometimes separated by bands of "rope." Both sites have dentate-stamped triangles with narrow apices (≤30°) and with one to three infill radial lines. One triangle at FCR/FCS has four infill lines. Triangles are absent from other sites of the Talasea area other than FRI at Walindi Plantation. Groups of fine dentate-stamped lines closed by plain arcs are common at FCR/FCS, but rare at FEA.

In terms of dentate-stamped faces and their associated designs, FCR/FCS is more like the excavated pottery than the surface collections at FEA (Table 3). At FCR/FCS, there is only one definite face, an example of the rectilinear Type 2C or 2D (Fig. 4e), and no "earplugs." In the FEA excavated sample there are no definite faces or "earplugs", though there may be fragments of two curvilinear faces (Specht & Summerhayes, 2007: figs 6h, 6p). Both faces and "earplugs" are present in the FEA surface collections (e.g., White *et al*., 2002: figs 3a–b, 3d and 3f; Specht & Summerhayes, 2007: plate 6; figs 12c, 12d, 12f, 16f and 19d–h). Both sites have sherds with interlocking rectilinear dentate-stamped designs (the "labyrinth" of Siorat, 1990: 62) that might have been used as a space filler between faces (cf. Kirch, 1987: fig. 3; Spriggs, 1990: fig. 8). They are rare at FCR/FCS (3) and in the FEA excavated sample (2), but more common (10) in the FEA surface collections (Ambrose & Gosden, 1991: fig. 6.2; Specht & Summerhayes, 2007: figs 12a–b, 13a, 13c, 20c–e, 20g–h). Overall, faces and their associated designs are more characteristic of the FEA surface collections than the FCR/FCS and FEA excavated collections.

In terms of definite or possible Anson (1983: table XII) motifs FCR/FCS has 46 and FEA has 45 (12 in the excavated collection only, 25 in the surface collections only, and 8 in both) (Specht & Summerhayes, 2007; the Ambrose and Gosden [1991: figs 3–6] collection is excluded from the FEA figures on account of the small size and poor condition of the sherds). All three collections have some designs that do not have an obvious Anson equivalent, and this is especially true of the FEA surface collections.

The level of sharing of definite or possible Anson motifs between the two sites is low. FCR/FCS has ten of the 20 motifs excavated at FEA (50%), and 11 of the 33 motifs in the FEA surface collections (33%). Overall, the two sites share only 15 motifs: M1, M3, M16, M35, M37, M120, M167, M206, M207, M217, M275, M430, M435, M441 and M443. These represent 37% of the FRC/FCS motifs, and are distributed at FEA as follows:

- four (M206, M435, M441, M443) are in the FEA excavated sample only;
- five (M3, M16, M120, M217, M275) occur in the FEA surface collections only;
- six (M1, M35, M37, M167, M207, M430) occur in both the excavated and surface collections at FEA.

Thickness. Data on the thickness of the pottery in the three collections are presented on Tables 4–7, where the means are compared using the Student's *t* (two-tailed) test. Table 4 compares the maximum and minimum thickness of all sherds at FCR/FCS and FEA, excluding shoulders. In each of the six comparisons, the FEA sherds are significantly thicker than those of FCR/FCS (P = <0.001). The actual differences between the FEA excavated sample and FCR/FCS are slightly more than 1 mm and could reflect measurement bias, but for the surface sherds at FEA the differences are about 2 mm or more. Breaking the samples down into dentate-stamped sherds, incised sherds and shoulders, there are no significant differences between the excavated sherds at FEA and the FCR/FCS sherds, with the possible exception of minimum thickness for excavated incised sherds (Tables 5–6). In contrast, the comparisons between surface sherds at FEA and FCR/FCS are all highly significant. The surface dentate-stamped sherds from FEA are thicker than those from FCR/FCS, with the FEA sherds up to 2 mm thicker than those at FCR/FCS, and the FEA surface shoulder sherds are up to 3 mm thicker than those at FCR/FCS. In terms of thickness, then, FCR/FCS is closer to the excavated pottery at FEA than it is to the FEA surface finds. These differences reflect the absence from FCR/FCS of vessels with thick walls such as large carinated vessels with "ledged" shoulders, definite vessel stands, cylinder stands and aspects of the designs.

Discussion. In summary, the pottery from FCR/FCS is generally similar to that of FEA, though the two sites share a remarkably small (33%) number of Anson motifs. FCR/FCS shares more of these with the FEA excavated collection than with the FEA surface collections. The main designs at FCR/FCS and in the FEA excavated sample are simple bands of repeated elements separated by bands of the "rope" design (M35 and related forms). Faces, especially curvilinear ones, and their associated earplugs and space fillers are more common in the FEA surface collections than in the other two, which both lack definite earplugs. Other features of the surface collections at FEA that are missing from the FCR/FCS sample include complex vessel forms, cylinder stand, applied relief elements, "tattooed" heads and cut-outs. The FEA surface sherds are thicker than those excavated or at FCR/FCS.

Table 3. Distribution of faces and related elements at FCR/FCS and FEA.

face element	FCR/FCS	FEA excavated	FEA surface
rectilinear face	1	0	2 (?4)
curvilinear face	0	?2	12
earplug	0	0	3
labyrinth	3	2	10
totals	4	4?	27 (29?)

Table 4. Thickness (mm) comparisons between all sherds at FCR/FCS and the excavated and surface collections at FEA.

	n	mean	SD	df	*t*	P
minimum thickness						
FCR/FCS	275	6.28	1.8			
FEA excavated	513	7.39	2.1	786	7.42	<0.001
FCR/FCS	275	6.28	1.8			
FEA surface	185	8.16	2.5	458	9.44	<0.001
FCR/FCS	275	6.28	1.8			
FEA all	698	7.59	2.2	971	8.69	<0.001
maximum thickness						
FCR/FCS	268	7.29	2			
FEA excavated	640	8.43	2.4	906	6.89	<0.001
FCR/FCS	268	7.29	2			
FEA surface	185	9.66	2.8	451	10.7	<0.001
FCR/FCS	268	7.29	2			
FEA all	825	8.7	2.5	1091	8.38	<0.001

Table 5. Thickness (mm) comparisons between dentate-stamped sherds at FCR/FCS and FEA.

	n	mean	SD	df	*t*	P
dentate—minimum thickness						
FCR/FCS	62	7.26	1.89			
FEA excavated	45	7.5	2.47	105	-0.58	0.5603
FCR/FCS	62	7.26	1.89			
FEA surface	33	10.2	2.77	93	-6.12	<0.001
dentate—maximum thickness						
FCR/FCS	62	8.42	2.17			
FEA excavated	45	8.66	2.63	105	-0.5	0.616
FCR/FCS	62	8.42	2.17			
FEA surface	33	11.5	2.56	93	-6.17	<0.001

Table 6. Thickness (mm) comparisons between incised sherds at FCR/FCS and FEA.

	n	mean	SD	df	*t*	P
incised—minimum thickness						
FCR/FCS	28	6.01	1.9			
FEA surface	34	9.36	2.21	60	-6.34	<0.001
incised—maximum thickness						
FCR/FCS	28	6.91	2.07			
FEA surface	35	10.8	2.33	61	-6.92	<0.001
incised—minimum thickness						
FCR/FCS	28	6.01	1.9			
FEA excavated	84	7.29	2.51	110	-2.48	0.0147
incised—maximum thickness						
FCR/FCS	28	6.91	2.07			
FEA excavated	85	8.1	2.7	111	-2.14	0.0344

Table 7. Thickness (mm) comparisons between all shoulders at FCR/FCS and FEA.

	n	mean	SD	df	*t*	P
FCR/FCS	47	9.34	2.58			
FEA excav.	54	10.44	2.54	99	-2.16	0.0329
FCR/FCS	47	9.34	2.58			
FEA surf.	24	13.01	4.44	69	-4.41	<0.0001
FCR/FCS	47	9.34	2.58			
FEA all	78	11.23	3.43	123	3.27	0.0014

These contrasts could be the result of differences in time, site function or aspects of social groupings, or some combination of two or more of these. The data presently available, however, does not allow resolution of this issue.

Date of FCR/FCS

The FCR/FCS surface collection cannot be directly dated, though comparisons with dated sites suggest a tentative chronology that can serve as a working hypothesis. At the FYS site on Garua Island, a dentate-stamped rim of form I similar to some FCR/FCS rims was found in layer 5, for which two nutshell samples from spits 3 and 4 give a pooled mean of 3370–3140 cal. BP at 2σ (Specht & Torrence, 2007; cf. Torrence & Stevenson, 2000: table 1).

The comparisons between FCR/FCS and FEA suggest that the FCR/FCS pottery should be similar in age to the excavated materials at FEA. Layer 4 of FEA has three dates on marine shells which have been calibrated using CALIB 5.0.1 with the default value for ΔR of 0±0 years, as there is no measured value for the Talasea area (White *et* al., 2001; Specht & Summerhayes, 2007; see Petchey *et al*., 2004, 2005 for problems with ΔR values in the Bismarck Archipelago). The oldest of these, from the base of layer 4, is 3340–3000 cal. BP at 2σ; the other two, from the middle-top part of layer 4, have a pooled mean of 3050–2750 cal. BP at 2σ.

According to Anson's (1983, 1986) comparative study, FCR/FCS should be similar in age to material from the original excavations at ECA on Eloaua Island in the Mussau group (Egloff, 1975: figs. 13–15). More extensive work at ECA has shown that the site has several components, and that Egloff's work was situated on a palaeobeach terrace now designated Area A (Kirch, 2001a: fig. 4.1). According to the summed range of several dates, use of Area A probably started around 3530–3260 cal. BP (1σ), and certainly by 3300 cal. BP (Kirch, 2001b: 205), and the closely related ECB site was probably occupied around 3470–3250 cal. BP (Kirch, 2001b: 214). The two ranges overlap the pooled mean for FYS on Garua Island, and it is possible that FCR/FCS was occupied at that time as well.

The basal layer 4 date for FEA (3340–3000 cal. BP) is close to those for FYS, ECA/A and ECB, whereas the pooled mean for the middle-top of layer 4 (3050–2750 cal. BP) lies within the range of 3250–2750 cal. BP for zone C in Area B of ECA (Kirch, 2001a: 103), with which the FEA surface collections have much in common (Specht & Summerhayes, 2007). The ECA/B range is slightly later than that for ECA/A and this time difference is consistent with the stylistic shift between them in the pottery (Kirch, 2001a: figs 4.30, 4.39; 2001b: 206, 214).

Comparisons with the early levels of Lapita sites in the Arawe Islands broadly support these comparisons with FEA and the Mussau sites. The vessel forms in the early Arawe levels, like those at FCR/FCS, do not include the large complex forms known from the FEA surface collections. At FOH/D-E-F and FNY, groups of very fine dentate-stamped lines with one or both ends closed by small plain arc impressions identical to those of FCR/FCS and FEA are common in the early Lapita levels (Summerhayes, 2000a: figs 5.16–5.20, 8.3 and 8.7), but are absent from later ones. In FOH/D-E-F there are probably three examples of Type 2 rectilinear faces (Summerhayes, 2000a: figs 5.4, 5.6 and 5.36), which are rare at FCR/FCS and FEA. Curvilinear faces of Type 1, which are common in the FEA surface collection, may be present in FOH/D-E-F, but seem more common at the later FOJ site (Summerhayes, 2000a: figs 5.6 top, 7.11). The Arawe sites also share with FCR/FCS and FEA pedestal stands, grooved rims and excised triangles.

Summerhayes (2004: table 2) places the earliest Arawe levels (FOH/D-E-F, FNY) at 3300 to 3000–2900 cal. BP. This range overlaps with those of FYS (3370–3140 cal. BP), FEA (3340–3000 and 3050–2750 cal. BP) and ECA/B zone C (3250–2750 cal. BP), but is slightly later than those of ECA/A (3530–3260 cal. BP) and ECB (3470–3250 cal. BP). A range of about 3300–3000 cal. BP is reasonable for the appearance of Lapita pottery at FCR/FCS.

The end of pottery use at FCR/FCS is difficult to define. There is only one fingernail impressed sherd (Fig. 8a). This technique is common in sites attributed to the "Late Lapita" and "Post-Lapita Transition" stages in the Bismarck Archipelago. The date of the first appearance of this technique has yet to be determined with certainty, though on Garua Island it does not seem to be present before about 2800–2600 BP (Specht & Torrence, 2007). There are no notched relief decorated sherds typical of later pottery in the Talasea area and south coast of New Britain (cf. Specht & Torrence, 2007; Summerhayes, 2000a). The scarcity of face designs and fingernail impressions, absence of large, complex vessels, notched relief decoration and coarse dentate-stamping suggests that dentate-stamped pottery ended at FCR/FCS before these features became common. The end of pottery use at FCR/FCS, therefore, is tentatively set at probably 2900–2600 cal. BP, or possibly slightly later.

Discussion

Pre-Lapita use of the FCR/FCS area is suggested by the presence of stemmed obsidian tools typical of the period c. 6000–3600 cal. BP, but how these relate to the pottery site is not known. The pottery site appears to have been located

at sea level on a sand-covered coral reef platform that might have been part of the mainland or a small, offshore islet that later became joined to the mainland through tectonic activity, a fall in relative sea level, and/or the emplacement of post-Lapita tephras. The original size of the site is uncertain, but could have been about 10,000 m^2.

Most of the pottery belongs to the early dentate-stamped stage of Lapita, consistent with Anson's attribution of his small sample of FCR/FCS sherds to the "Far Western Lapita" group of sites. Comparisons with the only other major early Lapita site of the Talasea area, FEA on Boduna Island, show differences between the FCR/FCS pottery and that from the FEA surface collections. Singularly absent from FCR/FCS is evidence for the large, complex vessel forms present in the FEA surface collections. This absence and other differences, such as sherd thickness and certain motifs, could be a function of time or the nature of the activities conducted at each site.

Stylistic comparisons between FCR/FCS and other Lapita sites in the Bismarck Archipelago, combined with the pooled mean of the nutshell dates for FYS on Garua Island, the oldest shell date for FEA and dates from the Mussau and Arawe sites suggest initial use of FCR/FCS was probably in the period 3300–3000 cal. BP. At this stage it is impossible to set an end-date for the use of dentate-stamped pottery at the site, though the scarcity of fingernail impressions and absence of notched relief sherds suggests it was probably around 2900–2600 cal. BP.

Most of the FCR/FCS site has been destroyed by quarrying, though there may be small parts of the FCR area that might reward future examination. Even here the heavily abraded condition of the sherds brought to the ground surface from the numerous crab burrows suggests that any sub-surface archaeological deposit in this area has been subjected to extensive re-working and disturbance. Our knowledge of the site, therefore, will probably continue to depend heavily on the material collected between 1973 and 1988.

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References

Ambrose, W.R., & C. Gosden, 1991. Investigations on Boduna Island. In *Report of the Lapita Homeland Project*, ed. J. Allen & C. Gosden, pp. 182–188. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University. *Occasional Papers in Prehistory* 20.

Anderson, A.J., S. Bedford, G. Clark, I. Lilley, C. Sand, G. Summerhayes & R. Torrence, 2001. An inventory of Lapita sites containing dentate-stamped pottery. In *The Archaeology of Lapita Dispersal in Oceania*, ed. G.R. Clarke, A.J. Anderson & T. Vunidilo, pp. 1–13. Canberra: Department of Prehistory, Australian National University. *Terra Australis* 17.

Anson, D., 1983. *Lapita Pottery of the Bismarck Archipelago and its Affinities*. Ph.D. thesis, University of Sydney, Sydney.

Anson, D., 1986. Lapita pottery of the Bismarck Archipelago and its affinities. *Archaeology in Oceania* 21(3): 157–165.

Anson, D., 1990. Aspiring to Paradise. In *Lapita Design, Form and Composition*, ed. M. Spriggs, pp. 53–58. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University. *Occasional Papers in Prehistory* 19.

Araho, N., R. Torrence & J.P. White, 2002. Valuable and useful: Mid-Holocene stemmed obsidian artefacts from West New Britain, Papua New Guinea. *Proceedings of the Prehistoric Society* 68: 61–81.

Boyd, B., & R. Torrence, 1996. Periodic erosion and human land-use on Garua Island, PNG: a progress report. *Tempus* 6: 265–274.

Chiu, S., & C. Sand, 2005. Recording of the Lapita motifs: proposal for a complete recording method. *Archaeology in New Zealand* 48(2): 133–150.

Chowning, A., & J. Goodale, 1966. A flint industry from southwest New Britain, Territory of New Guinea. *Asian Perspectives* 9: 150–153.

Egloff, B., 1975. Archaeological investigations in the coastal Madang area and on Eloaue Island of the St. Matthias Group. *Records of the Papua New Guinea Public Museum and Art Gallery* 5.

Hollis, J., 1983. Notes on temper sands in pottery from the Talasea area. Manuscript prepared for J. Specht.

Kirch, P.V., 1987. Lapita and Oceanic cultural origins: excavations in the Mussau Islands, Bismarck Archipelago, 1985. *Journal of Field Archaeology* 14: 163–180.

Kirch, P.V., 2001a. Three Lapita villages: excavations at Talepakemalai (ECA), Etakosarai (ECB), and Etapakengaroasa (EHB), Eloaua and Emananus Islands. In *Lapita and its Transformations in Near Oceania*, ed. P.V. Kirch, pp. 68–145. Berkeley: Archaeological Research Facility, University of California at Berkeley. *Contribution* 59.

Kirch, P.V., 2001b. A radiocarbon chronology for the Mussau Islands. In *Lapita and its Transformations in Near Oceania*, ed. P.V. Kirch, pp. 196–236. Berkeley: Archaeological Research Facility, University of California at Berkeley. *Contribution* 59.

Lohu, E., 1983. Optical polarising microscope analysis of dentate-stamped pottery samples from Watom, Ambitle, Talasea and Eloaue. Appendix II in D. Anson, *Lapita Pottery of the Bismarck Archipelago and its Affinities*, pp. 289–291. Ph.D. thesis, University of Sydney, Sydney.

Lowder, G.G., & I.S.E. Carmichael, 1970. The volcanoes and caldera of Talasea, New Britain: geology and petrology. *Geological Society of America Bulletin* 81: 17–38.

Mead, S.M., 1975. The decorative system of the Lapita potters of Sigatoka, Fiji. In *The Lapita Pottery Style of Fiji and its Associations*, ed. S.M. Mead, L. Birks, H. Birks & E. Shaw, pp. 19–43. Wellington: The Polynesian Society (Inc.).

Petchey, F., M. Phelan & J.P. White, 2004. New ΔR values for the southwest Pacific Ocean. *Radiocarbon* 46(2): 1005–1014.

Petchey, F., R.C. Green, M. Jones & M. Phelan, 2005. A local marine reservoir correction factor (ΔR) for Watom Island, Papua New Guinea. *New Zealand Journal of Archaeology* 26: 29–40.

Rath, P., & R. Torrence, 2003. Producing value: stemmed tools from Garua Island, Papua New Guinea. *Australian Archaeology* 57: 119–127.

Ryburn, R.J., 1975. *Talasea-Gasmata, New Britain. 1:250,000 Geological Series—Explanatory Notes*. Canberra: Australian Government Publishing Service.

Sand, C., with J. Bolé & A. Ouetcho, 1996. *Le Début du Peuplement Austronésien de la Nouvelle-Calédonie*. Noumea: Service des Musées et du Patrimoine. *Les Cahiers de l'Archéologie en Nouvelle-Calédonie* 6.

Siorat, J.P., 1990. A technological analysis of Lapita pottery decoration. In *Lapita Design, Form and Composition*, ed. M. Spriggs, pp. 59–82. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University. *Occasional Papers in Prehistory* 19.

Smith, I.E., & R.W. Johnson, 1981. Contrasting rhyolite suites in the Late Cenozoic of Papua New Guinea. *Journal of Geophysical Research* 86, B11: 10257–10272.

Specht, J.R., 1968. Preliminary report of excavations on Watom Island. *Journal of the Polynesian Society* 77(2): 117–134.

Specht, J.R., 1974. Lapita pottery at Talasea, West New Britain, Papua New Guinea. *Antiquity* 48: 302–106.

Specht, J.R., 1991. Kreslo: a Lapita site in southwest New Britain, Papua New Guinea. In *Report of the Lapita Homeland Project*, ed. J. Allen & C. Gosden, pp. 189–204. Canberra, Department of Prehistory, Research School of Pacific Studies, Australian National University. *Occasional Papers in Prehistory* 20.

Specht, J., & G. Summerhayes, 2007. Archaeological Studies of the Middle and Late Holocene, Papua New Guinea. Part II. The Boduna Island (FEA) Lapita site. *Technical Reports of the Australian Museum* 20: 51–103 [published online]. www.australianmuseum.net.au/pdf/publications/1474_complete.pdf

Specht, J., & R. Torrence, 2007. Archaeological Studies of the Middle and Late Holocene, Papua New Guinea. Part IV. Pottery of the Talasea Area, West New Britain Province. *Technical Reports of the Australian Museum* 20: 131–196 [published online]. www.australianmuseum.net.au/pdf/publications/1476_complete.pdf

Spriggs, M., 1990. The changing face of Lapita: transformations of a design. In *Lapita Design, Form and Composition*, ed. M. Spriggs, pp. 83–122. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University. *Occasional Papers in Prehistory* 19.

Spriggs, M., 1993. How much of the Lapita design system represents the human face? In *Artistic Heritage in a Changing Pacific*, ed. P.J.C. Dark & R.G. Rose, pp. 7–14. Bathurst: Crawford House Press.

Summerhayes, G.R., 2000a. *Lapita Interaction*. Canberra: Department of Archaeology and Natural History and Centre for Archaeology, Australian National University. *Terra Australis* 15.

Summerhayes, G.R., 2000b. What's in a pot? In *Australian Archaeologist. Collected papers in honour of Jim Allen*, ed. A. Anderson & T. Murray, pp. 291–307. Canberra: Centre for Archaeological Research, and Department of Archaeology and Natural History, Australian National University in conjunction with the Department of Archaeology, La Trobe University.

Summerhayes, G.R., 2004. The nature of prehistoric obsidian importation to Anir and the development of a 3,000 year old regional picture of obsidian exchange within the Bismarck Archipelago, Papua New Guinea. *Records of the Australian Museum, Supplement* 29: 145–156.

Torrence, R., 2004. Pre-Lapita valuables in Island Melanesia. *Records of the Australian Museum, Supplement* 29: 163–172.

Torrence, R., & C.M. Stevenson, 2000. Beyond the beach: changing Lapita landscapes on Garua Island, Papua New Guinea. In *Australian Archaeologist: Collected Papers in Honour of Jim Allen,* eds A. Anderson & T. Murray, pp. 324–345. Canberra: Coombs Academic Publishing, Australian National University.

Torrence, R., & J.P. White, 2001. Tattooed faces from Boduna Island, Papua New Guinea. In *The Archaeology of Lapita Dispersal in Oceania*, ed. G.R. Clark, A.J. Anderson & T. Vunidilo, pp. 135–140. Canberra: Pandanus Books, Australian National University. *Terra Australis* 17.

White, J.P., C. Coroneos, V. Neall, W. Boyd & R. Torrence, 2002. FEA site, Boduna Island: further investigations. In *Fifty Years in the Field. Essays in Honour and Celebration of Richard Shutler Jr's Archaeological Career*, ed. S. Bedford, C. Sand & D. Burley, pp. 101–107. Auckland: New Zealand Archaeological Association. *Monograph* 25.

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Appendix 1

This appendix provides information about the sherds illustrated in Figures 4–10. All sherds are from surface collections. Vessel forms are indicated according to the scheme developed for the Arawe Islands (Summerhayes, 2000a, 2000b). A horizontal line to the right of the sherd profile shows the orientation of rims and flat bases. Arrows indicate the direction of lip notching. Solid black triangles indicate excised triangles. Estimates of vessel mouth diameters are provided as a range where the small size of the sherd prevented accurate measurement. The colour of the red slips is based on the Munsell Colour Chart. Where a motif can be matched with one on Anson's list (1983: table XII; 2000: table 1), the motif number is given, such as M123. Motifs that are similar but not identical to those of Anson are prefixed "cf." (e.g., "cf. M123"); those that might be part of a motif on Anson's list are indicated with a question mark (e.g., "M123?").

Figure 4.

(*a*) FCS/A/217: rim, form I, dentate-stamped, plain stamped, single notched lip; M448, M3.
(*b*) FCS/B/5: rim, form I, dentate-stamped, single notched lip; M448 (Anson, 1983: plate VII.8).
(*c*) FCS/B/4: rim, form I, red slip 10R 4/6, dentate-stamped; M271 or 274 (possibly Anson, 1983: plate VII.9).
(*d*) FCS/A/44: rim, form I, dentate-stamped; M435, M378.
(*e*) FCS/B/15: rim, form I, dentate-stamped, excised triangles on lip; M345 or 351, "face" Type 2C or 2D.
(*f*) FCR or FCS: rim, form I, dentate-stamped; M167, M35, M275.
(*g*) FCS/B/26: rim, form I, dentate-stamped, plain circle stamped; M35, M272 (Anson, 1983: plate VII.17).
(*h*) FCS/A/8: rim, form I, red slip 10R 5/6, coarse dentate-stamped, single notched lip (Anson, 1983: plate VII.2).
(*i*) FCS/B/47: rim, form I, dentate-stamped; M199 or 207, M35.
(*j*) FCS/A/19: rim, form I, dentate-stamped; cf. M130.
(*k*) FCS/A/37: rim, form I, red slip 7.5R 4/6, dentate-stamped; M35.
(*l*) FCS/B/19: rim, form I, incised and/or plain stamped.
(*m*) FCS/A/6: rim, form I, red slip 7.5R 5/8, grooved lip, dentate-stamped. (*n*) FCS/A/13: rim, form I, grooved lip, decorated but too weathered to identify technique or design.

Figure 5.

(*a*) FCS/A/12: flat base, form I, incised; cf. M155.
(*b*) FCR/FCS/7: flat base, form I, plain stamped or incised.
(*c*) FCS/A/61: flat base, form I, plain stamped.
(*d*) FCS/A/97: rim, form II, dentate-stamped, single notched lip; M35, M448 (Specht, 1974: fig. 3c).
(*e*) FCS/A/77: rim, form II, plain.
(*f*) FCS/A/62 (plus FCS/B/31): rim, form II, mouth diameter 240 mm, traces of red slip possibly 5R 4/6 on both exterior and interior, dentate-stamped, plain stamped; M35, M2?, M205.
(*g*) FCR/24: rim, form III, dentate-stamped.
(*h*) FCS/A/108: rim, form III, dentate-stamped; M435.
(*i*) FCS/A/25: rim, form IV, mouth diameter 160–180 mm, plain.
(*j*) FCS/A/53: rim, form IV, plain.
(*k*) FCR/19: rim, form V, plain.
(*l*) FCS/A/42: rim, form V, plain.
(*m*) FCS/A/47: rim, form V, incised, single notched lip.
(*n*) FCS/A/4: rim, form V or VI, mouth diameter 180 mm, single notched lip.
(*o*) FCS/A/71: rim, form V or VI, plain (Anson, 1983: plate VII.7).
(*p*) FCS/D/9: rim, form VI, plain.
(*q*) FCS/A/51: rim, form VI, plain, double notched lip.
(*r*) FCS/C/3: rim, possibly form VII, plain, single notched lip.
(*s*) FCS/A/79: rim, possibly form VII, plain.
(*t*) FCS/A/54: rim, form VII, mouth diameter 280–320 mm, plain.
(*u*) FCS/B/16: rim, form VII, plain, single notched lip.
(*v*) FCS/B/32: rim, form VII, plain.
(*w*) FCS/A/85: rim, form VII, mouth diameter 280–320 mm, single notched lip.
(*x*) FCS/B/54: rim, form VII, mouth diameter 100 mm, possible red slip, dentate-stamped; M35 (Anson, 1983: plate VII.7).

Figure 6.

(*a*), (*b*) FCS/B/8: rim of form I, or base of form VIII, dentate-stamped; M35, M167.
(*c*), (*d*) FCS/B/29: rim of form I, or base of form VIII, dentate-stamped; M35, M207.1.
(*e*), (*f*) FCR/FCS/5: rim of form I, or base of form VIII, dentate-stamped; M167?, M35, M206.
(*g*) FCS/A/110–111: rim, uncertain form, double notched lip.
(*h*) FCS/A/81: rim, uncertain form, scalloped lip.
(*i*) FCS/B/53: rim, uncertain form, plain.
(*j*) FCS/A/39: rim, uncertain form, plain.
(*k*) FCS/A/55: rim, no Arawes equivalent, plain.
(*l*) FCS/A/15: rim, no Arawes equivalent, plain.
(*m*) FCS/B/42: rim, mouth diameter 120–140 mm, no Arawes equivalent, plain.
(*n*) FCS/B/41: modeled object, probably an appendage for a pot, plain.
(*o*) FCS/B/28: shoulder, dentate-stamped; M35.
(*p*) FCS/A/35: shoulder, possible red slip, dentate-stamped, plain stamped; M120, M35 (Anson, 1983: plate VII.14).
(*q*) FCS/A/33: shoulder, possible red slip, dentate-stamped. (*r*) FCR/FCS/1: shoulder, dentate-stamped; M37, M435?

Figure 7.

(*a*) FCS/(*d*): shoulder, dentate-stamped; M429?.
(*b*) FCS/A/115: shoulder, incised; cf. M187 or M188.
(*c*) FCS/A.21: shoulder, incised.
(*d*) FCS/A/31: shoulder, incised.
(*e*) FCS/A/95: shoulder, incised (Specht, 1974: fig. 3f).
(*f*) FCS/A/24: shoulder, possible red slip, plain.
(*g*) FCS/(*a*): body, dentate-stamped; M35.
(*h*) FCS/A/20: body, dentate-stamped; M329, M35, M443.
(*i*) FCS/A/10: body/shoulder, dentate-stamped, plain stamped (Anson, 1983: plate VII.13).
(*j*) FCS/A/88: body, dentate-stamped.
(*k*) FCS/A/70: body, dentate-stamped.
(*l*) FCS/A/28: rebated shoulder, plain.
(*m*) FCR/B/33: rebated shoulder, plain.
(*n*) FCS/A/38: shoulder, dentate-stamped; M237?, M37 (Anson, 1983: plate VII.10).
(*o*) FCS/B/38: shoulder, incised and plain stamped; M237, M37.

Figure 8.

(*a*) FCS/(*b*): shoulder, fingernail impressed.
(*b*) FCS/A/34: shoulder, red slip 10R 5/6, dentate-stamped, plain stamped; M35, M329, M21.
(*c*) FCS/A/22: neck, dentate-stamped; M237 (Anson, 1983: plate VII.3).
(*d*) FCS/E/I: body, dentate-stamped.
(*e*) FCR/FCS/3: body, dentate-stamped, plain stamped; M237, M327.
(*f*) FCS/A/216: body, red slip 10R 4/8, dentate-stamped, plain stamped; M120.
(*g*) FCS/A/32: body, red slip, dentate-stamped, plain stamped; M120, M35, cf. M14 (Specht, 1974: fig. 3d; Anson, 1983: plate VII.5).
(*h*) FCS/A/5: body, dentate-stamped, plain stamped; M120.
(*i*) FCS/B/48: body, dentate-stamped; cf. M107.
(*j*) FCS/A/89: body, dentate-stamped.
(*k*) FCS/A/99: body, possible lime-infill, dentate-stamped.
(*l*) FCR/FCS/15: body, dentate-stamped.
(*m*) FCS/B/17: body, dentate-stamped, circle stamped; M129 or M131 (Anson, 1983: plate VII.6).
(*n*) FCS/B/3: body, dentate-stamped; cf. M16 (Anson, 1983: plate VII.11).
(*o*) FCS/A/98: body, dentate-stamped; cf. M16, M496?
(*p*) FCR/FCS/17: body, dentate-stamped.
(*q*) FCS/B/35: body, dentate-stamped; M271? or M274? or M276? (Anson, 1983: plate VII.1).
(*r*) FCS/A/48: body, dentate-stamped; M35, cf. M11.
(*s*) FCS/A/105: body, dentate-stamped; M35.
(*t*) FCS/A: body, possible lime-infill, dentate-stamped; M35 (possibly Anson, 1983: plate VII. 16).
(*u*) FCS/A/102: body, dentate-stamped; M217, M448?

Figure 9.

(*a*) FCS/A/60: body, dentate-stamped, circle stamped; M44, M35, M443.
(*b*) FCS/B/23: body, dentate-stamped, incised or plain stamped, possible Type 1B or 1C "face" design.
(*c*) FCS/A/67: body dentate-stamped.
(*d*) FCS/A/2: body, dentate-stamped; M430.
(*e*) FCS/B/1: body, dentate-stamped; M430 (Anson, 1983: plate VII.4).
(*f*) FCS/A/26: body, dentate-stamped, circle stamped, possible "face" design; cf. M295.
(*g*) FCS/A/215: body, dentate-stamped.
(*h*) FCS/A/97: body, dentate-stamped; cf. M16.
(*i*) FCS/B/14: body, possible red slip, dentate-stamped, incised and/or plain stamped, possible Type 1B or 1C "face" design.
(*j*) FCS/A/90: body, red slip 7.5R 4/6, dentate-stamped, perforation on top left edge; M35, M329, M207? (Anson, 1983: plate VII.15).
(*k*) FCS/(*c*): body, plain stamped and/or incised; M35.
(*l*) FCS/B/46: body, plain stamped; cf. M17.
(*m*) FCS/B/43: incised.
(*n*) FCS/B/30: body, incised.

Figure 10.

(*a*) FCS/A/43: shoulder, incised and plain stamped; M42, cf. M237, cf. M149 (Specht, 1974: fig. 3e; Anson, 1983: plate VII.12 shows this sherd inverted).
(*b*) FCS/A/69: body, incised.
(*c*) FCS/B/36: body, incised.
(*d*) FCS/A/1: body, incised.
(*e*) FCR/FCS/9: body, incised.
(*f*) FCS/A/103: body, incised.
(*g*) FCS/A/46: body, incised.

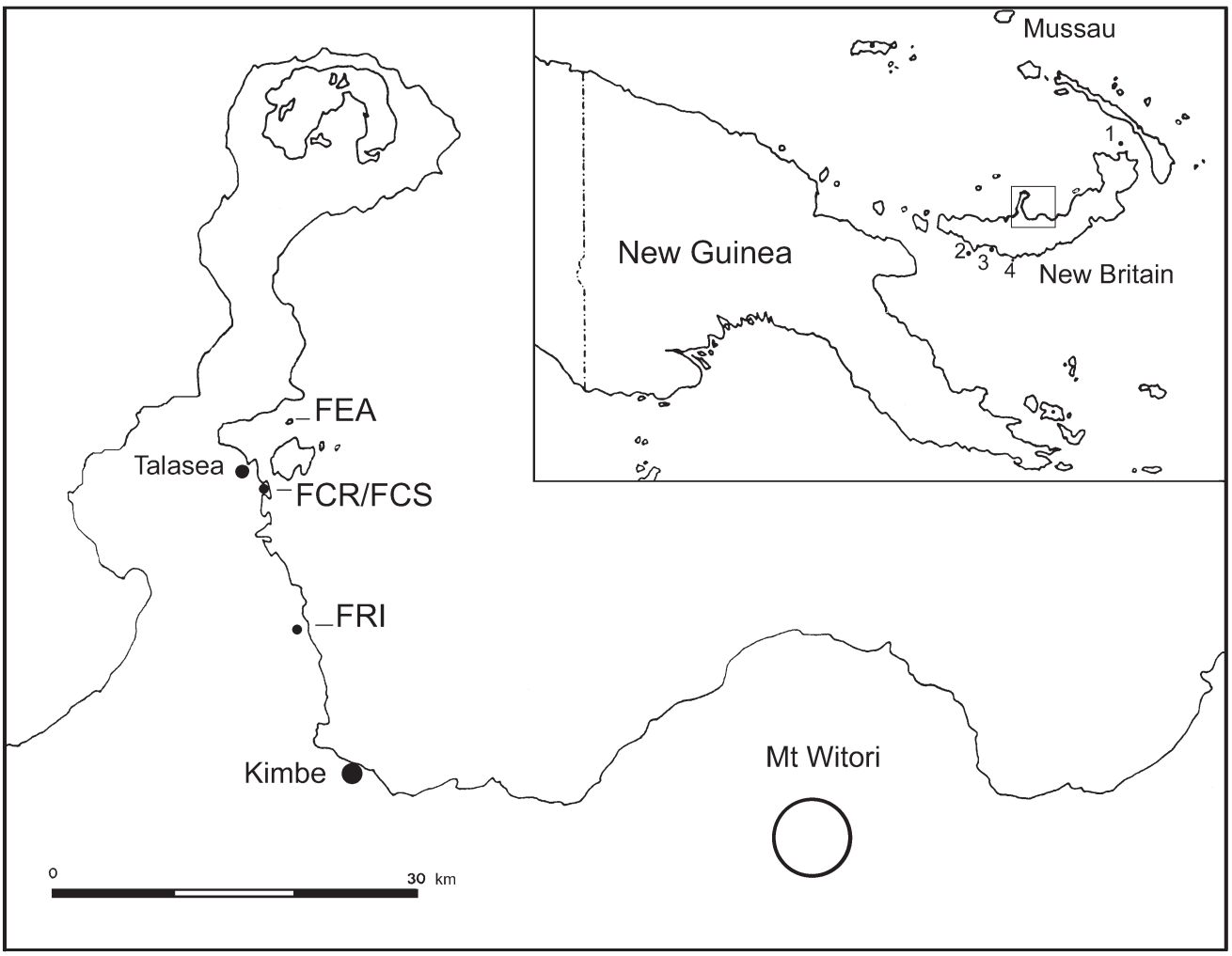

Fig. 1. Location of FCR/FCS on Willaumez Peninsula, West New Britain Province, Papua New Guinea. Inset: 1 = Watom; 2 = Arawe Islands; 3 = Kreslo; 4 = Kandrian.

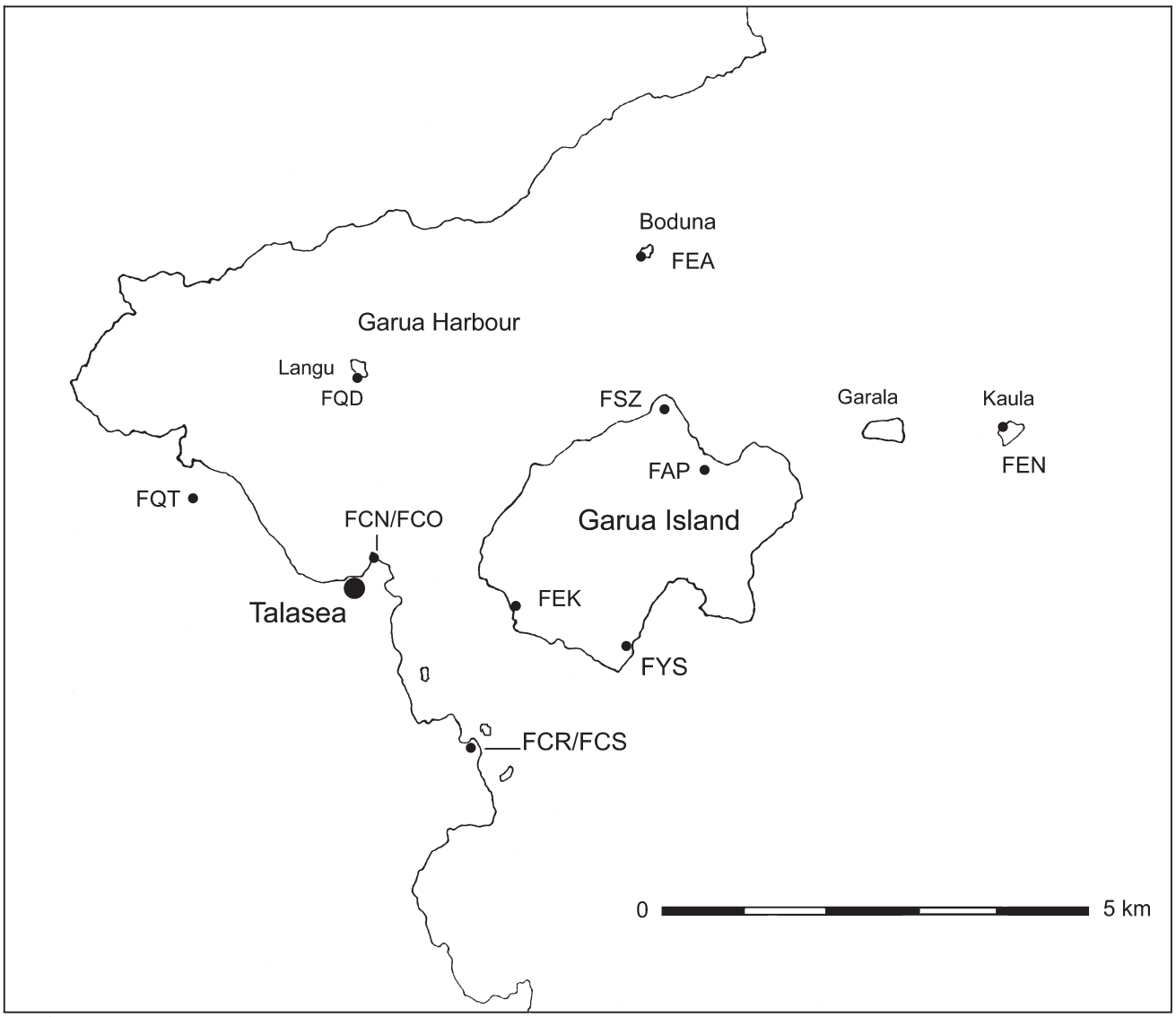

Fig. 2. FCR/FCS and Garua Harbour area with sites mentioned in the text.

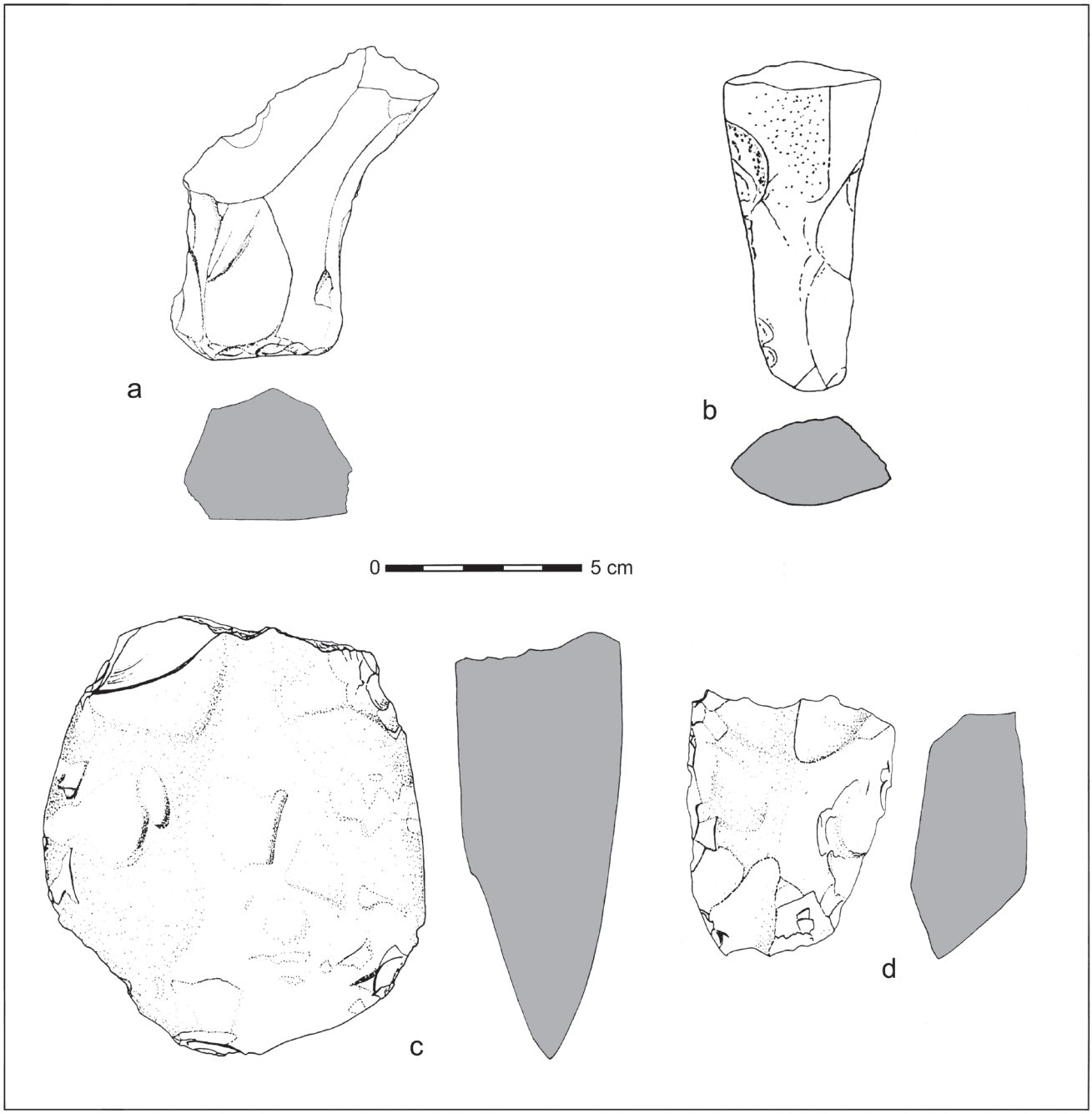

Fig. 3. Non-obsidian stone tools from FCR/FCS surface collections. (a) broken stem FCR/B (dacite?); (b) broken stem FCS/C/23 (quartzite or tuff); (c) broken axe blade FCS/B/75 (medium trachytic tuff); (d) broken axe blade FCS/B/76 (vitroclastic tuff).

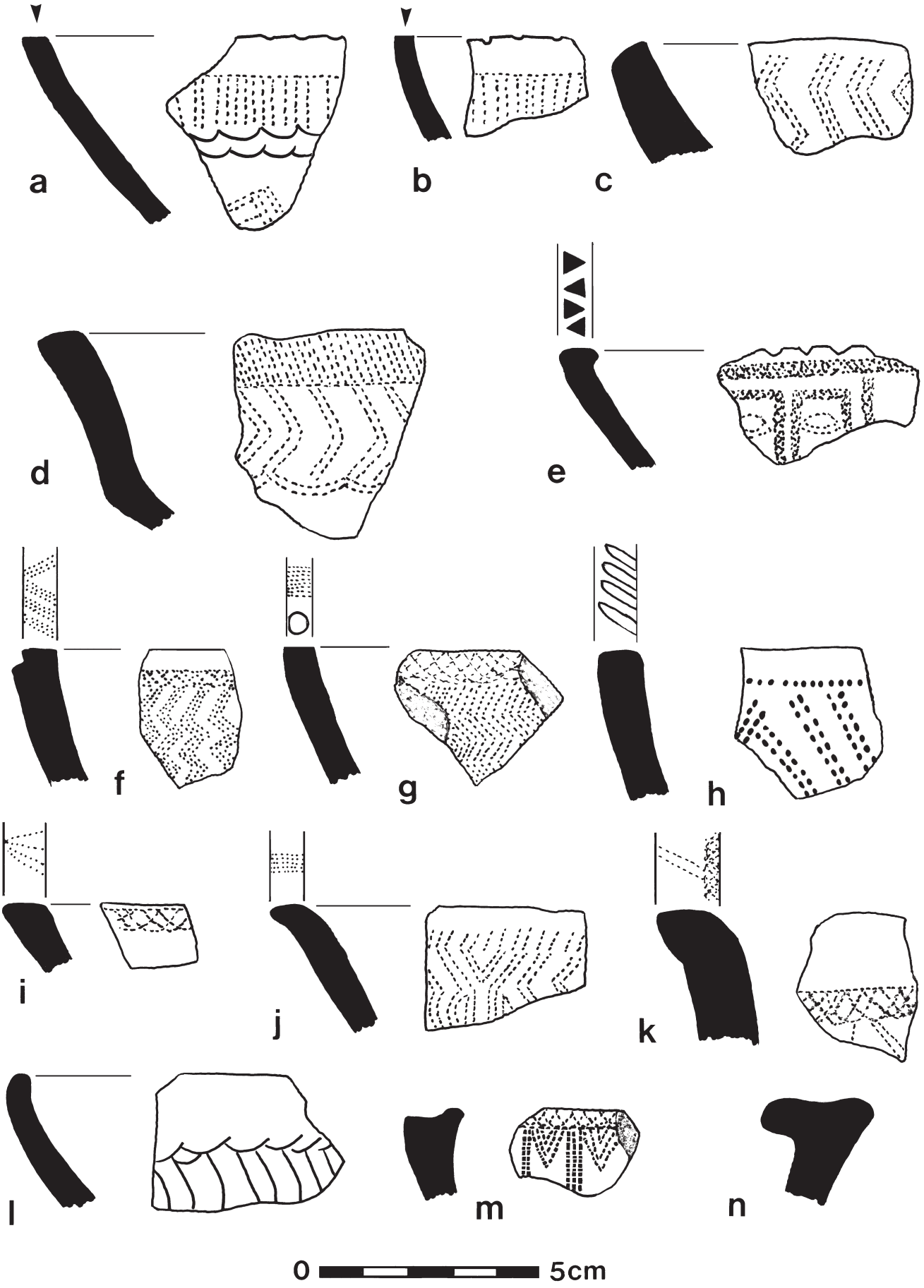

Fig. 4. Rims of vessel form I at FCR/FCS.

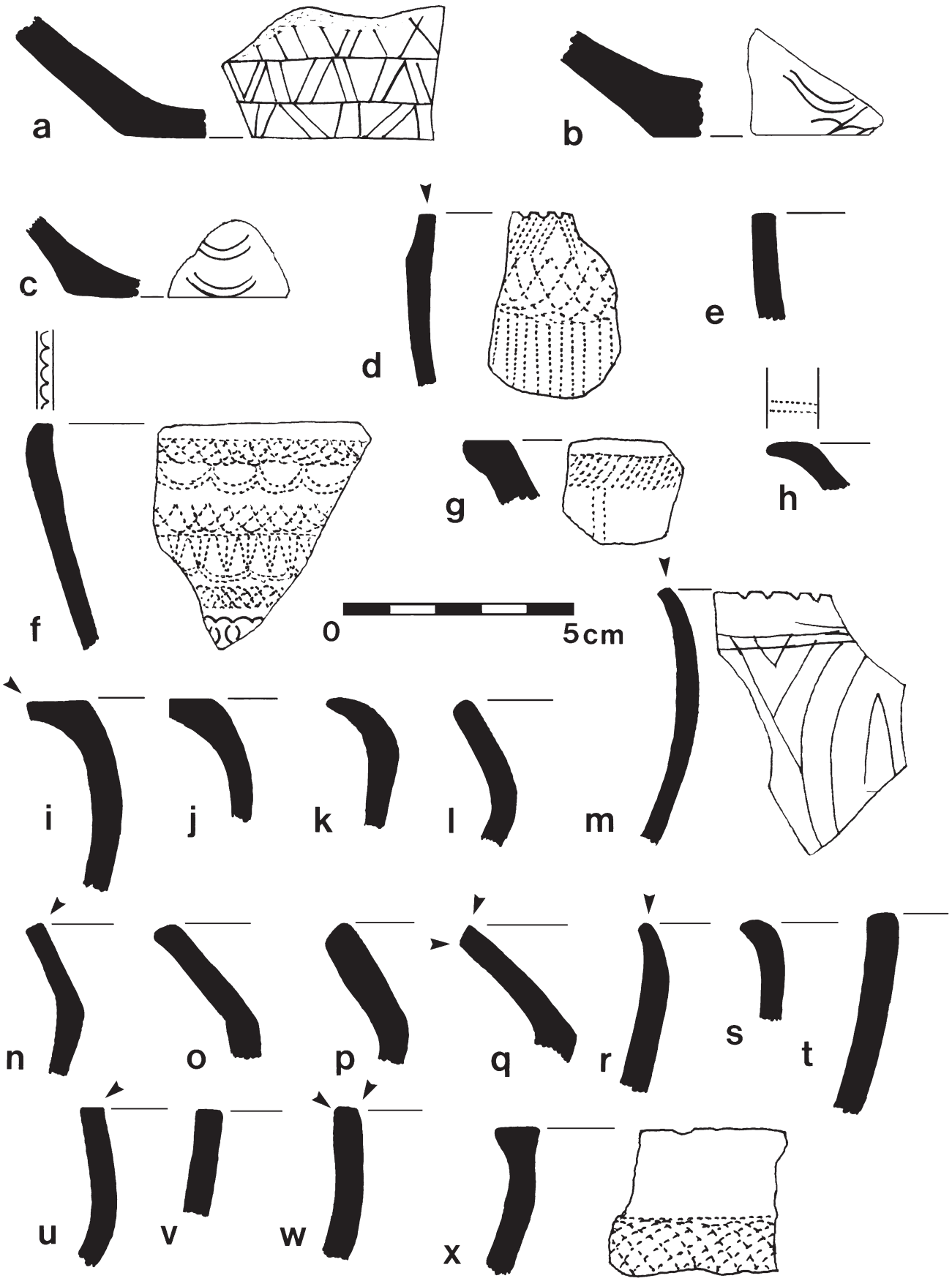

Fig. 5. Rims of vessel forms I, II, III, IV, V, VI and VII, and flat bases of form I at FRC/FCS.

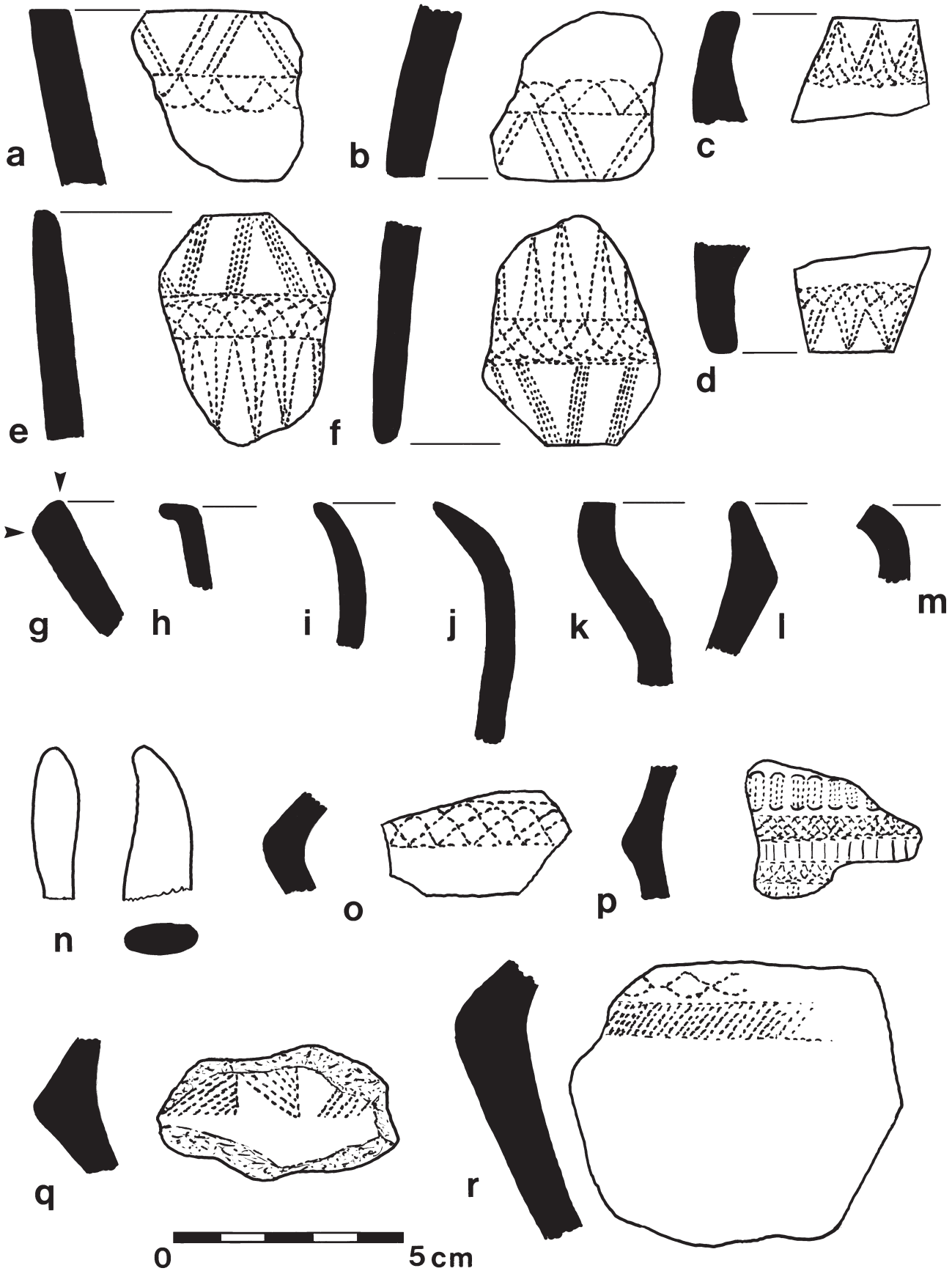

Fig. 6. Rims of vessel form I or bases of form VIII, unassigned rim forms, and carinated shoulders at FCR/FCS.

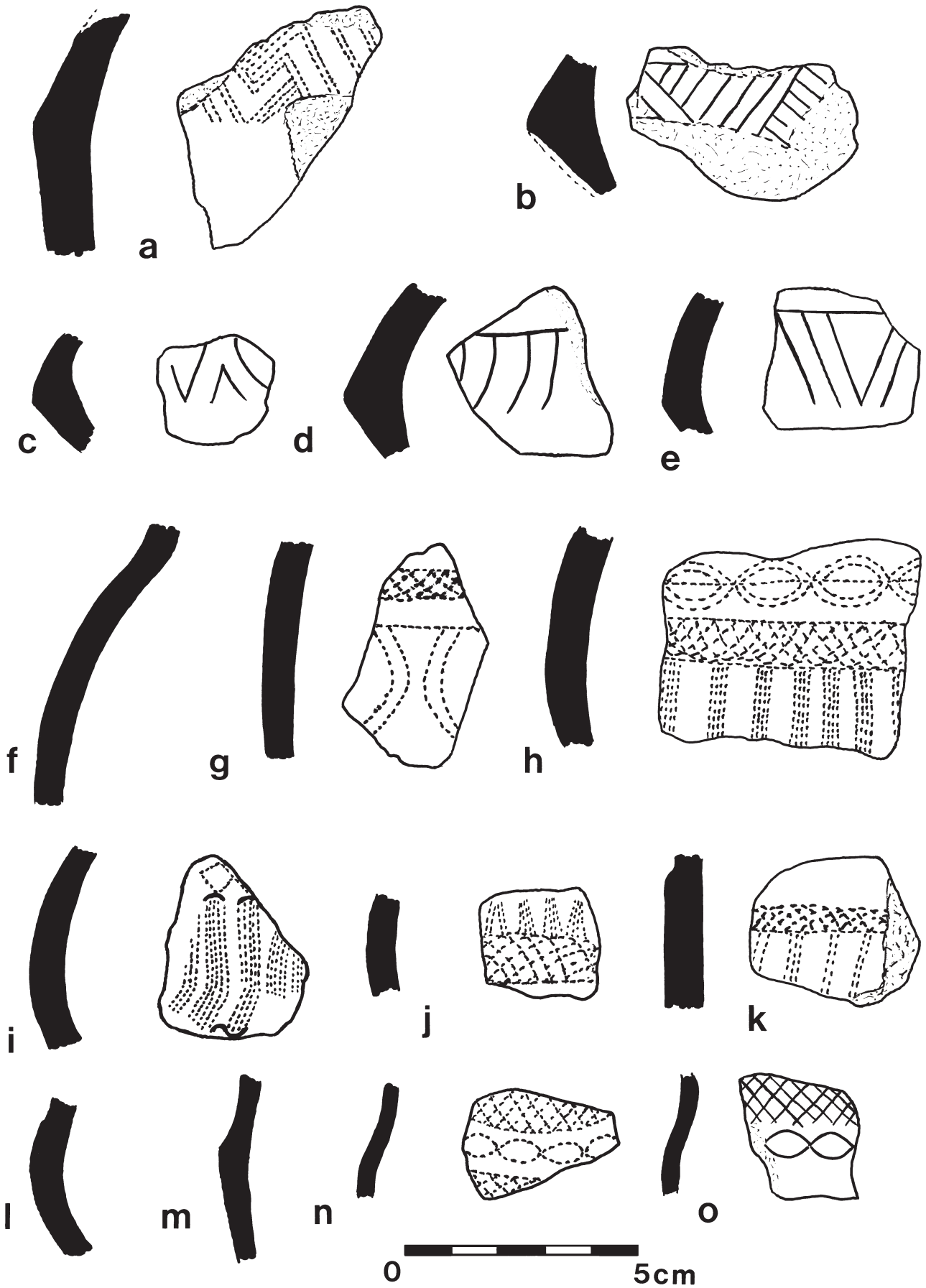

Fig. 7. Decorated carinated shoulders and body sherds at FCR/FCS.

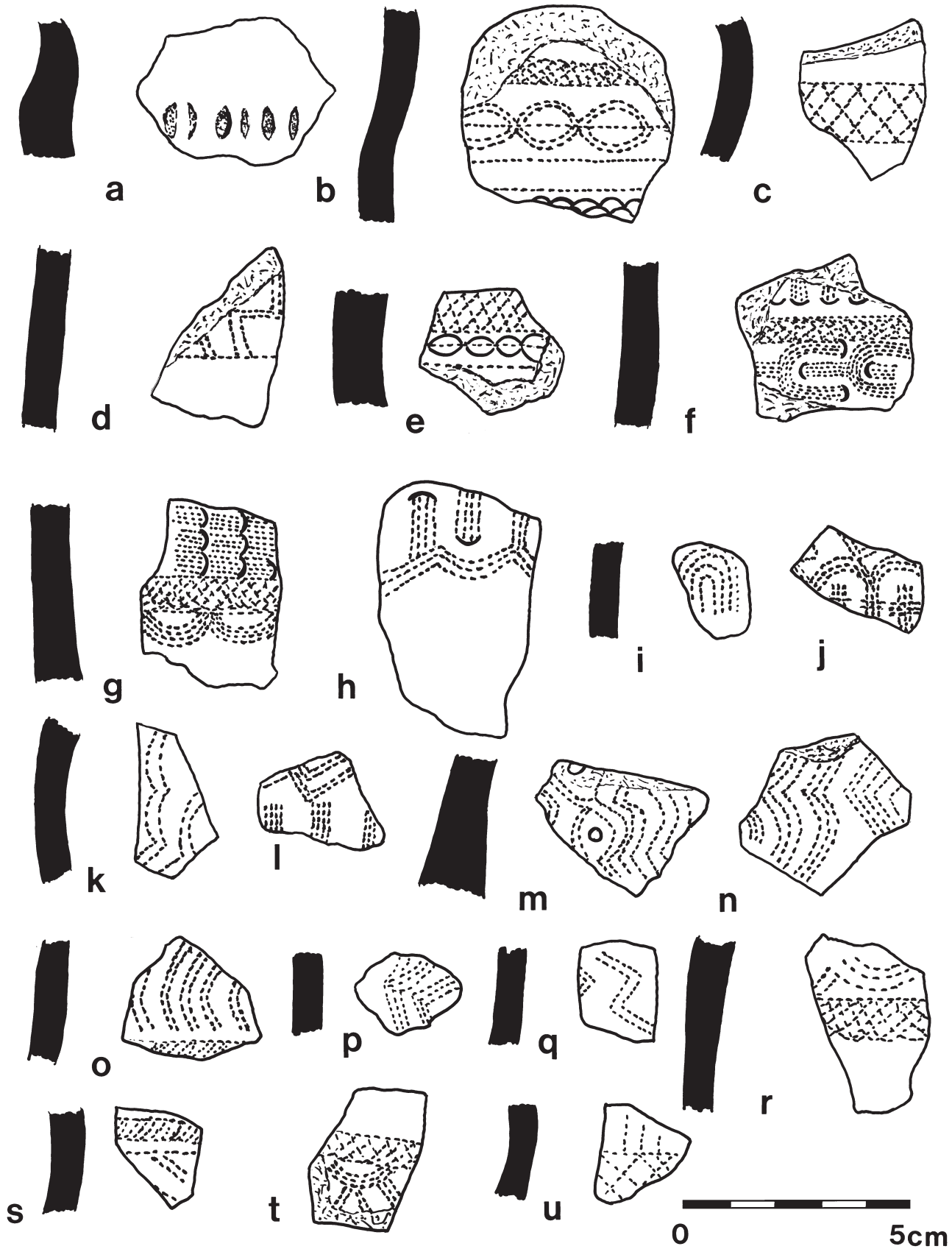

Fig. 8. Decorated shoulders and body sherds at FCR/FCS.

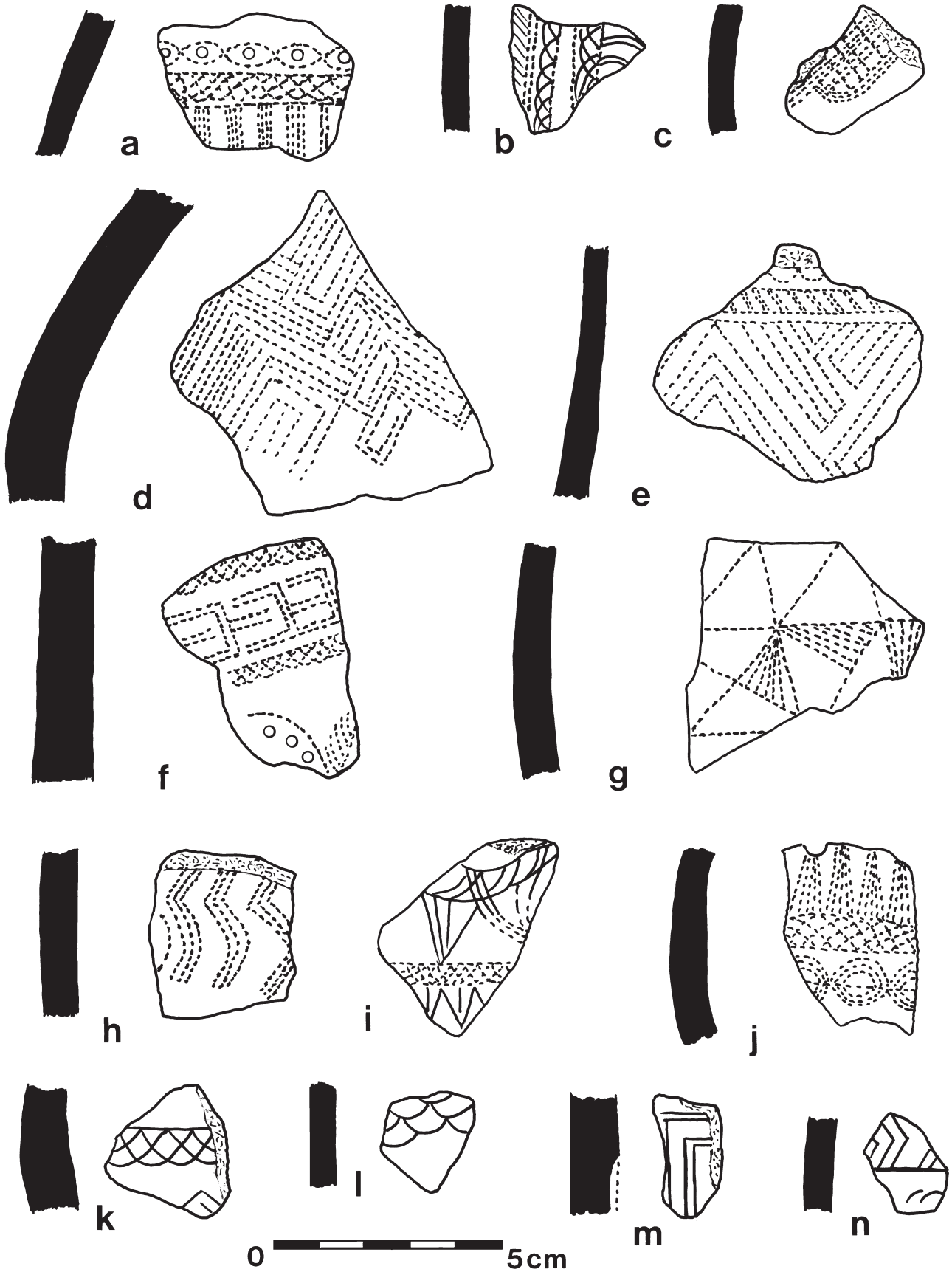

Fig. 9. Decorated body sherds at FCR/FCS.

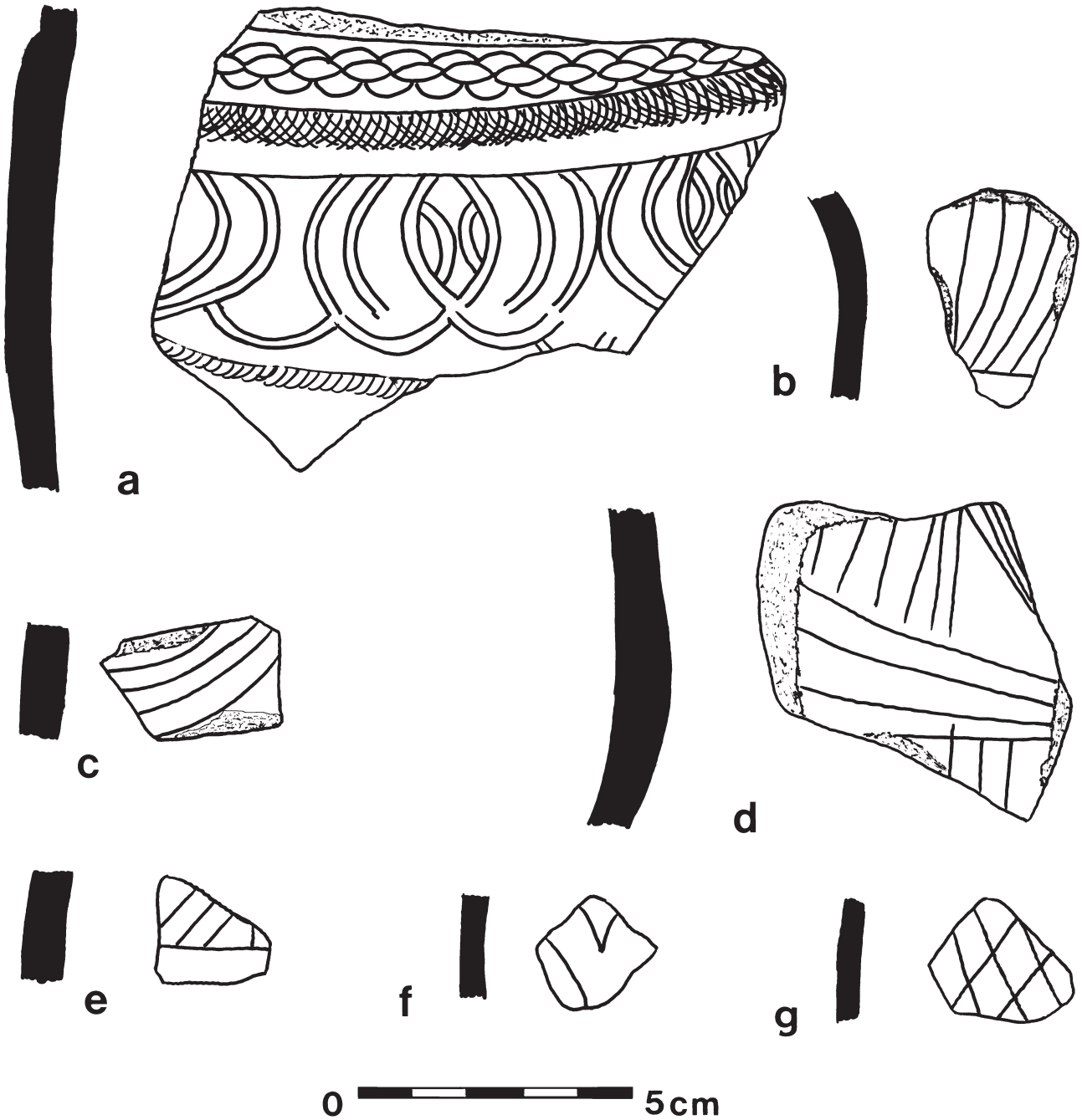

Fig. 10. Incised shoulder and body sherds at FCR/FCS.