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Mansiri in North Sulawesi: A new dentate-stamped pottery site in Island Southeast Asia

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Abstract

This report outlines new results from the Mansiri site, close to Toraut village, in North Sulawesi. A series of small excavations in 2015 recovered red-slipped pottery with decorations including dentate stamping, most commonly in straight or curved lines, circle impression and red painting including horizontal lines sometimes associated with dentate-stamped borders. These are decorative similarities shared with middle Lapita assemblages from the southwest Pacific, but the Mansiri assemblage also shows notable differences from the highly ornate Lapita pottery. Initial radiocarbon dating from the excavation shows evidence of a possible pre-3000 BP deposit at the site.

Keywords: North Sulawesi, Neolithic dating, Neolithic pottery, red slipping, dentate stamping

Introduction

Early Neolithic open sites in Island Southeast Asia (ISEA) are exceptionally rare with only around 20 sites dated to 3000 cal BP or older, and several have significant disturbance leading to doubt about the association of their cultural deposits with an early Austronesian occupation (Spriggs 2003, 2007, 2011). Despite decades of archaeological research, it remains unclear whether conclusive ceramic evidence has been recovered for a direct connection between the Lapita culture in the West Pacific and any Neolithic culture in ISEA, although there are claims to the contrary (Hung et al. 2011; Spriggs 2011; Carson and Kurashina 2012). Recently, Specht et al. (2014), in 'deconstructing' the Lapita Cultural Complex in the Bismarck Archipelago, noted the absence of an ancestral 'homeland' for the distinctive Lapita dentate-stamped pottery. Nonetheless, eastern Indonesia and the north coast of New Guinea were likely routes through which population movement occurred during the Neolithic, but these areas have received only modest amounts of archaeological research.

In this paper, we report a new site containing dentate-stamped, circle impressed, red-slipped and red-painted pottery in North Sulawesi. The small amount of decorated pottery at Mansiri parallels some of the techniques and designs identified in Lapita and ISEA assemblages, but Mansiri also contains vessel forms that have not been identified in any Lapita assemblage. The initial and tentative dating of Mansiri indicates the beginning of the ceramic phaseat the site around 3300–2700 cal BP and the ceramics might represent two-way movement between ISEA and the West Pacific after the initial occurrence of Far Western Lapita in the Bismarck Archipelago (Denham et al. 2012; Specht et al. 2014). This hypothesis would also support the simultaneous westward transportation of Kutau/Bao obsidian from New Britain in the Bismarck Archipelago, as seen in Neolithic levels of Bukit Tengkorak, Sabah, at around 3200–2900 cal BP (Bellwood and Koon 1989; Chia 2003) and its occurrence on Cebu, Philippines (Reepmeyer et al. 2011), albeit undated.

Location

The Mansiri site (0°32’42”N 123°52’3”E) is in the Bogani Nani Wartabone National Park, Bolaang Mongondow District of North Sulawesi, approximately 50 km west of Kotamobagu City (Figure 12.1). Situated in an upland region of North Sulawesi, the site location follows a similar settlement pattern to sites in the Karama Valley in Western Sulawesi (Anggraeni et al. 2014), being associated with a main inland river system. The closest distance to the sea is to the south, 25 km in straight line. The large river system of the Sungai Dumoga, however, drains in a west–east direction from the Central Mountains of North Sulawesi to the northeast, where it meets the sea at the Lombagin village, approximately 60 km away. The Mansiri site is located at 273 metres above sea level (m asl) at the western end of the Dumoga valley in the foothills of the Central Mountain range. The site experiences an equatorial climate and used to be covered by tropical rainforest. Unfortunately, in recent times, the area has been subject to uncontrolled logging and forest clearing and is now used as farmland for sweet corn agriculture.

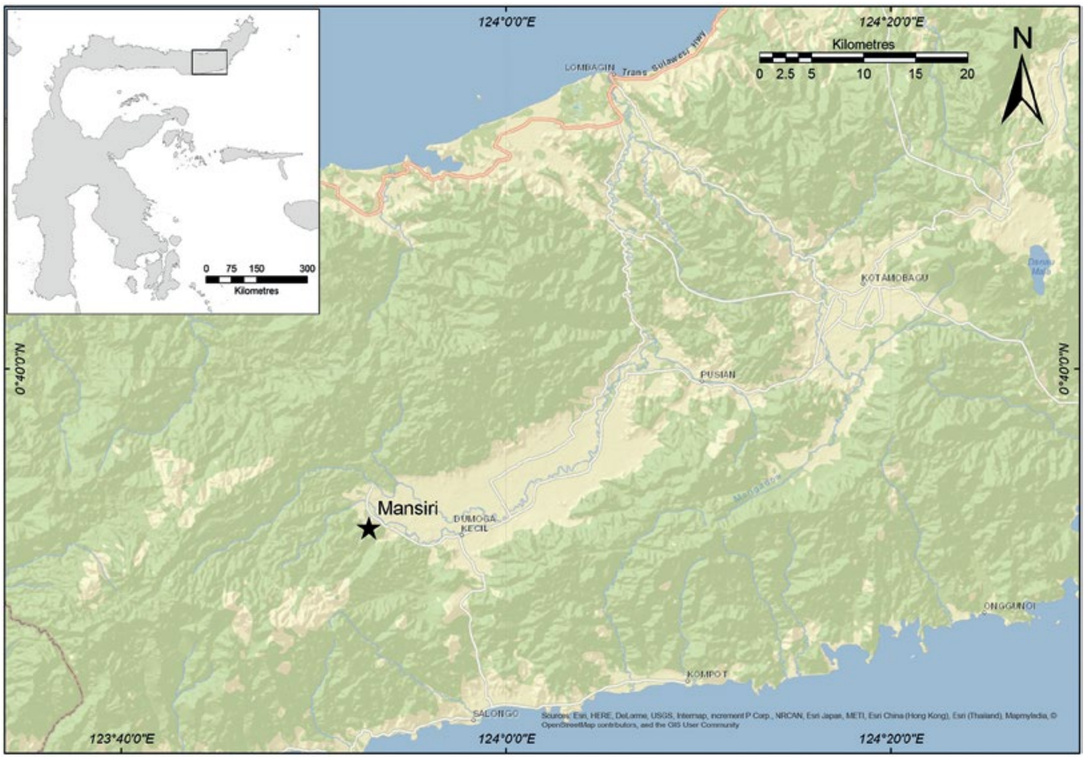

Figure 12.1: Map of the location of Mansiri site.
Source: Manado Archaeology Office.

Survey and excavation

Initially discovered during survey activities in the early 1990s by Dr Joko Siswanto of the Manado Archaeology Office, the Mansiri site had not been a focus of archaeological activities until a revisit to the area by the Manado Archaeology Office in 2011, and a surface survey of the surrounding area detected additional artefactual material. Previous excavations conducted by the Manado Archaeology Office in 2011–13 uncovered large numbers of decorated ceramic sherds indicative of an early Neolithic site.

Fieldwork in 2015 was conducted on 13 days between the 9–12 of April (Figure 12.2). During this time, activities included excavation of four test pits (Trenches A–D) and a north–south auger test drilling transect (16 samples, spaced at 2 m, total length of 32 m), to identify the extent of the site, as well as digital mapping of the general topography of the area (Figure 12.3).

Figure 12.2: (a) Panorama (facing north) of the site and (b) location at the foot of hill slope.
Source: Christian Reepmeyer.

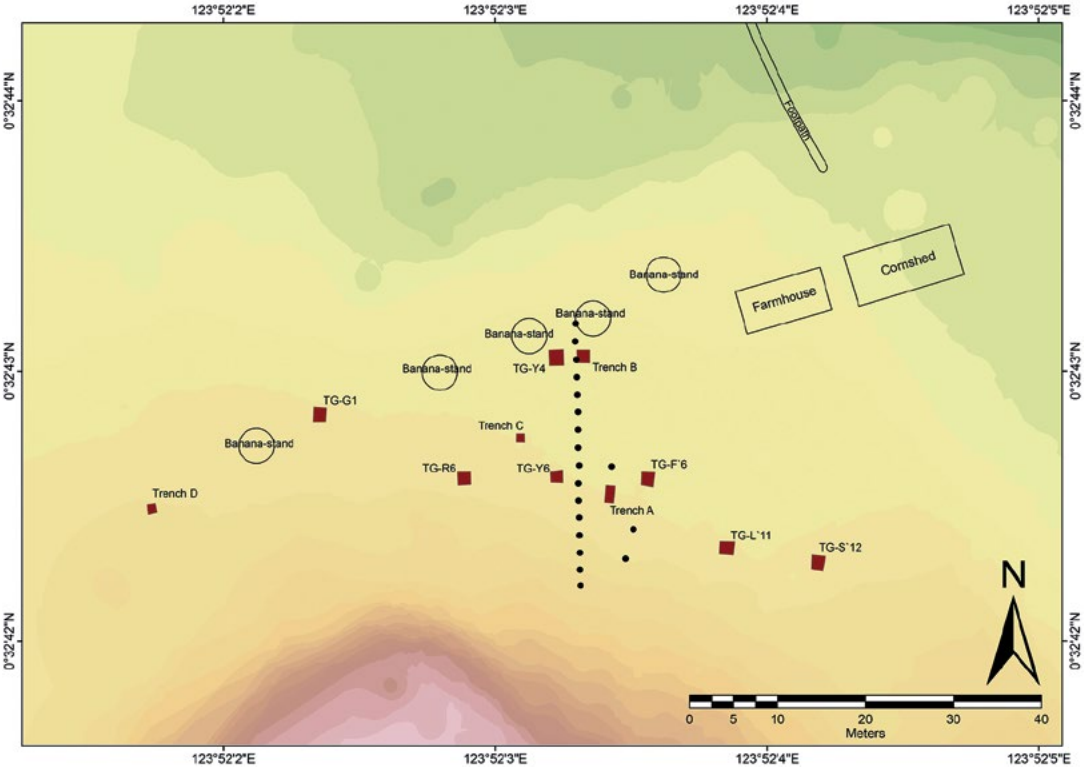

Figure 12.3: Digital elevation (green colour represents low areas and lavender high areas) and site plan of the Mansiri site with the location of previous excavation by Balai Arkeologi Manado (TG-G1 to TG-S`12) and 2015 excavations (Trenches A–D).

Source: Christian Reepmeyer.

The Mansiri site is an elevated, relatively level area of approximately 100 m x 40 m extent, situated to the south of an old creek bed (now dry) on a gentle rise. Currently, the area is only used for intermittent cattle grazing, with no sweet corn planted on the site location. Artefact density in prior excavations of the Manado office was found to be highest in the central area and to decline significantly to the north (Trench TG-G1) and east (TG-S`12). The northern boundary of the site is demarcated by an old creek bed and large banana stands; however, pottery was found in all of the auger drill holes to the north, indicating that the site extent most likely reaches still further north. The southern border is the steeper part of the slope of a hill that rises to about 400 m asl. It appears that the southern site boundary does not extend further up the hill slope as indicated by the lack of artefactual material in the southern auger drill holes and the lack of artefacts or structures on the hill top. Significant erosion is occurring due to logging/burning of vegetation on the hill slope.

Trenches A, C and D[1]

Trench A (Figure 12.4) is a 1 m x 2 m excavation in north–south alignment, whereas both Trenches C and D were 1 m x 1 m test units to the north of the site. The deposit was excavated in natural (stratigraphic) layers, or arbitrary 10 cm units if finer stratigraphic units could not be detected during digging, until a sterile layer was reached at ~160 cm (Table 12.1).

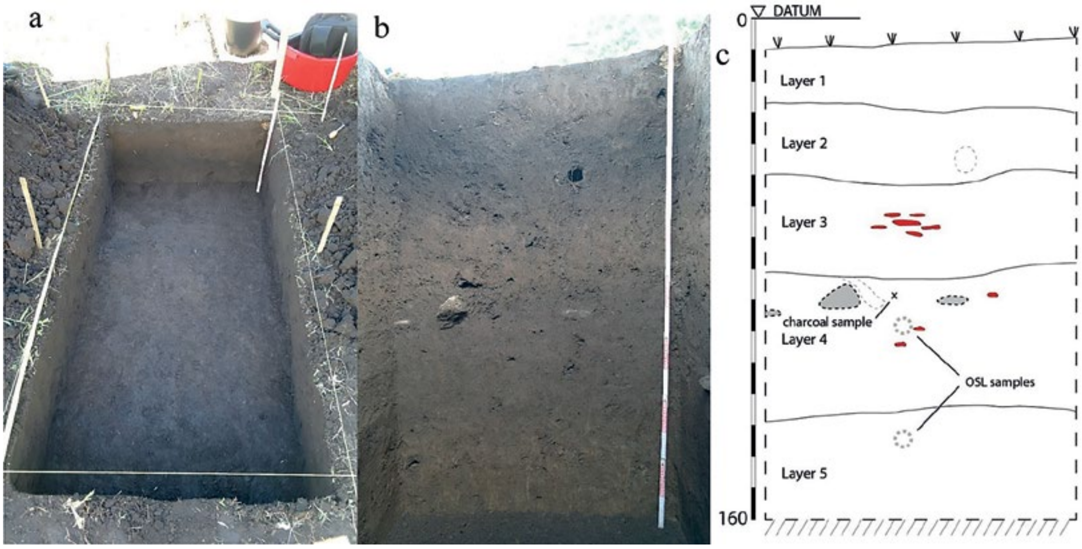

Figure 12.4: Trench A in plan (a) and section (b) view of the south section. Section drawing (c) of the south section of Trench A.

Source: Christian Reepmeyer.

Table 12.1: Stratigraphy of Trenches A and C at Mansiri.

Layer 1 (5 – 27 cm uD):	Topsoil, lighter brown sandy silt with frequent tree roots. Some rat burrows.
Layer 2 (27 – 50 cm uD):	Topsoil, very humic, loose, dark sandy silt, loamy. Some large rat burrows. Frequent tree roots.
Layer 3 (50 cm – 80 cm uD):	Lighter grey-brown sandy silt. Some tree roots. One pottery concentration, most likely 16th century. Some rat burrows.
Layer 4 (80 cm – 125 cm uD):	Main cultural layer until 102 cm uD. Below 105 cm only rarely ceramics. Grey (slightly darker than Layer 3) sandy silt with some clay content. Rare rat burrows and other bioturbations (mainly in top part of layer).
Layer 5 (125 cm – 160 cm uD):	Sterile yellow-brown mottled soil. Medium sand with some clay content. Most likely top part of weathered bedrock.

Note: uD = under Datum.

Source: Excavators' field notes.

Trench B

Trench B (Figure 12.5) is located around 10 m to the north of Trench A and in the same alignment as TG-Y4 trench excavated in 2014 by the lead author and his team. Trench dimensions were 1.5 m x 1.5 m to a maximum depth of 210 cm where either bedrock or a terrace of large water-rolled boulders was reached (Table 12.2). The trench was excavated in 10 cm units below 100 cm. The top 100 cm were excavated in one unit by shovel.

1 Trench D shows the same stratigraphic sequence as Trenches A and C, but is slightly deeper. The radiocarbon date at 143 cm is associated with the main cultural Layer 4, as described in Table 12.1.

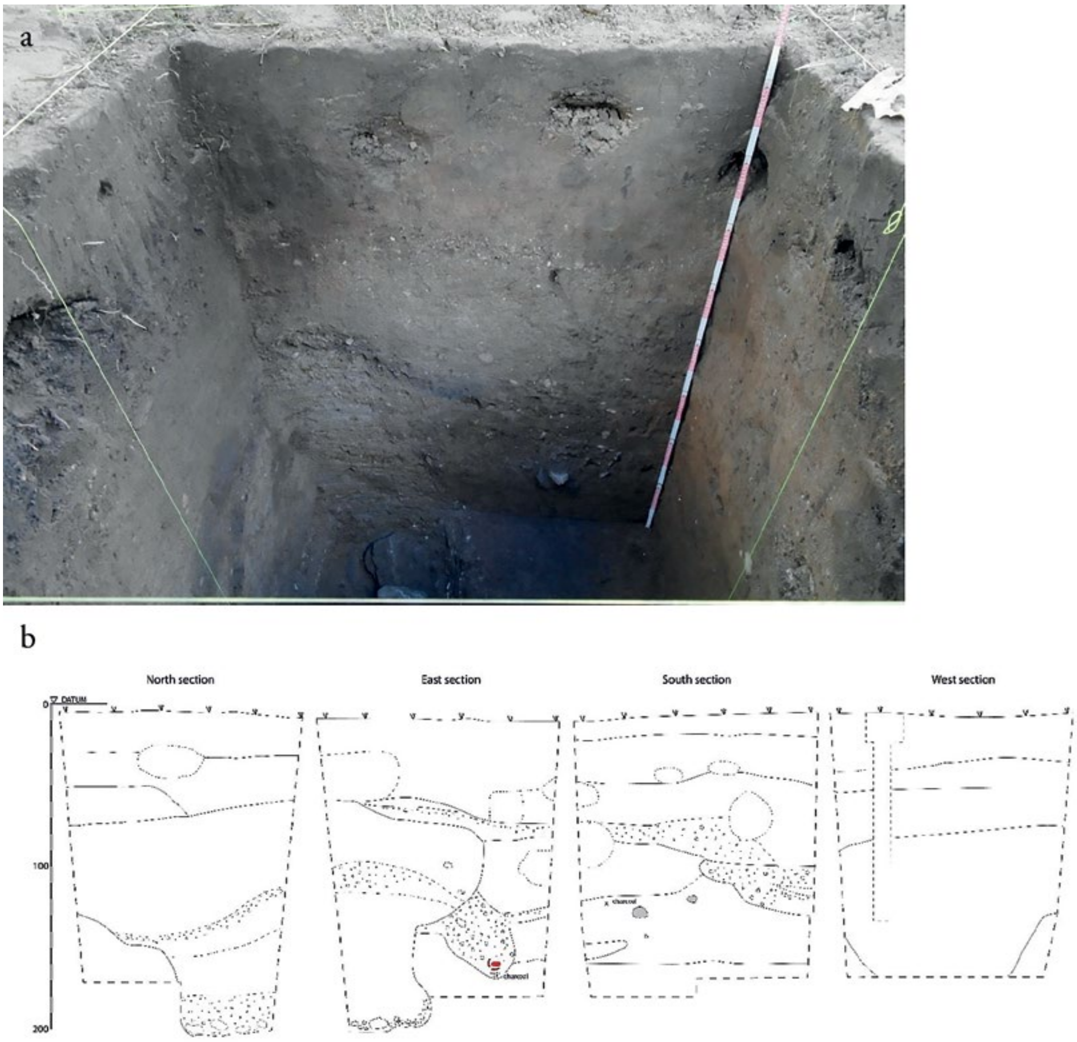

Figure 12.5: (a) View of east section of Trench B, drainage channel in the northern part, which cuts through cultural layers at around 180 cm; (b) Section drawing of all sections of Trench B.
Source: Christian Reepmeyer.

Table 12.2: Stratigraphy of Trench B at Mansiri.

Layer 1 (10 cm – 25 cm uD):	Topsoil, light grey humic silt. Frequent rat burrows and tree roots.
Layer 2 (25 cm – 55 cm uD):	Topsoil. Dark grey humic soil. Frequent roots and bioturbation, relatively loose material.
Layer 3a (55 cm – 65 cm uD):	Compacted grey silt with clay content. Frequent eroded gravel and white specks, most likely weathered dolomite (or sandstone) pieces.
Layer 3b (65 cm – ~80 cm uD):	Compacted grey silt, sandy with frequent angular or river-rounded gravel. Weathered white specks continue.
Layer 4 (80 cm – 200 cm uD):	Sandy layer. Frequent river-rolled gravel. Relative soft material in the top part. Alternating between finer sand layers and compacted gravelly sand. In the lower part increasingly banded, frequent iron and black layered concretions. To the sides particularly in the base part gravelly, mostly rounded. This layer cuts through all subsequent layers. In the base of the layer large boulders, some angular and some river-rolled. Frequently eroded sandstone gravel. There is a clear border between this layer and the silt/clay layers to the south. Most likely old drainage channel.
Layer 5 (85 cm – 127 cm uD):	Very compacted silt/clay layer. Light grey-brown. Frequent burned tree roots. A large moist patch (east section) appears to be an old tree root.

Layer 6 (127 cm – 168 cm uD):	Very compacted silty sand with frequent river-rolled gravel. Larger pieces of rock, partly angular. Frequent pottery, main layer with cultural material. Only specks of charcoal, most likely from only small tree roots. Frequent iron concretions.
Layer 7 (135 cm – 160 cm uD):	Very compacted grey-brown silt/clay with frequent white specks (weathered dolomite or sandstone?). Mottled with some fine sand content.
Layer 8 (below 160 cm uD):	Sterile compacted mottled yellow-brown silt.

Note: uD = under Datum.

Source: Excavators' field notes.

Trench B shows significant disturbance from a drainage channel that cut through earlier deposits, including pottery-containing layers. It appears that these drainage channels are not recent as there is a substantial amount of sediment accumulated (~70 cm) on top of them. Ceramics were found in a pit feature filled with compacted silt/fine sand deposit with some clay content; the southern boundary of this pit feature is unclear. The sediment is concreted by iron aggregations. Charcoal samples were collected from the pit feature (unfortunately, these samples might have been contaminated by tree root disturbances) and the surrounding sediment.

Results

Stratigraphy and age

Only a limited amount of bioturbation (specifically, rats burrows) could be detected, which might have brought in sediment from higher layers. One charcoal sample recovered from the upper part of the pottery layer dates to 3355–3084 cal BP, while two additional samples from Trenches A (in the highest sections of the ceramic layer that might overlie the ceramic deposition) and D (in direct association with ceramic) showed slightly younger ages of 2720–2480 cal BP and 2720–2430 cal BP, respectively (Table 12.3 and Figure 12.4). Charcoal was scarce in the highly acidic soil, limiting the potential for radiocarbon dating of the site and encouraging the use of alternative dating methods.

Table 12.3: Summary of radiocarbon dates from Mansiri Trench TG7'6, Trenches A and D.

Radiocarbon Date						
Lab. code #	**Trench**	**Burial depth (cm)**	**d13C**	**D14C**	**^{14}C age**	**cal BP (95.4%)**
S-ANU 40031[1]	TG-F'6	90–100	−28.58±1.0	−314.6±2.6	3035±35	3355–3084
Wk44605[2]	A1	80–90	−28.0±0.4	−266.9±1.8	2494±20	2720–2480
Wk44610[2]	D	143	−26.7±0.4	−264.6±1.8	2469±20	2720–2430

Sources:

1. ANU Radiocarbon Dating Centre. For experimental setup, see Fallon et al. (2010).
2. Waikato Radiocarbon Dating Laboratories.

It was decided to employ Optical Stimulated Luminescence (OSL) dating at the Oxford University Luminescence Dating Laboratory to investigate the radiocarbon ages. OSL results are based on luminescence measurements of sand-sized quartz (180–255 µm) extracted from the samples using standard preparation techniques including, wet sieving, HCl (10%) treatment to remove carbonates, HF treatment (48%) to dissolve feldspathic minerals and heavy mineral separation with sodium polytungstate. Measurements were performed in an automated luminescence reader (Risø DA15 upgraded to Risø DA20) made by Risø (Bøtter-Jensen 1988, 1997; Bøtter-Jensen et al. 2000) using a SAR post-IR blue OSL measurement protocol (Murray and Wintle 2000; Banerjee et al. 2001; Wintle and Murray 2006). A preheat combination of 220°C for the main OSL signal and 200°C for the test dose signal were adopted following the outcome of a dose recovery test on four of the samples (X6836 – X6839). Dose rate calculations are based on Aitken (1985) and are derived from the concentration of radioactive elements (potassium, thorium and uranium) within the samples. These were derived from elemental analysis by ICP-MS/AES using a fusion sample preparation technique. The final OSL age estimates include an additional 4% systematic error to account for uncertainties in source calibration and measurement reproducibility. These incorporated beta attenuation factors (Mejdahl 1979), dose rate conversion factors (Guérin et al. 2011) and an absorption coefficient for the water content (Zimmerman 1971). The contribution of cosmic radiation to the total dose rate was calculated as a function of latitude, altitude, burial depth and average over-burden density based on data by Prescott and Hutton (1994).

Unfortunately, OSL dating of the sediments resulted in anomalous dating of the pottery layer to a maximum of 1400 BP with underlying sterile deposition at a maximum of approximately 2900 BP (Table 12.4). At this stage, the discrepancy between the radiocarbon and OSL dates is unexplained; however, it is possible that this either evidences significant disturbances of sediment deposition or that water content in the sediment resulted in incomplete bleaching, degrading the accuracy of the OSL readings from the site (Murray and Olley 2002; Rhodes 2011). Furthermore, sampling of sediment cores for OSL dating was not ideal, as only improvised sampling containers (PVC pipe with 7 cm diameter, cut into 25 cm long sections) were used.

Table 12.4: Summary of OSL dates from Mansiri Trench A.

OSL Dates					
Lab. code #	Burial depth (cm)	Water content (%)	Palaeodose (Gy)	Dose rate (Gy/ka)	OSL age estimate (years before 2015)
X6839	98	18.87	1.27±0.17	0.98±0.07	1290±195
X6841	135	21.39	2.94±0.38	1.21±0.09	2430±380

Source: Oxford University Luminescence Dating Laboratory.

Pottery

In total, 2146 pottery fragments were excavated in 2015. Due to the high acidic content of the soil, the pottery is poorly preserved and highly fragmented, making the pot forms difficult to reconstruct. Identified pot forms include small flat bottom dishes, ring-foot dishes and globular pots with everted and thickened rims (Figures 12.6 and 12.7).

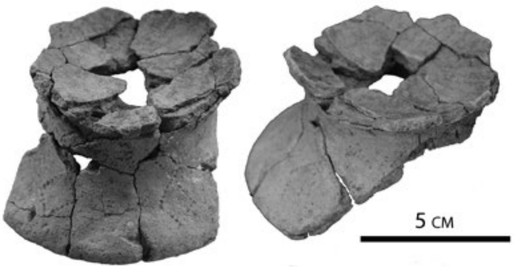

Figure 12.6: Example of a dentate-stamped ring-foot stand.

Source: Naszrullah Azis.

Figure 12.7: Examples of rim shapes.

Source: Christian Reepmeyer.

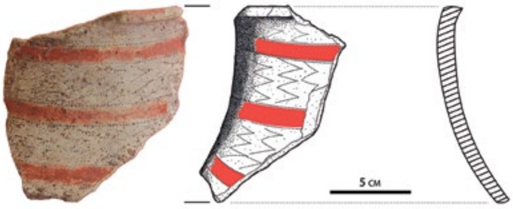

Figure 12.8: Selected example of red-painted and dentate-stamp decorated ceramic.
Source: Naszrullah Azis.

Figure 12.9: Selected examples of red-painted, circle-stamped and dentate-stamped decorated ceramics.
Source: Naszrullah Azis.

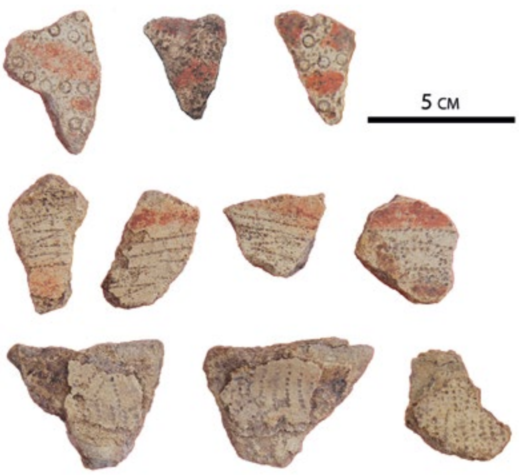

Figure 12.10: Selected examples of red-painted, circle-stamped and dentate-stamped decorated ceramics.
Source: Naszrullah Azis.

Pottery fragments with decoration are exceptionally rare and account for less than 1% of the assemblage (Figures 12.8–10). Decorations include dentate stamping, most commonly in straight or curved lines. Zigzag patterns and rhombic motifs are common. Single lines of circular bamboo stamps bordered by dentate-stamped lines have been recorded. There are two instances where bamboo stamps were noted, both as part of a joint composition with red paint, again with a rhombic pattern. Most of the decorated pottery shows red painting, including horizontal lines associated with dentate-stamped borders on several sherds. One sample showed white incrustation associated with dentate stamping, albeit it is unclear whether this is a weathering product or intentional addition of lime or other carbonate film. At this stage, identified incision is extremely rare as only one sherd with possible incision was found. Instances of rim-notching have been detected.

A red slip, which has substantially exfoliated, was frequently applied. Of the 1019 wall sherds analysed, 150 (14.7%) retained red slip or red paint on the inside surface and 165 (16.2%) on the outside. This high percentage (24.6%, taking both inside and outside surfaces into account) of applied slip would be further enhanced by only considering the 611 sherds with non-eroded surfaces, which would result in 41% of the sample displaying red-slipped surfaces.

Discussion

The location of the Mansiri site follows a similar settlement pattern to the sites of the Karama valley, Kalumpang in West Sulawesi (van Heekeren 1957; Anggraeni et al. 2014), both being associated with main inland river systems. The distance from the coast along the river system of the Mansiri site is comparable with Pantara'an 1, whereas the sites at Minanga Sipakko and Kamassi are twice that distance. Mansiri appears to be slightly younger than the Neolithic deposits at Minanga Sipakko, which have been dated from c. 3500 cal BP ranging to 3000 cal BP

(Anggraeni et al. 2014:745, Table 1). Anggraeni et al. (2014:746) state that the dates from Kamassi confirm that the transition to pottery making was completed by 1500 BC in the Karama valley at Minanga Sipakko; however, the Kamassi early dates derive from uncalibrated freshwater molluscs for which no local calibration curve was adopted (see Keaveney and Reimer (2012) and Philippsen (2013) for discussions of significant in-built ages in freshwater molluscs). The only published charcoal date for Kamassi suggests a later deposition at around 3175–2365 cal BP; however, this sample derives from higher levels than the freshwater mollusc dates. Similarities in the vertical distribution of different types of ceramics at Kamassi and Minanga Sipakko might indicate that the earlier dates at both sites are outliers and an initial transition to pottery use might have occurred a few hundred years later than inferred by Anggraeni et al. (2014). This is also reflected in the ceramics found at Mansiri, which show some similarities such as circular stamping with the pottery from Minanga Sipakko and Kamassi as well as those from Nagsabaran in Luzon (Hung et al. 2011). However, incisions that are common at these latter sites are virtually absent from Mansiri. The lack of incisions in association with missing curvy-linear decoration patterns, and rectangular, instead of circular or triangular stamping, also excludes a comparison with later Iron Age Sa-Huynh Kalanay ceramics (Solheim 2006).

Dentate stamped red-painted pottery is exceptionally rare in ISEA and its occurrence in a possible 3000-year-old site in North Sulawesi invites a comparison with Lapita assemblages in Near Oceania. A detailed analysis of the decoration is ongoing and will be presented at a later stage. Initial similarities between the Mansiri dentate-stamping, infilled and red-painted horizontal lines can be detected with middle Lapita assemblages from Vanuatu (Bedford 2006), but the Mansiri assemblage also shows significant differences from the highly ornate Lapita pottery, and so significant additional research is necessary to determine the nature of any connections.

The ambiguous status of the Mansiri radiocarbon dates is not unique for ISEA where the transition to the Neolithic is not very well dated. The earliest radiocarbon dates of initial pottery occurrence overlap at the 2-sigma 95.4% confidence interval (Table 12.5). Almost none of these dates have been unambiguously accepted (for example, Spriggs 2003, 2007, 2011), particularly as only in rare cases in ISEA are local correction curves available for marine shell dates, and there are suggestions that the Neolithic transition might have occurred significantly later at each of the sites (Spriggs 2011; Carson and Kurashina 2012; Gaffney et al. 2015).

The hypothesis of a multi-directional backward and forward movement of goods and people has long been accepted further east in the Lapita distribution (Sheppard 2011), as exemplified by the flow of obsidian raw material (Green 1987; Sheppard 1993; Reepmeyer 2009). If we accept the later proposed dates for the appearance of Lapita in the Bismarck Archipelago (post-3200 cal BP; Specht et al. 2014) and the earlier age range of both Mansiri and the Karama valley sites (pre-3300 cal BP), then the Mansiri site might be viewed as an archaeological precursor to Lapita in ISEA, which would support earlier claims for direct connections between ISEA and the Western Pacific (Hung et al. 2011; Carson et al. 2014). This proposal, admittedly, is tenuous at best, and instead cultural influences in the reverse direction might have been at play.

However, the Lapita culture has been associated with highly mobile settlement patterns and a distinct maritime focus (Kirch 2000; Bedford et al. 2007). This adaptation does not accord well with the site location of Mansiri, which is as far away from the coast as the river system allows. Mansiri's location is unexplained at this stage, but would fit with the hypothesis that agricultural expansion followed an opportunistic pattern whereby arable land along large freshwater systems provided the primary targets for farming communities after an initial maritime spread of people and innovations (Bellwood 2005).

Table 12.5: Summary of radiocarbon dates from selected early Neolithic sites in Island Southeast Asia.

Region	Site	Lab-number	Age (calibrated) (95.4%)	Shell dates	Reference
Batanes Islands	Torongan Cave	OZH 771 Wk 14642	4510–4085 cal BP 3640–3452 cal BP		Bellwood and Dizon 2013
Philippines	Nagsabaran	WK-23397 ANU 13016	4517–4248 cal BP 3867–3697 cal BP		Hung et al. 2011
		NTU-3799		3450±40 uncalibrated	
	Dimolit	GaK 2937	4815–3930 cal BP		Peterson 1974
	Andarayan	N.G.	3975–3380 cal BP		Snow et al. 1986
	Edjek	Beta-1117	4421–3183 cal BP		Hutterer 1982
Talaud Islands	Leang Tuwo Mane'e	ANU 1515	4821–4295 cal BP		Bellwood 1976
		ANU 10209		3690±70 uncalibrated	Tanudirjo 2001
Sarawak	Gua Sireh	CAMS-725 ANU 7047	4962–3581 cal BP 3921–2953 cal BP		Datan and Bellwood 1991
	Niah Cave	Gm-7204	3915–3410 cal BP		Harrisson 1975
Northern Papua New Guinea	Wañelek	Wk-22060 GX-3326	4146–3929 cal BP 4226–3253 cal BP		Gaffney et al. 2015

Source: See Reference column.

On the other hand, recent research has shown that social interaction between distant communities, including maritime transportation of raw materials in ISEA, can be traced back into the early Holocene period and might be associated with sea-level changes following the Late Glacial Maximum (Torrence and Swadling 2008; Neri et al. 2015; Pawlik et al. 2015). Considering the intensification of forest management evidenced at Niah Cave in Sabah (Barker et al. 2011) and early independent domestication of tuber crops in highland Papua New Guinea (Denham et al. 2003), it seems that the transition to pottery production and agricultural systems in ISEA was indeed complex and most likely a process that involved multiple migrations (Tumonggor et al. 2013), as well as staggered acceptance and discard of innovations by local communities over hundreds of years.

Conclusions

The new dentate-stamped ceramic site of Mansiri adds new information to the Neolithic transformations in ISEA. Radiocarbon and OSL dating show a level of uncertainty about the true age, and occupation length, of the site. Based on the acquired preliminary age determinations, we propose that there might be a Neolithic presence at the site of a few hundred years, which started just prior to 3000 cal BP. At this stage of investigation, it might be tentatively inferred that the new-found pottery indicates links with the emergence of highly decorated dentate-stamped pottery of the Lapita Cultural Complex in the Bismarck Archipelago. However, the probability of a slightly later date of occupation at Mansiri makes it an unlikely precursor to Lapita. We propose here that the Mansiri site might show a backflow of ideas and people to the west, as would accord with the appearance of Kutau/Bao obsidian in ISEA at a similar time frame.

A more detailed analysis of the ceramics, combining results from the 2012–14 excavation and the 2015 excavation is forthcoming. These analyses will include typological assessment of rim shapes, a detailed study of the decorative motifs and technological analysis of manufacturing by examining direction of pores, geochemical and petrographic analysis of clay, temper and red-slip types, and compound specific radiocarbon analysis (CSRA) to obtain direct dates on the pottery manufacture.

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