

# 9

## Comparison of Neolithic Sites in Southeast Asia

### **Introduction: Methodology for comparative research of Southeast Asian neolithic ceramics**

There are few well-documented neolithic sites in Southeast Asia. This has had consequences for understanding the inception of agriculture and related events in the region. At present, there are two main explanations for the origins of the neolithic in Southeast Asia. The first is the ‘Two Layer’ model for demographic transition (Bellwood and Oxenham 2008), which links archaeological and linguistic evidence. It posits that the growth of the population and expansion in the Southeast Asia region can be attributed to the adoption of food production, whereby farmers spread and assimilated indigenous hunter-gatherers. This hypothesis explains the widespread presence of Austroasiatic languages across areas with similar neolithic mortuary traditions, ceramic vessels, weaving evidence, and domestic rice and pigs (Bellwood and Oxenham 2008). The second model, which is purely archaeological, places more importance on the role of the indigenous hunter-gatherers, and suggests that the intrusive neolithic farmers had a reduced impact when compared to the adaptation within the hunter-gatherer groups (Gorman 1977, 1972, 1971; Solheim 1972).

There is increasing evidence that rice farming only entered the prehistoric Southeast Asian economy around 2000 BC (Higham 2011b). There is a noticeable distinction between Hoabinhian hunter-gatherers and neolithic populations of mainland Southeast Asia who arrived with knowledge of rice cultivation, ground and polished stone adzes, and incised and impressed pottery. In accordance with the first hypothesis described above, their origin has been suggested to be in southern China, with most research supporting the Yangtze Valley (Higham 2009d, 2002a; Rispoli 2007; Wiriayomp 2007; Bellwood 2005; Blust 1996).

This chapter builds upon past ceramic comparative research in the region (e.g. Wiriayomp 2011, 2007; Rispoli 2007) to investigate the relationship between neolithic sites. It draws upon specific comparisons with An Sơn in order to place southern Vietnam in the wider context of neolithic events in Southeast Asia. As in Chapter 8, a correspondence analysis (CA) is employed (described in Chapter 3) to compare a broad range of sites in mainland Southeast Asia, chosen for their neolithic occupational evidence and accessible excavation reports. Some sites have dubious chronologies and efforts have been made to include only evidence from pre-metal contexts. Both early and late neolithic contexts are represented in this study. The comparison included the sites of Ban Non Wat, Khok Phanom Di, Nong Nor, Khok Charoen, Tha Kae, and Mán Bạc since they exhibited neolithic evidence from secure contexts, even if the radiocarbon dates have not been confirmed from some sites. The additional sites of Samrong Sen, Laang Spean, early Ban Lum Khao, early Ban Chiang, early Non Nok Tha, Krek and Xóm Rền were also included but contextual information and chronology for these sites is less secure. Collectively, these sites

cover a wide geographic area and span some 1000 years of time, so a relative lack of precision is unavoidable. For this analysis, An Sơn is divided into a burial phase and early, middle and late phases of occupation. Refer to the map in Figure 1.2 and the summary of Table 3.3 for these sites.

Unlike the previous CA of the southern Vietnam sites (Chapter 8), there is less focus on the combinations of material culture traits, for example each variable represented a number of traits identified together on a ceramic vessel. Each trait is treated separately as one variable in the current analysis. This is to account for and manage the increasing variability of material culture as a wider area is examined. Data for the CA were collected and plotted in terms of the presence or absence of certain variables. As in the previous CA analyses for southern Vietnam, absence was assigned when no information for that variable was available. This does not always mean that the variable concerned was not present, but that there was no evidence for its presence. The results of these analyses should be revisited and revised as more information becomes available for the studied sites, and as more sites are added as research expands in Southeast Asia. This chapter first introduces each site and summarises the material culture data. This is followed by the results of the CA and a discussion of the material culture relationships within the neolithic of landscape Southeast Asia. The methods for data collection from these sites and the CA were described in Chapter 3. The material culture variables, presence and absence data, and the codes for the variables used in the CA are presented in Appendix C.

## Northeast Thailand

### *Ban Non Wat*

The site of Ban Non Wat is situated on the Khorat Plateau in northeast Thailand, in the Huai Yai valley. Ban Non Wat has been extensively excavated and comprehensive radiocarbon determinations have indicated that it represents a sequence in which late neolithic occupation developed onwards into bronze age and iron age occupation. Ban Non Wat was a moated site during the iron age, one of many in northeast Thailand visible in aerial photographs. The majority of the radiocarbon dates were determined from bivalve shell offerings in burials and charcoal from burials and features. The inception of neolithic occupation at Ban Non Wat occurred *c.* 1750–1500 cal. BC, with the Neolithic phase 1 burials dated to *c.* 1450–1350 cal. BC, and Neolithic 2 burials to *c.* 1350–1150 cal. BC. The earliest date for the bronze age burials is 1100–900 cal. BC, and this period extends to the beginning of the iron age, *c.* 700–400 cal. BC, after which Iron Age phase 1 ceased *c.* 175 cal. BC–AD 200 cal. (Higham and Higham 2009a).

The earliest evidence for occupation at Ban Non Wat may represent late Pleistocene hunter-gatherers. This evidence is scarce and includes clusters of bivalve shell, a deer skeleton, an infant human skeleton, and crouched burials with mortuary offerings. The dates are less secure from these burials than for the rest of the Ban Non Wat sequence, and three of these crouched burials dated to 1741–1537, 1521–1423 and 1262–1055 cal. BC (95% probability). Some of these dates are the earliest for the site and others overlap with the neolithic occupation (Higham 2009d; Higham and Higham 2009a).

The first neolithic people at Ban Non Wat grew rice, had domestic animals, fished and collected shellfish, and hunted wild animals. This first phase of neolithic occupation is consistent with the wider patterns of habitation in mainland Southeast Asia at this time. There is evidence for trade and exchange during this phase with a presence of marine cowrie shells in burial contexts. This is similar, perhaps, to Shang state traditions in the Yellow River Valley of China and to the more

recent Dian culture in Yunnan. Stone resources were also imported (Higham 2009d). An evident decrease in decorated pottery and other mortuary offering in the second neolithic burial phase is paralleled at Ban Lum Khao (Higham 2009d).

The neolithic occupation of Ban Non Wat was associated with the basal layer 5 and the lowest spits of layer 4. Artefacts were rare in layer 5 and mostly included stone adzes, ceramic anvils, clay pellets and worked bone. The lowest spits of layer 4 predominantly included clay pellets, stone adzes and shell bangles (Higham 2009a, 2009b) (Table 9.1). Middens identified as representative of neolithic occupation contained gastropod and bivalve shells, and fish bones. The main species of shellfish were *Filopaludina* and *Pila*, which are found in freshwater ponds and lakes. The most common fish species were *Hemibagrus/Mystus*, a bagrid catfish that is widespread in the Mekong and Chao Phraya River basins; *Channa striata*, snakehead, and *Clarias* and *Anabas testudineus*, walking catfishes (Thosarat and Kijngam 2011).

The inhabitants at Ban Non Wat are believed to have kept domestic cattle and also hunted the local wild bovid species during the neolithic. Greater quantities of pig remains, *Sus scrofa*, were identified in the lowest layers 5 and 4. Domestic dog, *Canis familiaris*, was also an important presence at the site, since dogs were introduced to Southeast Asia and there were no native wolves south of China (see Chapter 4). The presence of domestic dog is closely linked to the appearance of rice cultivation. Other fauna represented on site included deer, the Javan rhinoceros, tiger, hare, lizard, the elongated tortoise, the Malayan snail-eating turtle, the Asiatic soft-shell turtle, Indian bullfrog, and bird bones, including a few chicken bones, possibly domestic (Thosarat and Kijngam 2011).

There was a predominance of stone adzes in the neolithic occupation of Ban Non Wat, with a drop-off in the number of such items in the subsequent bronze age. Unshouldered adzes were three times more common than shouldered adzes. The adzes were small with ovoid cross-sections, in general, and an average length of 53 mm (Boer-Mah 2008a, 2008b; and in Higham 2009c). Compared to the later layers, ceramic anvils and burnishing stones were relatively rare, and there was a noticeable increase in these items at the transition point from neolithic to bronze age occupation. Similar observations were reported for spindle whorls, although the major increase in these items occurred at the terminus of the bronze age and the inception of the iron age (Higham 2009c).

No clay bangles were found complete at Ban Non Wat, but the majority of the fragments were variable in cross-section and originated from neolithic and bronze age occupation layers. It has been suggested that these items were for everyday wear rather than mortuary offering. While clay pellets and ceramic counters were identified throughout the Ban Non Wat sequence, pellets increased in number after the initial occupation (first two spits) and the counters were rare in the neolithic layers (a reported total of 85 in all layers) (Higham 2009c). The quantity of counters was minimal given the extensive excavation area and length of the sequence at Ban Non Wat, when compared to the relatively small excavation of only neolithic occupation at An Sôn, which yielded a total of 48 roundels/counters (see Chapter 4).

The neolithic burials at Ban Non Wat have been grouped into two phases. Phase 1 included burials interred with incised and painted ceramic vessels. The phase 2 burial vessels had minimal decoration, except for cordmarking, and fewer grave goods. The vessels of phase 2 were similar to those found in the subsequent earliest bronze age phase (Higham 2011a; Higham and Wiriyaromp 2011c). The Neolithic phase 1 burials also contained pig and fish bones, stone adzes, some shell beads and bangles, bivalve and cowrie shells (Higham and Wiriyaromp 2011c). The burials of phase 2 also contained the occasional pig and fish bones, bivalve shells and shell beads (Higham 2011a). Increasingly exotic and prized items, such as marble, shell and bronze ornaments, appeared subsequently in bronze age burials (Higham 2009c).

A summary of the material culture identified in neolithic occupational (Table 9.1) and burial (Table 9.2) contexts, and a sample of vessel forms and modes of decoration (Figures 9.1, 9.2 and 9.3) at Ban Non Wat are provided. The data in Appendix C and the CA for Ban Non Wat were adapted from reported information (Higham and Wiriyaromp 2011c; Higham 2011a, 2009a, 2009b, 2009c; Wiriyaromp 2007), and from personal observations of neolithic occupation ceramics excavated during 2008–2009.

Table 9.1. The material culture contents of the neolithic occupation layers and spits (4:7 to 5:3; 5:3 is the base) at Ban Non Wat. Note that the unexpected items for neolithic contexts (e.g. bronze, iron, and perhaps spindle whorls) may represent the disturbance of artefacts from higher layers, and not original deposition. Ceramic vessels are not included in this table but sherds were present in all layers.

Layer: Spit Quantity of material culture present						Layer: Spit List of material culture present				
	4:7	4:8	5:1	5:2	5:3	4:7	4:8	5:1	5:2	5:3
burnishing stone	2	3	1	2	0	burnishing stone	burnishing stone	burnishing stone	burnishing stone	clay anvil
bronze artefact	22	33	2	2	0	bronze artefact	bronze artefact	bronze artefact	bronze artefact	clay pellet
clay anvil	11	16	9	6	2	clay anvil	clay anvil	clay anvil	clay anvil	stone adze
clay conical roller	4	10	1	0	0	clay conical roller	clay conical roller	clay conical roller	clay pellet	whetstone
clay counter	2	1	2	0	0	clay counter	clay counter	clay counter	mould	
clay pellet	37	94	25	2	6	clay pellet	clay pellet	clay pellet	shell bangle	
cowrie shell	0	7	2	0	0	crucible	cowrie shell	cowrie shell	stone adze	
crucible	9	18	1	0	0	iron artefact	crucible	crucible	whetstone	
iron artefact	1	1	1	0	0	iron slag	iron artefact	iron artefact	worked bone	
iron slag	1	3	0	0	0	marble bangle	iron slag	ivory bangle		
ivory bangle	0	2	1	0	0	mould	ivory bangle	marble bangle		
marble bangle	15	30	6	0	0	shell bangle	marble bangle	shell bangle		
mould	4	9	0	1	0	spindle whorl	mould	spindle whorl		
shell bangle	30	50	4	2	0	stone adze	shell bangle	stone adze		
spindle whorl	14	10	3	0	0	whetstone	spindle whorl	whetstone		
stone adze	33	101	32	19	14	worked bone	stone adze	worked bone		
whetstone	10	13	5	4	2		whetstone			
worked bone	6	24	10	4	0		worked bone			

Source: Data from Higham 2009a: 22, table 3:1, 2009b: 33, table 4:1.

Table 9.2. The material culture contents of the neolithic burials at Ban Non Wat.

Neolithic burial phase 1	Neolithic burial phase 2
bivalve shell	bivalve shell
ceramic vessel	ceramic vessel
cowrie shell	shell rectangular bead
fish remains	pig remains
ivory bead	
pig remains	
shell bangle	
shell disc bead	
shell rectangular bead	
stone adze (most unshouldered, small)	

Source: Data from Higham and Wiriayomp 2011c; Higham 2011a, 2009a, 2009b, 2009c; Wiriayomp 2007.

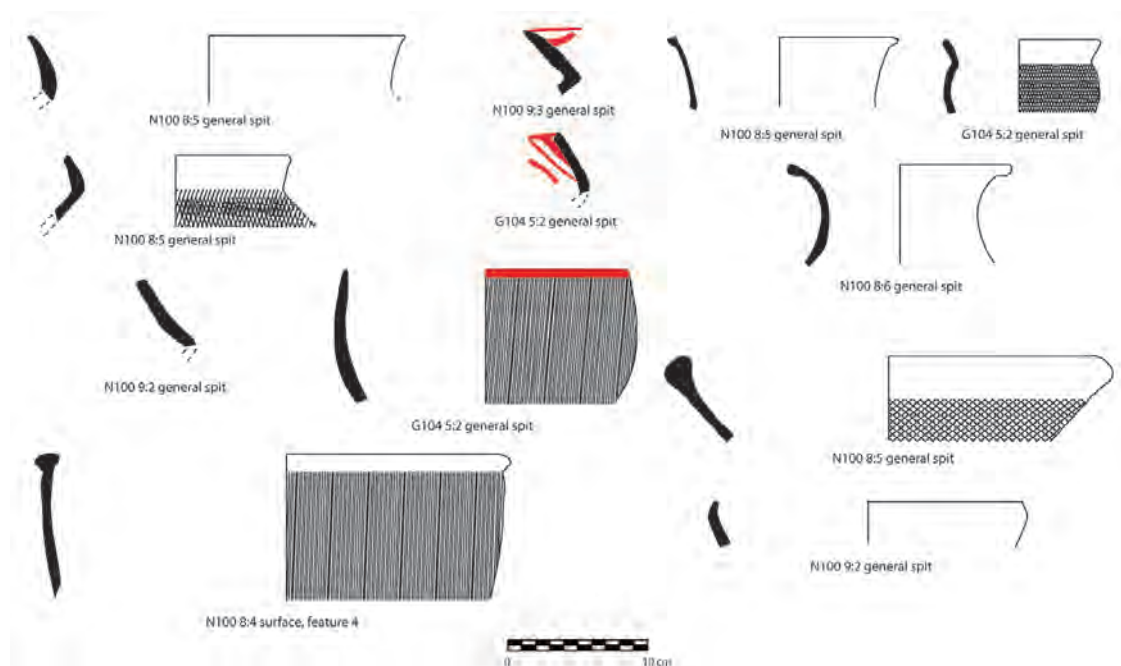


Figure 9.1. Ban Non Wat ceramic vessel forms, neolithic occupation layers, 2008–2009 excavation.

Source: Illustrations, C. Sarjeant.





Figure 9.2. Ban Non Wat ceramic modes of decoration, neolithic occupation layers, 2008–2009 excavation.

Source: Photos C. Sarjeant.

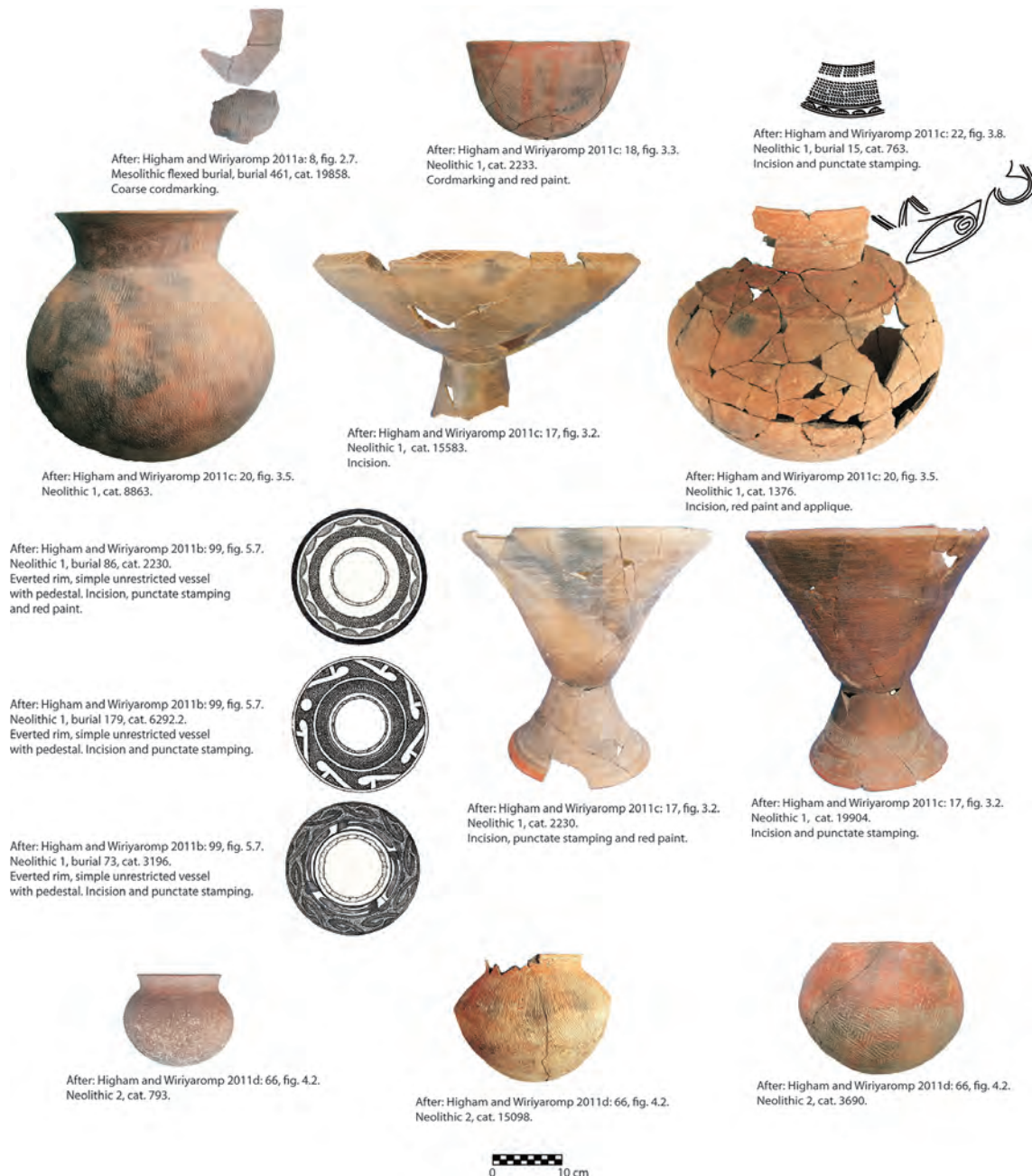


Figure 9.3. Ban Non Wat ceramic vessel forms and modes of decoration, Neolithic burial phases 1 and 2.

Source: Higham and Wiriyaromp 2011a, 2011b, 2011c, 2011d, as credited.

### *Ban Lum Khao*

Ban Lum Khao had a mainly bronze age sequence, although some of the earliest evidence from the site was indicative of neolithic occupation. Situated downstream from Ban Non Wat in the upper Mun Valley, Ban Lum Khao differs from many of the other sites in the area due to its lack of iron age occupation and moat construction. The calibrated radiocarbon dates indicate the site was initially occupied *c.* 1450–1000 BC (T.F.G. Higham in Higham and Thosarat 2004d: 5). Parallel evidence to the neolithic occupation of Ban Non Wat (Neolithic 2) occurred within the earliest mortuary phase 1 at Ban Lum Khao, with simply decorated ceramic vessels. These vessels were commonly small, everted rimmed independent restricted forms with cord-marked surfaces,

however two everted rimmed simple unrestricted vessels with pedestals were also recovered (see Figure 9.3 for similar vessels from Neolithic 2 burials at Ban Non Wat). Other material culture in these burials included 786 shell beads in one interment, and some pig bones, bivalve shells, *Cervus unicolor* antlers, marble bangles and turtle bones. It is unclear if these burials were terminal neolithic or bronze age, however there is very little evidence of metal in the lower occupation layers in the site (Higham and Thosarat 2004a).

The possible neolithic occupation at Ban Lum Khao was represented by pits filled with potsherds, shellfish, animal bones, and shell midden. The lowest occupation layer 3 at Ban Lum Khao had evidence of deer species (*Cervus eldi*, *Cervus unicolor*, *Muntiacus muntjak*), water buffalo (*Bubalus bubalis*), *Bibos* sp., domestic dog (*Canis familiaris*) and wild boar/pig (*Sus scrofa*). Pig was the most common fauna throughout the sequence. There appeared to be greater wild mammal diversity in the assemblage of the lowest layer compared to the upper layers (Higham 2004b). The fish bones of layer 3 included the climbing perch (*Anabus testineus*), catfish (*Mystus nemurus*, *Clarius* sp., *Wallagonia* sp.), swamp eel (*Monopterus albus*), bronze featherback (*Notopterus notopterus*), and snakehead (*Channa striatus*) (Thosarat 2004).

There were a larger number of adzes in the potentially neolithic layers (3:3 to 2:8), after which the number decreased substantially. Although a couple of the adzes were shouldered, the majority were small and unshouldered with an ovoid or elliptical cross-section. Clay anvils were rare in the lowest layer. The number of clay bow pellets was low in the basal spit but was high in the other spits of layer 3, and spindle whorls only appeared in significant quantities from layer 2:7 and into the upper layers, after the neolithic occupation (Higham 2004a). Shell beads were uncommon at Ban Lum Khao, and most were disc-shaped and mainly from layer 3. Some *Tridacna* and *Trochus* shell bangles were identified in layer 3 occupational contexts (Chang 2004). The Ban Lum Khao ceramics have been likened to the Tamyae phase pottery identified by Welch and McNeill (1991) at Phimai.

A summary of the material culture identified in neolithic occupational and burial contexts at Ban Lum Khao is provided in Table 9.3. The data in Appendix C and the CA for Ban Lum Khao were adapted from reported information (Chang 2004; Higham 2004a; Higham and Thosarat 2004a). Only the earliest and possibly neolithic data was utilised in the CA and presented in the Appendix C.

Table 9.3. The material culture contents of the possible neolithic occupation layers and burials at Ban Lum Khao.

Occupation (layer 3)	Burial (mortuary phase 1)
ceramic vessel	bivalve shell
clay anvil	ceramic vessel
clay pellet	deer antler
shell bangle	marble bangle
shell disc bead	pig remains
stone adze (most unshouldered, small)	shell disc bead
	turtle bone

Source: Data from Chang 2004; Higham 2004a; Higham and Thosarat 2004a.

### *Northeast Thailand and the bronze age*

Like Ban Non Wat, Non Nok Tha and Ban Chiang in northeast Thailand have revealed deposits that may show a transition from neolithic technology to a knowledge of metallurgy. Ban Chiang has a legendary status within the history of archaeology in Southeast Asia owing to the dispute over the dating of the initial bronze production there. Bronze was originally placed at 3600 BC by Gorman and Charoenwongsa (1976) as a result of poorly-contexted radiocarbon dates from an early



phase of burials with incised pottery and a bronze spearhead (Higham, Higham, Ciarla, *et al.* 2011; Higham, Higham and Kijngam 2011; Higham 2011a, 1996b: 7–12, 1996c; Higham and Higham 2009b; White and Hamilton 2009; White 2006, 1997, 1986; White *et al.* 2004; Bayard 1996).

Non Nok Tha is located about 80 km from Khon Kaen. The site was shallow, but revealed 205 burials and about 800 complete or reconstructable ceramic vessels. The earliest period at Non Nok Tha had evidence of rice, domestic cattle and pigs, stone tools and a single copper tool. Bronze tools, crucibles and moulds, and new ceramic forms appeared in the middle occupation. Earlier pottery vessels were predominantly sand tempered, although a few were grog or fine rice chaff and sand tempered. The rim forms of the early period were mostly straight everted rims, with some curved inverted rims, curved everted rims, simple vertical or slightly inverted rims, and tall vertical rims. After the early period, the variety in forms increased substantially. The surface decoration in the early period included cordmarking, cross-hatched cordmarking, diagonal unidirectional cordmarking, smoothed cordmarking, red slipping, and burnishing (Bayard and Solheim 2009; Rispoli 1997; Bayard 1977: 61–83). Parallels with other neolithic sites included incised and impressed decorations, such as the ‘scale pattern impressed decoration’ (SPID) within curvilinear incised motifs (Rispoli 1997: 68) (see Figure 9.5 for similar motifs from Khok Charoen). Rispoli (1997: 68) identified SPID as ‘small, contiguous scales’ that resemble fish or reptile scales. SPID was usually applied between two incised lines. Some SPID examples are similar to the identified roulette stamping at An Sôn (see Figure 5.17).

Non Nok Tha ceramics were not as ornately decorated as those from Ban Chiang (Bayard and Solheim 2009: 234). The Ban Chiang vessels incorporated the scale pattern impressed decoration (SPID), and an incised zigzag motif between two incised lines, either as a band or in curvilinear motifs (Rispoli 1997). Other incised curvilinear motifs were identified at Ban Chiang during the period tentatively dated to 2000 BC, similar to those in the basal layers of Non Nok Tha. Ban Chiang is also known for its red painted spiral designs on pottery vessels, but these appear in the mid to late sequence, contemporary with bronze and possibly iron metallurgy (Gorman and Charoenwongsa 1976). Ban Chiang has become synonymous with a ‘culture’ of pottery vessels that are observed at other sites in eastern Udon and western Sakon Nakhon provinces in northeast Thailand (Bayard 1977: 90).

The pottery sequence at Ban Chiang began with cord-marked or incised scroll motifs with impressed fill on black surfaces. This was followed by a layer including cord-marked vessels with curvilinear incised designs and followed again by the appearance of incised and painted curvilinear and geometric motifs, then red-on-buff freehand painted pottery. The most recent upper layers included red slipped and burnished pottery, followed by historic Thai celadon and earthenware and Chinese porcelain (Bayard 1977: 91; Gorman and Charoenwongsa 1976). Quartz sand and grog tempers were identified throughout the sequence in preliminary analyses, while plant material tempers were observed primarily in the Early and Middle Periods, and not the Late Period (McGovern *et al.* 1985: 110, figure 3; see also Bubpha 2003).

A summary of the material culture identified in neolithic contexts at Non Nok Tha and Ban Chiang is provided (Table 9.4). The Non Nok Tha data in Appendix C and the CA were adapted from reported information (Bayard and Solheim 2009; Rispoli 1997; Higham 1996b: 189–194; Bayard 1977, 1971). The Ban Chiang data in Appendix C and the CA were adapted from reported information (Bubpha 2003; Rispoli 1997; Higham 1996b: 196–198; McGovern *et al.* 1985; Bayard 1977; Gorman and Charoenwongsa 1976). Only Early Period data from Non Nok Tha (Bayard and Solheim 2009: 93) and Initial Period and Early Period I and II data from Ban Chiang (White 2006: 93, 97, table 1, figure 3) were utilised for the CA presented in Appendix C.

Table 9.4. The material culture contents of the possible neolithic burials and occupation layers at Non Nok Tha and Ban Chiang.

Non Nok Tha (Early Period)	Ban Chiang (Initial–Early Period I–II)
bone tool	ceramic vessel
cattle remains	clay roller
ceramic vessel	ivory bangle
clam shell	
dog remains	
hammerstone	
pig remains	
red ochre	
sandstone	
shell disc bead	
stone bangle	
stone unshouldered adze (small)	
whetstone	

Source: Data for Non Nok Tha: Bayard and Solheim 2009; Rispoli 1997; Higham 1996b: 189–194; Bayard 1977, 1971. Data for Ban Chiang: Bubpha 2003; Rispoli 1997; Higham 1996b: 196–198; McGovern *et al.* 1985; Bayard 1977; Gorman and Charoenwongsa 1976.

## Central Thailand

### *Tha Kae*

In the Khao Wong Prachan Valley of central Thailand, south of Khok Charoen (described below), the Lopburi Archaeological Project investigated the sites of Tha Kae and Non Pha Wai. Tha Kae was excavated in 1988, 1989, 1990, 1991 and 1993 (Ciarla 1992, n.d.). The site revealed evidence of both stone and shell bangle manufacture. Rispoli (1992) has assessed the similarities between the bronze age ceramics of layers 4 and 3 at Tha Kae and those of central Thailand and the Khorat Plateau of northeast Thailand. Layer 5 at Tha Kae, the basal layer, most likely corresponds with the neolithic since layer 4 above it exhibited parallels with the Early Period (late neolithic/early bronze age) at Ban Chiang (Rispoli 1992: 59; White 1982). Layer 5 dates to around the end of the third millennium BC and the beginning of the second millennium BC, and according to ceramic typologies represents the late neolithic or a transition to the bronze age. The ceramics included light grey pedestal bowls, and black ovoid jars with incised and impressed decoration (dentate stamping or SPID). The burials of this layer contained small disc-shaped shell beads, H-shaped shell beads and freshwater bivalve shells. Some of the later burials in this layer included Thick Red Burnished Slip (TRBS) bowls with red painted motifs on the pedestal (Rispoli 1997, 1992; Ciarla n.d.). Other decorative modes recovered from this layer included zigzag incision (Rispoli 1992; Ciarla n.d.).

A summary of the material culture identified in neolithic occupational contexts (Table 9.5), and a sample of vessel forms and modes of decoration (Figure 9.4) at Tha Kae are provided. The data in Appendix C and the CA for Tha Kae were adapted from reported information (Rispoli 1997, 1992; Ciarla 1992, n.d.).

Table 9.5. The material culture contents of the neolithic occupation layer at Tha Kae.



Figure 9.4. Tha Kae red painted and incised and impressed ceramic vessels.

Source: Photos, F. Rispoli (Not to scale). Illustrations, C. Sarjeant (After: Rispoli 2007; 1997; as credited).

### *Khok Charoen*

Khok Charoen, a neolithic cemetery site located in the Pa Sak Valley of central Thailand, was excavated by William Watson and Helmut Loofs-Wissowa in 1966. Thermoluminescence dates of  $980 \pm 450$  BC and  $1180/1080 \pm 300$  BC were acquired for two burial groups, which are tentatively considered in comparison to the more reliable material culture evidence that suggests a neolithic occupation (Ho 1984; Watson 1979).

Forty-four burials were revealed in an extended position, and revealed apparent differential wealth with regard to the associated grave goods. One burial incorporated 19 pottery vessels, stone beads, ten shell and nine stone bangles and many small shell disc beads, while other burials had fewer items. Shell disc beads were found in the pelvic areas of some skeletons and small, trapezoid-sectioned polished stone adzes were common and comparable to those from Ban Kao and Ban Non Wat in Thailand. Shouldered adzes were present at Khok Charoen but were absent in the burials. Khok Charoen was originally interpreted to date between 1000 and 500 BC, due in part to the fact that shouldered adzes were dated to after 1000 BC in southern China (Ho 1984; Watson 1979). However, more recent research in the lower reaches of the Yangtze River and southeastern China has dated shouldered and stepped adzes to at least 3000 BP (Jiao 2007: 123–124). Most of the shell ornaments were marine in origin, including *Trochus* for bangles, ear ornaments and finger rings, and *Conus* for small finger rings. The pottery vessels included incised and impressed decoration, as observed at Tha Kae, Ban Chiang and Non Pa Wai, together with cordmarking and red slipping (Ho 1984; Watson 1979).

Ho Chui Mei Wendy (1984) has reported that at least two ceramic vessels were imported to Khok Charoen, since these vessels were manufactured with a non-local epidotised granitic temper. The forms of these imported wares were also imitated in local fabrics with either simplified or no decoration. The majority of the studied ceramic sherds from Khok Charoen were sand tempered with feldspar, quartz and fine-grained volcanic rock fragments, and this was considered be a local fabric. Some sherds were tempered with grog fragments that had similar inclusions to the sand temper, and the temper was presumably manufactured by crushing these local sherds. Other rare fabrics included rice husk, grog and sand, and those inclusive of the non-local granitic inclusions (Ho 1984). Parallels have been noted between the Thai sites of Tha Kae, Sab Champa II, Ban Krong Bamrung, Non Nok Tha, Ban Kao and Khok Charoen, in an attempt to outline a Southeast Asian tradition of not only ceramics, but also metal, shell and stone artefacts. Roulette decoration has also been identified at Khok Charoen, Tha Kae and Ban Krong Bamrung (Ho 1984).

The shell ornaments at Khok Charoen were similar to those at the coastal site of Khok Phanom Di, and trade links between coastal and inland sites have been suggested (Higham 2011c). In an effort to explain the shift from non-local to local strontium isotope signatures in female burials, Bentley *et al.* (2007) hypothesised that women may initially have moved from this central inland region to coastal sites like Khok Phanom Di. If Khok Charoen is a later site, as the very early attempt at thermoluminescence dating might suggest, and contemporary with some metal age sites of central Thailand, then the absence of metal must indicate that the movement of metal technology overlooked Khok Charoen in terms of consumption and smelting (Pryce *et al.* 2011; White and Hamilton 2009). In general, the lack of metal at Khok Charoen and the above parallels with Khok Phanom Di indicate a neolithic occupation.

A summary of the material culture identified in neolithic occupational and burial contexts (Table 9.6), and a sample of vessel forms and modes of decoration (Figure 9.5) at Khok Charoen are provided. The data in Appendix C and the CA for Khok Charoen were adapted from reported information (Higham 2011c; Ho 1984; Watson 1979) with illustrations courtesy of Helmut Loofs-Wissowa.

Table 9.6. The material culture contents of the neolithic occupation layers and burials at Khok Charoen.

Occupation	Burial
burnt clay lump	animal teeth
ceramic vessel	ceramic vessel
chicken remains	conus shell
clay bangle	shell bangle
clay barrel bead	shell disc bead
clay cones	shell ear ornament
clay phallus item fragment	shell finger ring
hammerstone	stone adze (small)
marble ear ornament	stone bangle
pestle stone	stone bead
stone adze (small)	trochus shell
stone bead	
stone blank	
tortoise shell	
wild boar teeth	

Source: Data from Higham 2011c; Ho 1984; Watson 1979.

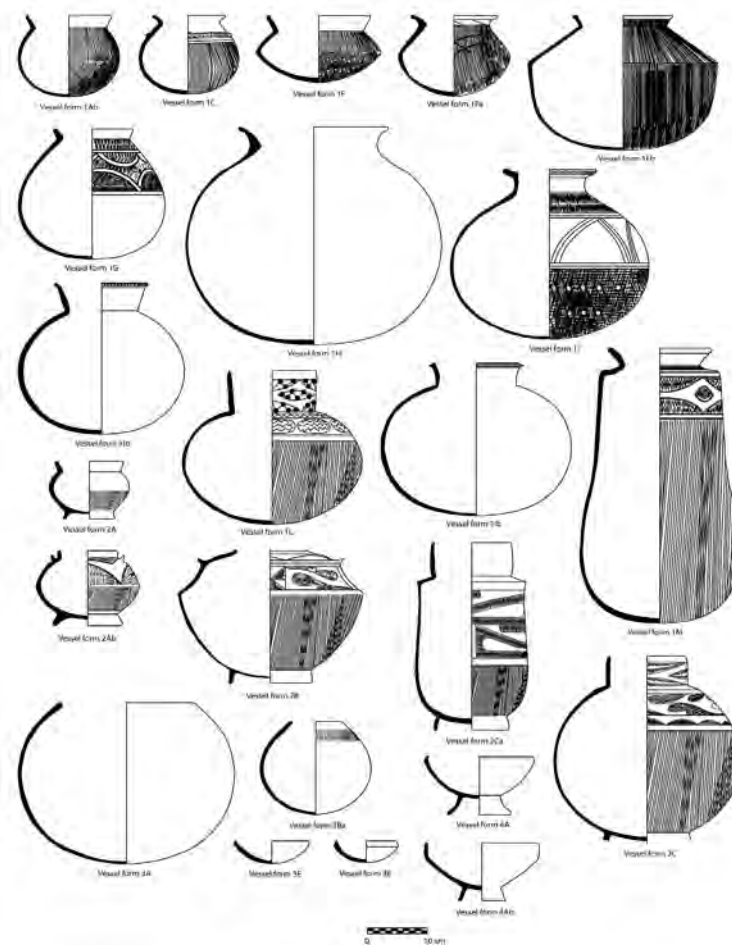


Figure 9.5. Khok Charoen vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: Illustrations courtesy of H. Loofs-Wissowa).



## Coastal central Thailand

### *Khok Phanom Di*

Khok Phanom Di is situated in the Bang Pakong Valley of coastal central Thailand. The site is a mound and the main excavation of 1985 was conducted at its highest, central point. While Charles and Thomas Higham's revisions of the Khok Phanom Di radiocarbon dates continue, the published dates of the 1990 volume must be applied here, which Charles Higham now considers to be a *terminus post quem* (pers. comm. 2011; see also Higham, Higham and Kijngam 2011). The dates indicate rapid deposition of cultural remains between 2000 and 1500 B. Although no dates were determined for the upper layers (5 to 1), it is thought that these layers represent a short period of occupation, after 1500 BC, of perhaps 100 years or less. The dates were determined from discrete ashy/charcoal or hearth deposits (Higham and Bannanurag 1990: 19). The excavation revealed 154 burials that represented seven mortuary phases (Higham and Bannanurag 1990: 19–21). The offerings in each mortuary phase are listed in Table 9.7.

The lower occupation layers (11 to 8) included ceramic anvils, clay pellets, bone tools including large one-piece fishhooks, burnishing stones, whetstones, stone adzes and 'hoes', ceramic net weights, shell bangles and knives, and stone and turtle-shell bangles. The middle occupation layers (7 to 6) contained a similar assemblage, with the addition of ivory bangles, clay ladles, and a shark tooth pendant. The upper layers (5 to 2) added bone bangles, worked antlers, awls and micro-awls (Higham and Bannanurag 1990: 31–48). The occupational material culture is listed in Table 9.8.

The adzes were typically small in size, ground and polished. Many observed throughout the sequence were unshouldered and elliptical to oval in cross-section, rounded or flattened. Some adzes were shouldered, particularly those in the lower layers. Other stone items included chisels, sandstone grinding stones, fine-grained sandstone whetstones, pounders and red ochre. The majority of the adzes were broken and then sharpened or modified, suggesting long-term use of each item and that stone was scarce. Adzes were very rarely found in mortuary contexts. It has been suggested the adzes or raw materials were acquired via exchange along the Bang Pakong River (Pisnupong 1993).

The shell ornaments included disc beads 2–7 mm in diameter, funnel-shaped beads 2–4 cm long, I-shaped beads 2–6 cm long, H-shaped beads 1–2 cm long, cylindrical beads about 1 cm in diameter, and barrel-shaped beads about 1 cm long. These beads were identified in mortuary contexts. The shell bangles were made from *Tridacna* and *Conus* shells. The larger bangles had an L-shaped cross-section and the smaller ones had a quadrangular cross-section. Many of the bangles were found in burials. All of the small fishbone bangles were in mortuary contexts. With the exception of fine quadrangular cross-sectioned bangles, few stone ornaments occurred in mortuary contexts. Some fragments of ivory bangle were also recovered in the occupation layers. Modified animal teeth were found in both burial and non-burial contexts, and large turtle carapace plaques appeared with burials from mortuary phase 3 (Pilditch 1993).

Four ceramic periods have been defined for Khok Phanom Di, based on stratigraphic relationships and ceramic characterisations. The first period included pottery made from a local fabric with sand temper, and occupational and pottery working contexts. The forms were frequently inverted rimmed restricted vessels with coarse cordmarking up to the rim. Ceramic period 1 also included everted rimmed independent restricted vessels with cordmarking up to the rim. Finer wares from ceramic period 1 included inverted rimmed simple restricted vessels, both plain and incised and impressed, and everted rimmed independent restricted vessels, some with a carination, both plain and incised and impressed (Vincent 2004: 107–163) (Figure 9.6).

Ceramic period 2 was associated with mortuary contexts. The typical local period 2 ceramics were dark brown to black highly burnished wares with incision, and were tempered with sandy grog. A smaller number of sherds were paddle impressed, painted or slipped, punctate stamped, appliqué, and shell impressed. Also present in this period were inverted rimmed restricted vessels with coarse cordmarking up to the rim, some with incision, and everted rimmed independent restricted vessels with cordmarking up to the rim. Finer wares from ceramic period 2 included inverted rimmed simple restricted vessels, both plain and incised and impressed, and everted rimmed independent restricted vessels, both plain and incised and impressed. The decorated everted rimmed vessels (rim form 5) exhibited a great deal of variation and after characterisations of the fabrics some sherds were identified as exotic (Vincent 2004: 110, 165–301).

Some of the ceramic period 2 non-mortuary wares were crudely made direct rimmed simple unrestricted vessels, everted rimmed independent restricted vessels, direct rimmed independent restricted vessels, and inverted rimmed simple restricted vessels. The mortuary vessels of ceramic period 2 were from mortuary phases 2 and 3; mortuary phase 1 interments did not include ceramic vessels. These mortuary vessels included everted rimmed independent restricted vessels with a carination; everted rimmed independent restricted vessels with a low carination and pedestal; direct, inverted and everted rimmed simple unrestricted vessels; direct and everted rimmed independent restricted vessels; inverted rimmed simple restricted vessels with a pedestal; everted rimmed simple unrestricted vessels with a pedestal; and highly burnished and incised everted rimmed independent restricted vessels with a convex neck and carination. Many of the vessels from ceramic period 2 mortuary contexts were burnished and incised and impressed (Vincent 2004: 110, 165–301) (Figure 9.6).

Ceramic period 3 was also associated with mortuary contexts. This period is characterised by orthodox grog tempered wares, with incised and impressed motifs, appliqué, highly burnished surfaces, paddle impressed, painted and slipped, and a few were punctate stamped. The vessel forms were oval-shaped inverted rim simple restricted vessels, and inverted rimmed simple restricted vessels with coarse cordmarking or incision. Roulette stamping appears at this period, while the curvilinear and geometric incised motifs continue; both decorations were identified on inverted rimmed simple restricted vessels. Everted rimmed vessels, some of which have a concave profile, were also present with roulette stamping and geometric, zigzag and curvilinear incisions. Coarse cordmarking was present on inverted rimmed simple restricted vessels (Vincent 2004: 110, 303–461).

The ceramic period 3 non-mortuary vessels were typically tempered with orthodox grog and included everted rimmed independent restricted vessels with cordmarking up to the rim; highly burnished everted rimmed independent restricted carinated vessels with a convex neck; inverted rimmed simple restricted vessels with a pedestal; and everted rimmed simple unrestricted vessels with a carination and geometric incised and impressed motifs. The mortuary vessels came from mortuary phases 5, 6 and 7. The vessels were typically tempered with orthodox grog, while a few were tempered with bleb grog/rice husk. The highly burnished everted rimmed independent restricted vessels with a carination and convex neck continued in this period, usually with incised decoration. Large unrestricted vases with a pedestal and curvilinear incised and impressed motifs were present. Simple unrestricted vessels also appeared, as well as slightly burnished everted rimmed independent restricted vessels (Vincent 2004: 110, 303–461).

Ceramic period 4 is represented by the upper layers of the site, layers 4 to 1, and is marked by evidence of a pottery workshop. The ceramics were predominantly tempered with rice and bleb grog. The fine burnished and incised wares of the previous periods diminished and were only present in layer 4, although fine incised wares and paddle impressed wares increased in

period 4. Few painted or slipped and punctate sherds were present, while there were a number of appliqué sherds. The forms included simple unrestricted and restricted vessels, including an inverted rimmed simple vessel with an angled shoulder and triangular incisions at the rim infilled with punctate and/or zigzag-line roulette stamping or other geometric incised motifs. The inverted rimmed simple restricted vessels were also decorated with geometric incision. Everted rimmed independent restricted vessels were also present, with cordmarking, paddle impression and incision. This period saw the introduction of historic wheel-turned vessels, stoneware and porcelain sherds. Non-mortuary complete vessels included burnished everted rimmed independent restricted vessels with a carination and convex neck, inverted rimmed simple unrestricted vessels, some with an angled shoulder and/or a pedestal, and everted rimmed independent restricted vessels (Vincent 2004: 479–608).

The most common decorative modes at Khok Phanom Di were horizontal incision, impressed dots in vertical and horizontal rows, impressed diagonal dotted lines, cordmarking with incised lines overtop, and paddle impressed lines. Horizontal incision was present throughout the sequence, and rows of short vertical incision with horizontal incised lines between each row were more common in the earliest layers. The impressed dot and dotted line motifs were not so prevalent in the upper layers. Cordmarking with smoothed incision over the top was less apparent in the upper layers, while cordmarking with fine incised lines increased in the middle and upper layers. Paddle impressed designs also increased in the upper layers (Hall 1993). Burnishing stones, ceramic anvils, bone stylus points, ceramic firing stands and prepared clay occurred in ceramic periods 1, 2, 3 and 4, and support local manufacture of pottery throughout the sequence (Vincent 2004: 109–128, 168–185, 306–320, 486–527).

The evidence of subsistence at Khok Phanom Di indicated a wide spectrum of exploited resources. Marine resources dominated the faunal assemblage, and while some domesticated land animals, such as pig and dog were present, wild fauna continued to be exploited. The marine, estuarine and riverine resources included the carapaces of turtle and tortoise in higher proportions in the upper layers; mud crab (*Scylla serrata*) was most common in the middle and lower layers; blue crab (*Portunus pelagicus*) in the lower layers; freshwater crab (Potamidae) in the middle layers; catfish (Tachysuridae, Bagridae, *Plotosus canius*, *Clarius* sp.) and barramundi (*Lates calcarifer*) throughout the sequence; snakehead (*Channa* sp.) that was present in low quantities throughout the sequence except the upper layers; stingrays (Dasyatidae) were present throughout the sequence but increased in the upper layers; minimal sharks remains (Carcharinidae) and climbing perch (*Anabas testudineus*) (Higham and Bannanurag 1991).

The land mammals included water buffalo (*Bubalus bubalis*) which was minimal throughout the sequence but increased somewhat in the upper layers; Bovidae and Canidae were minimal throughout the sequence; Sambar deer (*Cervus unicolour*), marsh deer (*Cervus schomburgki*, *Cervus eldi*), other deer species (*Muntiacus muntjak*, *Axis porcinus*) and surili (*Presbytis* sp.) all increased in the upper layers; and macaque (*Macaca* sp.), wild boar/pig (*Sus scrofa*), and rat (*Rattus rattus*, *Rattus* sp.), which were present throughout the sequence. Other fauna present in small numbers throughout the sequence were crocodile (*Crocodylus porosus/siamensis*), rhinoceros (*Rhinoceros sondaicus*), tiger (*Panthera tigris*), various wild cat species (*Felis viverrina*, *Felis temmincki*, *Felis marmorata*, *Felis bengalensis*), civet species (*Viverra zibetha*, *Paradoxurus hermaphroditus*, *Paguma larvata*, *Viverra megaspila*, *Cynogale bennetti*, *Civet* sp.), loris (*Nycticebus coucang*), porcupine (*Hystrix brachyura/hodgsoni*), otter species (*Aonyx cinerea*, *Lutra sumatrana*, *Lutra* sp.), and bandicoot rat (*Bandicota indica*) (Higham and Bannanurag 1991).

The bird species included crane (*Grus antigone*), stork (*Ciconia* sp., *Mycteria leucocephala*, Stork sp.), heron (*Ardea sumatrana*), pelican (*Pelecanus* sp.), ibises and spoonbills (Threskiornithidae),

cormorant species (*Phalacrocorax pygmaeus*, *Phalacrocorax carbo*), crow (*Corvus* sp.), godwit (*Limosa limosa/lapponica*), broadbill (*Corydon sumatranus*), anhinga (*Anhinga* sp.), fowl (*Gallus gallus*), duck species (*Anas crecca*, Duck sp.). Frog species were also recovered in minimal quantities throughout the sequence (Higham and Bannanurag 1991).

With the exception of rice, the plant remains recovered from Khok Phanom Di comprised few species that were likely to have contributed to the diet, except for rice. The former mangrove environment of Khok Phanom Di was best suited to non-food plants, such as those for house and boat construction, and most of the biodiversity came from animals. The evidence indicates a strong reliance on shellfish, crustacean and fish for subsistence. The lack of edible wild plants available in the area meant that a balanced diet was not available without rice cultivation. Evidence of rice was observed in the temper of ceramics and in human and/or dog coprolites. Even though experimentation of rice production was not likely to have occurred in an unsuitable environment like this coastal area, once rice was introduced, the site could be settled for some time. It has not been determined whether a transition from wild to domestic rice occurred during the occupation of Khok Phanom Di. While the site offered great marine and estuarine resources, nutrients from plants and necessary water may have been difficult to access at times (Thompson 1996: 215–225).

There were commonalities in the material culture of early Khok Phanom Di and Nong Nor phase 1, and increasing similarities from mortuary phase 3 onwards at Khok Phanom Di with inland agricultural settlements like Khok Charoen and Ban Non Wat. Higham and Thosarat (2004c: 157–158) suggest that this was due to the inception of a relationship between inland rice farmers and coastal groups which involved the exchange of goods, ideas and people, namely: dogs, knowledge of rice cultivation, and a coastal migration of inland women (as previously discussed for Khok Charoen, see Bentley *et al.* 2007; Bentley *et al.* 2005; also in Higham, Guangmao, *et al.* 2011).

A summary of the material culture identified in neolithic burial (Table 9.7) and occupational (Table 9.8) contexts, and a sample of vessel forms and modes of decoration (Figure 9.6) at Khok Phanom Di are provided. The data in Appendix C and the CA for Khok Phanom Di were adapted from reported information (Vincent 2004; Higham and Bannanurag 1990).

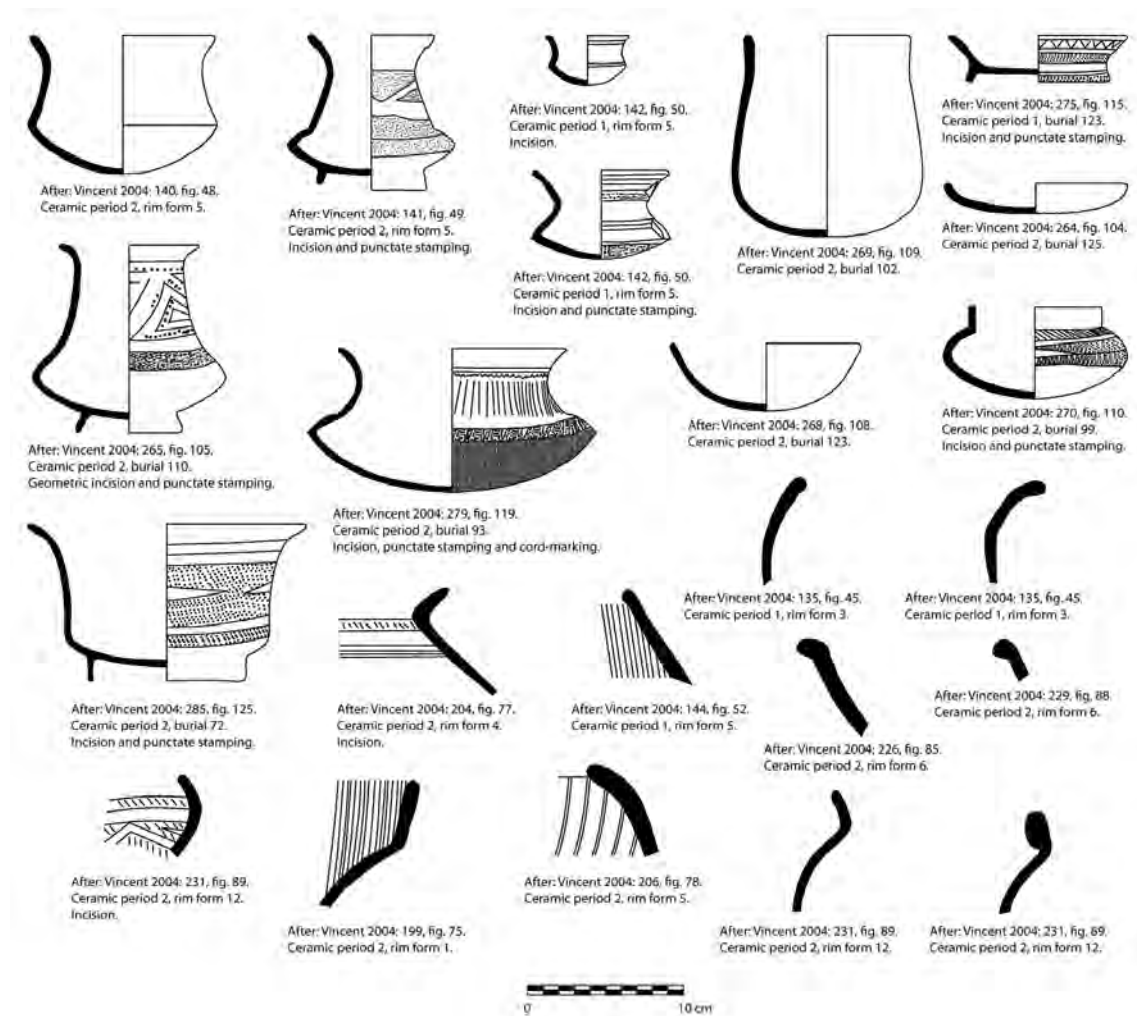


Figure 9.6. Khok Phanom Di vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: Vincent 2004, as credited).



Table 9.7. The material culture contents of the burials at Khok Phanom Di. MP = mortuary phase.

MP1	MP2	MP3	MP4	MP5	MP6	MP6-7
red ochre	animal bone	bored shell object	bone fishhook	bivalve container	bone object	burnishing stone
shell disc bead	bone cylinder-shaped bead	burnishing stone	burnishing stone	burnishing stone	burnishing stone	ceramic vessel
shell funnel bead	bone fishhook	ceramic vessel	ceramic vessel	ceramic vessel	ceramic vessel	clay anvil
Tapa fabric	bored canine tooth	fish skeleton	clay anvil	clay anvil	clay anvil	red ochre
	burnishing stone	fish vertebra disc/bangle	clay counter	clay cylinder	fish vertebra disc/bangle	shell disc bead
	ceramic vessel	Nautilus shell	red ochre	clay pellet	red ochre	shell disc/bangle
	clay cylinder	perforated fish vertebra	shell disc bead	horned shell disc	shell bead disc/bangle	shell H-shaped bead
	clay net weight	polished stone chisel	shell L-shape bead	pierced mammal canines	shell disc	stone adze
	clay pellet	red ochre	Tapa fabric	red ochre	shell disc bead	stone disc/bangle
	cowrie shell	shaped animal tusk	turtle bone object	shell barrel beads	shell H-shaped bead	worked shell
	fish vertebra disc/bangle	shark dorsal spine pendant	turtle bone pendant	shell cylindrical beads	shell small cylindrical bead	
	pierced snail shell	shell barrel bead	turtle carapace ornament	shell disc	Tapa fabric	
	pig scapula	shell disc bead	worked gastropod shell	shell disc beads	turtle carapace ornament	
	red ochre	Tapa fabric		shell disc/bangle	turtle plastron ornament	
	rhinoceros tooth	turtle bone ornament		shell headdress		
	shell disc beads			shell L-shape bead		
	shell funnel beads			turtle carapace ornament		
	shell implement					
	Shell-perforated disc					
	stone adze					
	Tapa fabric					
	wooden bier					
	worked fish vertebrae					
	worked shell					

Source: Data from Higham and Bannanurag 1990: 143–363.

Table 9.8. The material culture contents of the occupation layers at Khok Phanom Di.

Layer 11	Layer 10	Layer 9	Layer 8	Layer 7	Layer 6	Layer 5	Layer 4	Layer 3	Layer 2
bone bobbin	bone awl	bone fishhook	bone fishhook	bone bobbin	bone disc/bangle	bone awl	bone awl	bone awl	bone awl
bone fishhook	bone bobbin	burnishing stone	burnishing stone	ceramic vessel	burnishing stone	bone bobbin	bone bobbin	bone bobbin	bone disc/bangle
burnishing stone	bone fishhook	ceramic vessel	ceramic vessel	clay anvil	ceramic vessel	burnishing stone	bone disc/bangle	bone disc/bangle	bone micro-awl
ceramic vessel	bone harpoon	clay anvil	clay anvil	clay ladle	clay anvil	ceramic vessel	bone micro-awl	bone micro-awl	burnishing stone
clay anvil	burnishing stone	clay net weight	clay pellet	clay net weight	clay pellet	clay anvil	ceramic vessel	burnishing stone	ceramic vessel
clay pellet	ceramic vessel	clay pellet	net weight	fishhook	ivory disc/bangle	clay pellet	clay anvil	ceramic vessel	clay anvil
stone adze	clay anvil	shell disc/bangle	shell disc/bangle	ivory disc/bangle	shark tooth pendant	shell disc/bangle	clay pellet	clay anvil	clay ladle
whetstone	clay net weight	shell knife, point	shell knife	shell knife	shell disc/bangle	stone 'hoe'	shell disc/bangle	clay pellet	clay net weight
	clay pellet	stone adze	stone 'hoe'	stone adze	stone adze	stone adze	stone 'hoe'	ivory disc/bangle	clay pellet
	crocodile tooth pendant	stone disc/bangle	stone disc/bangle	stone disc/bangle	stone disc/bangle	stone disc/bangle	stone adze	shark tooth pendant	clay pellet
	shell knife	whetstone	turtle shell disc/bangle	turtle shell disc/bangle			stone disc/bangle	stone 'hoe'	ivory disc/bangle
	stone 'hoe'		whetstone				worked antler	stone adze	shark tooth pendant
	stone adze							stone disc/bangle	stone adze
	stone disc/bangle							worked antler	stone disc/bangle
	whetstone								turtle shell disc/bangle
	worked shell								whetstone
									worked antler

Source: Data from Higham and Bannanurag 1990: 31–48.

### *Nong Nor*

Neighbouring Khok Phanom Di, Nong Nor, located in Tambon Rai Lak Thong, Amphoe Phanat Nikhom, Changwat Chonburi, was excavated under the direction of Charles Higham and Rachanie Thosarat from 1991 to 1993. The three distinct layers in the site consisted of an upper rice field layer, a second layer of compact midden that was 20cm thick, and a basal third layer of natural substrate (Higham and Thosarat 1998c: 12-13). The radiocarbon dates for Nong Nor commenced from approximately 2500-2100 cal. BC, but most of the burials dated to around 1200-1100 cal. BC (Higham and Hogg 1998).

Nong Nor had two occupation phases, of which the first dated to about the mid-third millennium BC, according to the radiocarbon dates obtained at the time. The first phase was associated with concentrations of shellfish, lenses of ash and burnt material, and pottery scatter deposits. No evidence for rice was observed. The material culture included bone fishhooks, awls, weaving shuttles, and evidence of local pottery manufacture with anvils and burnishing stones. This phase exhibited cultural connections with Khok Phanom Di, *c.* 2500-1500 BC, particularly in the pottery, stone adze and bone fishhook assemblages (Higham and Thosarat 1998e; see also O'Reilly 1998c).

The most common ceramic rim forms were everted with a flattened or rounded lip, everted with a tapered lip, but the most frequent were everted with an inward-folding lip (O'Reilly 1998b: 100-103). The reconstructed ceramic vessels of phase 1 included: simple unrestricted bowls with horizontal incisions over the whole vessel and two zigzag incisions without fill over top; carinated vessels that were incised and impressed with dentate stamping; vessels with a pronounced shoulder and combed incised designs that are similar to the An Sơn decorated form A2a; and simple unrestricted vessels with a flat base and horizontal incision and stamping. The decorations on the ceramics included: one or more incised lines; combed concentric rings; punctate and dentate stamping; painted and slipped designs, stamped with rollers; matte finish; paddle impression; and various incised, cross-hatched and zigzag motifs. Curvilinear incised decoration was most common, while an undulating incised line between two parallel lines and three or more horizontal parallel lines with juxtaposed vertical lines also appeared frequently. Other incised and impressed decorative variations appeared less frequently (see examples in Figure 9.7). Other clay artefacts included wasters and a clay pellet (O'Reilly 1998b: 104-113).

The lithic artefacts included grindstones, whetstones, hammerstones, pounders, stone flakes and burnishing stones, but only four adzes were recovered. The adzes were small, 5-6 cm long, with an elliptical cross-section and unshouldered with a flattened poll (O'Reilly 1998d). The faunal remains included large deer, bovid, turtle/tortoise, cetacean and crocodile. Nong Nor phase 1 exhibited no evidence of domesticated plants or animals, and the earliest occupation contained no dog remains. Large mammal bones were exploited for artefact manufacture. Worked bone was generally rare in phase 1, and it is likely that mammals were an addition to the shellfish and fish diet for the Nong Nor inhabitants from time to time. There was a lack of butchery evidence at the site and the bones for artefacts were most likely brought from the kill site where the animals were originally butchered. All of the bone fishhooks had a U-shaped shank, while awls and a shuttle/bobbin made from bone were also recovered (Higham *et al.* 1998).

It has been hypothesised that the Nong Nor shell midden reflects a single occupation, probably during a dry season. There is evidence for pottery production in the site, which ethnographically, is a dry season occupation in Southeast Asia from October to May. In rare cases, pottery production occurs year-round in tropical rainy environments (O'Reilly 1998a: 141-143; see also Rice 1987:

156). The stone and bone resources were valued, as the adzes were well-worn and the mangrove environment of Nong Nor would not have been a preferred environment for large terrestrial mammals (O'Reilly 1998a: 141-142).

There were parallels between Nong Nor phase 1 and Khok Phanom Di layers 11 and 10, *c.* 2130-1700 BC, prior to the change in Khok Phanom Di material culture in layers 10 and 9 (*c.f.* Table 9.8, Table 9.9). Comparisons between the ceramic motifs at Khok Phanom Di and Nong Nor were difficult to ascertain since complete motifs are known only from Khok Phanom Di (Hall 1993), whereas only partial motifs were identified at Nong Nor (O'Reilly 1998c). The ceramic designs that were paralleled included, plain burnished zigzag bands within a panel of stamped impression, curvilinear incision with stamped impression, cross-hatching between incised lines, a single-incised line with stamped impression, and combed rings and stamping. There were very few pigmented sherds at Khok Phanom Di, while no highly burnished sherds were identified at Nong Nor. The adzes were classified as Duff type 2G, with a lenticular cross-section, at Nong Nor and in layers 10 and 11 at Khok Phanom Di. The fishhooks at both sites were identical, and after 2000 BC, in layers 11 and 10 at Khok Phanom Di, they appeared less frequently (O'Reilly 1998c). It is thought that Khok Phanom Di may have evolved from the tradition represented at Nong Nor, particularly in terms of the ceramics (O'Reilly 1998c: 172).

Phase 2 at Nong Nor represents a bronze age cemetery. The pottery vessels from mortuary contexts at phase 2 are illustrated in Figure 9.8. Many personal ornaments, made from glass, shell, bone, stone and bronze, were also recovered from this phase (Chang 1998; Debreceeny 1998).

The sites of Nong Nor and Khok Phanom Di have been considered in light of a potential transition from hunter-gatherer to agricultural communities in central Thailand, given that there was no evidence for rice cultivation in Nong Nor phase 1, but it was present at a slightly later date at Khok Phanom Di. In spite of the commonalities in material culture between the earliest occupations at both sites, domesticated plants and animals may have appeared in a later, separate transmission. In comparison to rice cultivation, material culture (items or ideas) appear to have been part of an earlier exchange between sites of the third millennium BC in coastal Thailand. This situation highlights a potentially slow, staggered and multi-layered trajectory for the introduction of 'neolithic' attributes, particularly the incised and impressed ceramics, ground and polished stone adzes, domestic dogs and pigs, and cultivated rice (O'Reilly 1998e).

Earlier arguments for continuity from the terminal palaeolithic Hoabinhian to neolithic occupation in Southeast Asia (*e.g.* Gorman 1977; Meacham 1977; Solheim 1972) have been supplanted by archaeological and linguistic claims that immigrant populations played a role in the development of the neolithic (*e.g.* Blust 1996; Higham 1996a; Bellwood 1994). Higham and Thosarat (1998a) believe there is limited evidence to support a continuous transition since the information to support this hypothesis has often been scant and from dubious contexts. Now, archaeological evidence supports immigration with a potential origin in the Yangtze River region (Bellwood 2011; Castillo 2011; Lu 2011; Nakamura 2010; Zhang and Hung 2010; Rispoli 2007; Higham 2002a). This does not rule out any role for indigenous groups, and interaction between immigrants and indigenous people would have been important in generating the subsequent regional diversification of material culture, as observed at Khok Phanom Di and Nong Nor.

A summary of the material culture identified in phase 1 occupational contexts (Table 9.9), and a sample of vessel forms and modes of decoration for both phases 1 and 2 (Figure 9.7, Figure 9.8) at Nong Nor are provided. The data in Appendix C and the CA for Nong Nor were adapted from reported information (Higham and Thosarat 1998e; O'Reilly 1998b: 104-113). Only phase 1 at Nong Nor was utilised in the CA and presented in Appendix C.

Table 9.9. The material culture contents of occupation phase 1 at Nong Nor.

Occupation phase 1
bone awl
bone fishhook
bone weaving shuttles
burnishing stone
ceramic vessel
clay anvil
clay pellet
clay waster
hammerstone
sandstone
stone adze (few, small, most unshouldered)
stone flake
stone pounder
whetstone

Source: Data from Higham and Thosarat 1998e; O'Reilly 1998b: 104–113.



Figure 9.7. Nong Nor phase 1 ceramic vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: O'Reilly 1998b; 1998c, as credited).



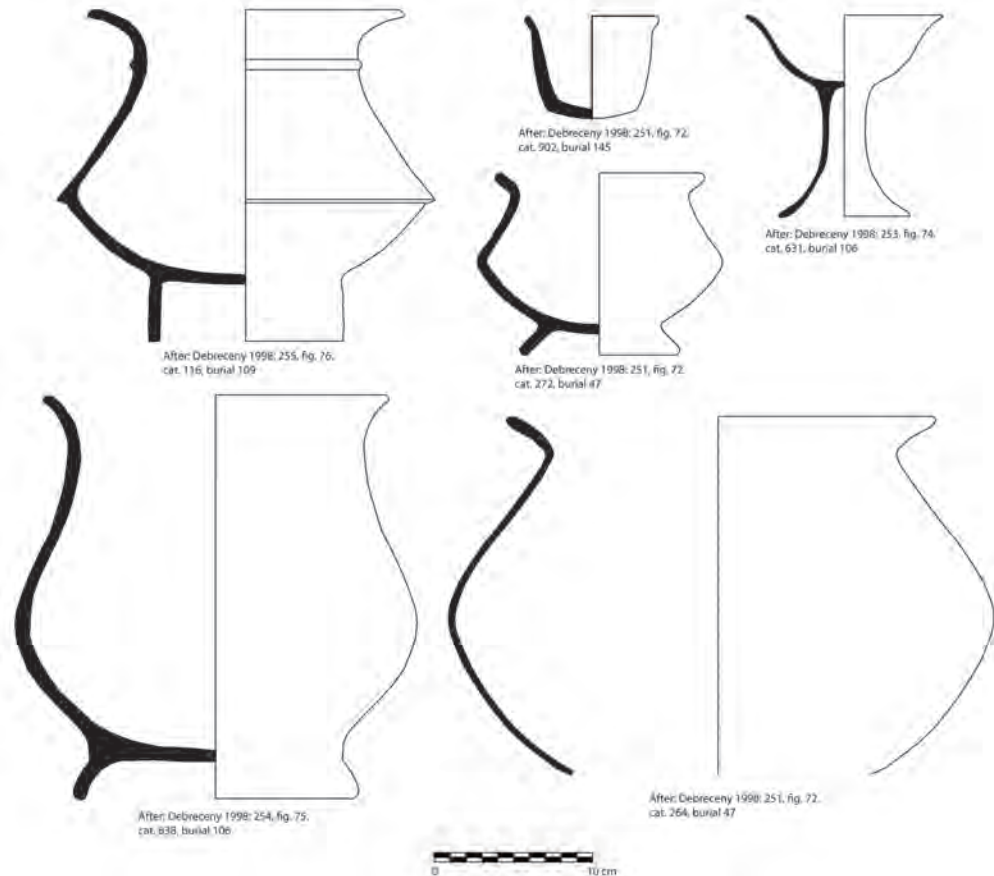


Figure 9.8. Nong Nor phase 2 ceramic vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: Debreceny 1998, as credited).

## Cambodia

### *Laang Spean*

The large cave of Laang Spean is situated on the top of a limestone hill, Phnom Teak Trang, at 150 m altitude in a landscape of hills and caves in Battambang Province, Cambodia. The cave was inhabited periodically throughout antiquity, and has presumably undergone a great deal of disturbance, leading to uncertainty over the dating and stratigraphic relationship of the layers (Hubert Forestier, pers. comm.). One of the original dates, probably for the earliest occupation, is  $6240 \pm 70$  BP (Gorman 1971). Cécile Mourer and Roland Mourer (1970) suggested there were five cultural levels in the site, from 6800 BC to AD 750–830.

Mourer and Mourer undertook excavations in the 1960s, while more recent excavations have been run by Hubert Forestier and Heng Sophady. The earliest cultural level had no pottery and minimal chert flakes. Cord-marked or paddle-marked ceramics appeared in cultural level II, particularly in the middle and upper part of the layer (dated to *c.* 4290 BC) in association with core stone tools like short axes, side-scrapers, scrapers, disc-shaped items, and flakes. Some of these Hoabinhian-type tools had been retouched. Incised and impressed decoration like that found elsewhere in neolithic mainland Southeast Asia appeared in cultural layer III, *c.* 2050 BC (Mourer and Mourer 1970).

In addition to stone tools and pottery, burnt bones, shells and lateritic concretions were recovered at the site, although no bone industry was identified. The stone tool assemblage included scrapers and flake tools, but there was a notable absence of polished and ground stone tools or their debitage. Very little is known about the vessel forms of the ceramics since only small sherds were recovered, and many of these sherds were cord-marked. Both mineral sand and organic tempers are thought to be present, and decoration included impression, incised bands in association with other motifs or short parallel incisions within the band, comb-like 'stippling' and punctate stamping, and appliqué (Mourer and Mourer 1970). The 'stippling' decoration was also noted by Edmond Saurin and Madeliene Colani (in Mourer and Mourer 1970) at neolithic sites in Quảng Bình Province in northern Vietnam, and may be similar to the An Sơn examples.

Many of the animal bones were burnt, and others were gnawed. The majority of the faunal remains were from small bovids and freshwater turtle, but also included rhinoceros, chevrotain, deer, small carnivores, porcupine, primates, and reptiles. The molluscs included local gastropods in addition to large aquatic gastropods and bivalves that were imported for subsistence and ornament manufacture (Mourer and Mourer 1970).

A summary of the material culture identified in potentially neolithic occupational contexts, (Table 9.10), and a sample of vessel forms and modes of decoration (Figure 9.9) at Laang Spean are provided. The data in Appendix C and the CA for Laang Spean were adapted from reported information (Mourer and Mourer 1970).

Table 9.10. The material culture contents of the possible neolithic occupation layers at Laang Spean.

Occupation
ceramic vessel
flake tool
no bone industry
no polished stone industry
pebble tool

Source: Data from Mourer and Mourer 1970.

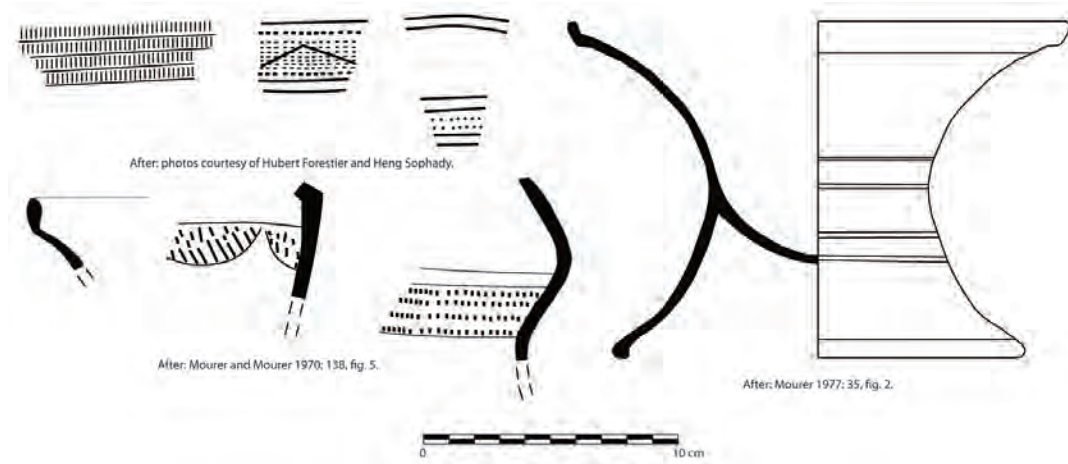


Figure 9.9. Laang Spean vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: photos courtesy of H. Forestier and S. Heng; Forestier and Heng 2010; Mourer 1977; Mourer and Mourer 1970, as credited).

### *Samrong Sen*

Samrong Sen is a well-known shell midden site located on alluvial terrain in Kampong Chhnang Province on the Tonlé Sap floodplain of central Cambodia. Its importance has been noted since the late nineteenth century, but the site was not excavated until 1902 and 1923 (Mansuy 1923, 1902). The stratigraphy is reported to have an upper historic layer, a second dense shell midden layer, a third cultural layer with shells, animal bones, hearths, and prehistoric artefacts, and a base layer of clayey loam. Mansuy claimed the site was late neolithic, in spite of the bronze evidence, and the only radiocarbon date, obtained from shells, was  $3230 \pm 120$  BP (Carbonnel and Delebrias 1968). The metallurgical evidence perhaps represents the introduction of such technology to the site later than the dated shells (Mourer 1977: 46–47).

The stone artefacts of Samrong Sen were predominantly adzes and chisels, including both trapezoidal-sectioned unshouldered adzes, some of which were a curved gouging type, and sharply shouldered adzes. Some symmetrical-sectioned axes were present. While a polished stone industry was present, there was a lack of evidence of polishers, waste flakes and cores, suggesting the tools were brought to the site. The bone industry included arrow points, spear points, fishhooks, smoothing tools for pottery production, and personal ornaments. Complete pottery vessels were few at Samrong Sen but the assemblage included unrestricted vessels with pedestals, inverted rimmed independent restricted vessels with a shoulder carination and either a flat or a rounded base, and oval-shaped restricted vessels. Since bronze items, albeit minimal, were identified at Samrong Sen, some of these ceramic vessel forms are likely to represent occupation later than the neolithic period. The decoration included geometric with incision, either in curves or triangles, found in association with cordmarking, wavy lines, and punctate stamping. Like Laang Spean, there was a lack of painting and a preference for incised and impressed decoration (Mourer 1977: 42–45).

The Samrong Sen faunal remains included cervids, bovids, rhinoceros and elephant, and riverine resources such as *Corbicula* or *Paludina* shells, tortoise, crocodiles and otter. Pig and dog bones were also recovered, and these animals which may have been domesticated. The faunal descriptions from Mansuy's excavations are incomplete, lacking bone morphology and measurements to support the claim of mammalian domestication, and the absence of reported fish remains indicates that no sieving took place on site (Mourer 1977: 46).

More recent research took place at Samrong Sen in 1999 and 2001 (Vanna 2002). The 1999 excavations revealed sixteen ceramic rim types, as classified by Ly Vanna (2002: 287–288, figures 6 and 7) (Figure 9.10). Rim forms B, D, E, F, G, I, K, L, M, N and O were present in the lowest layer, and most likely represented the neolithic assemblage (Vanna 2002: 289, figure 8). Many of these rim forms were everted rims from independent restricted vessels, others were from inverted simple restricted vessels. Some rim form D vessels were decorated with punctate dots separated by geometric incisions. Incised decoration was identified on form E vessels with an applied ridge, in addition to wavy incisions, appliqué and punctate dots at the lip in some cases. Rim form G was regularly identified with punctate dot and circular stamping and incisions. Rim form K was decorated with simple incisions (Vanna 2002: 81–86). Please note that Vanna's rim form categorisation does not correspond to the An Sơn rim forms of Figure 5.1.

The 2001 excavation revealed twenty-eight rim forms. Bronze was not found in layers 3 and 4. Rim forms 1, 2, 3, 4, 5, 6, 7, 8, 9 and 11 were associated with layers without evidence of bronze. The forms included inverted simple restricted vessels (one of which had triangular handles at the shoulder), everted rim independent restricted vessels, and everted rims with protruding lateral lips (Figure 9.10). Rim form 2 was sometimes associated with parallel and wavy incisions and herringbone designs, and rim form 11 was decorated with parallel cord lines on the body of the vessels (Vanna 2002: 140–152, 298–306, figures 17, 18, 19, 20, 21, 22, 23, 24, 25). While various decorative modes have been reported for the ceramics from Samrong Sen, no particular sequence was identified. The decorations included cord impression, finger imprint and fingernail impression, paddle striation, punctate and dot stamping, and a variety of incised designs such as wavy, dotted, lattice, parallel straight, herringbone and curvilinear, fluting (narrow grooves cut out of surface), appliqué, comb marks, roller stamping, and slipping. Incised and impressed decoration was most common. Other clay items included net sinkers, balls, a slotted earring, bangles and pottery-making anvils (Vanna 2002: 153–158).

The Samrong Sen adzes were polished and divided into five different types by Vanna (2002: 88–89, 290–291, figures 9 and 10). Types 1 and 2 were both unshouldered and rectangular-sectioned, but type 2 was retouched at the edges so the cross-section was more rounded. The type 3 adzes were smaller, unshouldered, and rectangular or ovoid in cross-section. Type 4 appears to have been worked to create a shoulder, while type 5 adzes were very small and highly polished. One flake tool and sandstone whetstones were also recovered (Vanna 2002: 90–91). An animal bone and antler industry was also present for fishing and hunting activities, and preparing fabric or skin with 'bobbins', or awls (Vanna 2002: 91–92; Higham and Thosarat 1994). Clay, stone and bronze bangles were recovered, faunal remains, shellfish and rice remains as husk and carbonised grain in pottery tempers were also identified (Vanna 2002: 92–94). The relationship between the appearance of bronze and the early occupation at Samrong Sen remains unanswered (Vanna 2002: 121), so it is possible that the site contains mixed neolithic and metal age assemblages.

A summary of the material culture identified in potentially neolithic occupational contexts (Table 9.11), and a sample of vessel forms and modes of decoration (Figure 9.10) at Samrong Sen are provided. The data in Appendix C and the CA for Samrong Sen were adapted from reported information (Heng 2007; Vanna 2002; Mourer 1977).

Table 9.11. The material culture contents of the possible neolithic occupation layers at Samrong Sen.

Occupation
bone arrow point
bone fishhook
bone ornament
bone smoothing tool
bone spear point
ceramic vessel
clay anvil
clay bangle
clay net sinker
stone adze (most unshouldered)
stone bangle
stone chisel

Source: Data from Heng 2007; Vanna 2002; Mourer 1977.

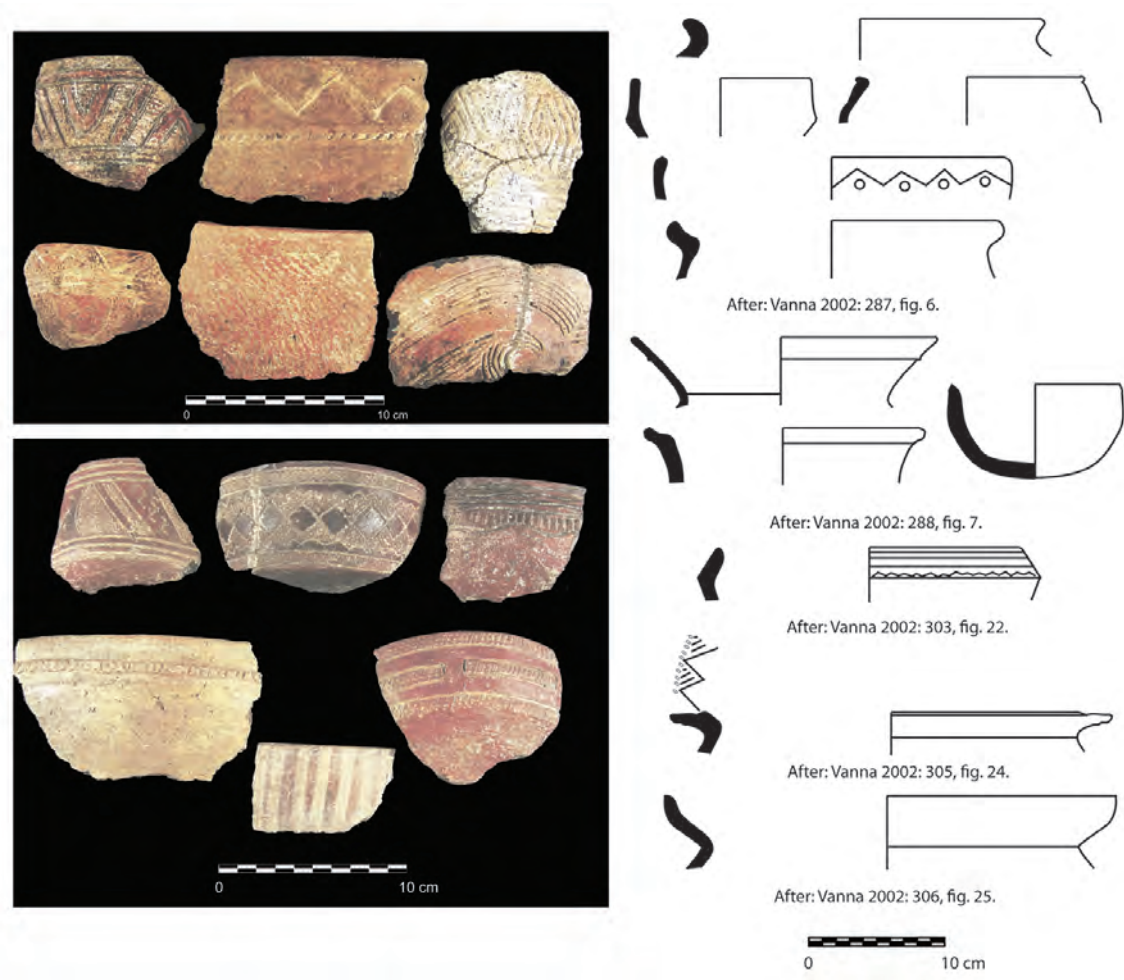


Figure 9.10. Samrong Sen ceramic vessel forms and modes of decoration.

Source: Photos, P. Bellwood; Illustrations, C. Sarjeant (After: Vanna 2002, as credited).



### *Krek and Memot circular earthwork sites*

The numerous circular earthwork sites within eastern Cambodia and southwestern Vietnam contain similar material cultures (Dega 2002: 1). While the site of Krek 52/62 is the focus of the comparative study, other Memot sites such as Chi Peang and Phum Trameng, are included for additional information. The contentious dating for the region, and the absences of shell, bone and metal and presence of glass have resulted in varying chronologies for the Memot earthwork sites, ranging from neolithic to metal age, and even to historic contexts (see Chapter 2).

The material culture from these sites included a varied lithic toolkit: basalt and sandstone cores, whetstones, rectangular-sectioned and shouldered adzes, chisels, scrapers, and flakes and debitage. This is indicative of local stone tool manufacture. The ceramic assemblage consisted of low-fired earthenwares with variable surface decorations and vessel forms. This included plain, red-slipped, cord-marked, stamped, punctate, dentate and incised decorations, and the use of more than one technique on a vessel was not uncommon. The tempering agents were identified as quartz and sand or rice and rice chaff. The vessel forms included small, thin bowls and large, thick-walled and shallow vessels (Dega 1999). The Memot sites are located on highly acidic soil that may have inhibited the survival of faunal, botanical and human remains, and evidence of metallurgy. However, any stone or ceramic items indicative of metalworking (such as moulds and crucibles) would have survived if they were present (Dega 1999).

A summary of the material culture identified in potentially neolithic occupational contexts (Table 9.12), and a sample of vessel forms and modes of decoration (Figure 9.11) at Krek are provided. The data in Appendix C and the CA for Krek were adapted from reported information (Dega 2002; Albrecht *et al.* 2000).

Table 9.12. The material culture contents of the possible neolithic occupation layers at Krek.

Occupation
ceramic vessel
clay anvil
clay spindle whorl
sandstone
stone adze
stone bangle
stone chisel
stone core
stone flake
whetstone

Source: Data from Dega 2002; Albrecht *et al.* 2000.

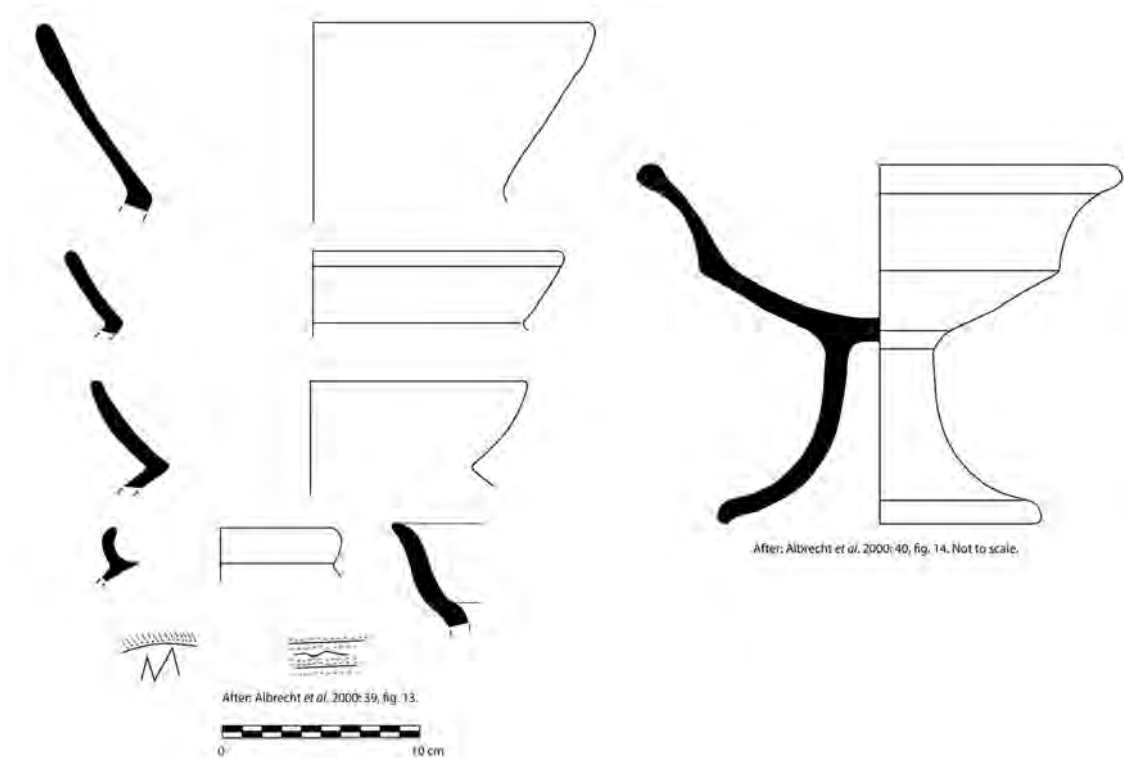


Figure 9.11. Krek ceramic vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: Albrecht *et al.* 2000, as credited).

## Central Vietnam

### *Bàu Tró*

Located near Đồng Hới in Quảng Bình Province of central Vietnam, Bàu Tró is associated with stone adzes, hammerstones, flakes, quartz, whetstones, polishing stones and ochre. The ceramic fabrics were coarse with angular rock fragments, and incised and painted decoration was observed on the pottery. The stone adzes were small, either polished, trapezoidal-sectioned unshouldered or rectangular-sectioned shouldered (sometimes with heavily retouched and rounded edges). The ceramics were commonly incised in vertical and horizontal combinations, criss-cross patterns or in triangular motifs, and coarse cordmarking was present. The vessel forms included everted rimmed, independent restricted vessels with an oval body shape and cordmarking, and plain simple unrestricted vessels. The inhabitants of Bàu Tró exploited both marine and inland resources for subsistence: deer, *Sus scrofa*, small carnivores, freshwater fish, dugong, marine snails, marine bivalves, shark, stingray, parrot fish, sea bass, and coastal dwelling fish species (Gorman 1971; Patte 1924). The sequence of Bàu Tró is roughly consistent with neolithic occupation, as indicated by the material culture evidence and approximate dates of 4000–3500 BP (Phạm 1997).

A number of sites have been associated with the Bàu Tró culture, named after the aforementioned site, that have late neolithic to early metal age sequences in the Nghệ An, Hà Tĩnh and Quảng Bình provinces. Bàu Tró itself was a shell midden site, but other Bàu Tró assemblages occurred in sand dunes, mound sites or cave sites. Animal bone and shell artefacts were recovered from Bàu Tró culture sites, and included chisels, points, scrapers, and pierced shell beads. The major vessel

forms included pointed bottomed pots, round bottomed pots with cordmarking, and round bottomed pots or pedestals with incision, cordmarking and red paint. Most of the ceramics were tempered with sand or lime particles (Phạm 1997).

A summary of the material culture identified in neolithic occupational contexts (Table 9.13), and a sample of vessel forms and modes of decoration (Figure 9.12) at Bàu Tró and related sites are provided below. The data in Appendix C and the CA for Bàu Tró were adapted from reported information (Phạm 1997; Patte 1924).

Table 9.13. The material culture contents of the neolithic occupation layers at Bàu Tró.

Occupation
ceramic vessel
hammerstone
red ochre
sandstone
stone adze (small)
stone blade
stone flake
whetstone

Source: Data from Phạm 1997; Patte 1924.

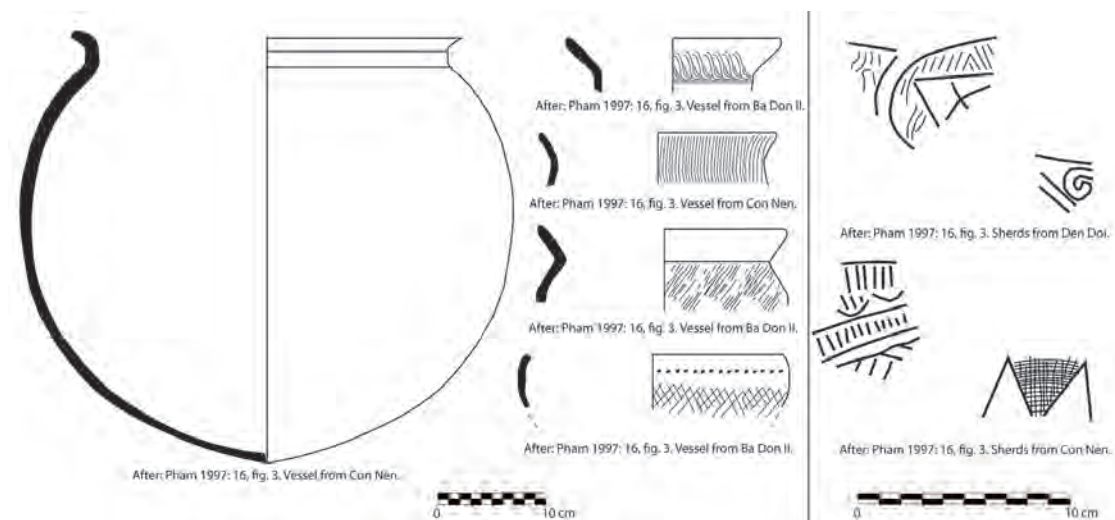


Figure 9.12. Bàu Tró culture ceramic vessel forms and modes of decoration.

Source: Illustrations, C. Sarjeant (After: Phạm 1997, as credited).

## Northern Vietnam

### *Mán Bạc*

Mán Bạc is located within the Tam Điệp limestone outcrop in Ninh Bình Province in northern Vietnam. The 2004–2005 excavations revealed three cultural layers, the upper with faunal remains, charcoal, and ceramic and stone artefacts, the middle with shell midden remains and ceramic and stone artefacts; the lower contained only human burials (Nguyễn 2006). The radiocarbon dates of 2000 to 1500 cal. BC suggest the site was early neolithic, although there have been suggestions of contemporaneity with the Phùng Nguyên period, which dates from *c.* 1800 to 1400 BC

(Oxenham *et al.* 2008; Nguyễn *et al.* 2004). Phytolith analysis by Tetsuro Udatsu indicated there were high densities of rice husk in the middle and upper cultural layers, suggesting that cultivation probably took place nearby.

The 35 burials contained pottery vessels, stone adzes/axes, a stone chisel, whetstones, nephrite beads, T-sectioned bangles, shells, shell beads, and animal bone tools as mortuary offerings. In the occupation layers above the burials, the stone artefacts included adzes and axes, chisels, blades, whetstones, net sinkers, hammerstones, nephrite beads and rings/bangles, red ochre, and flakes. Most of the adzes were unshouldered, although a few small shouldered adzes were recovered (Nguyễn 2006).

Complete pottery vessels were found mainly with the burials, including simple unrestricted and restricted vessels, everted rimmed independent restricted vessels that were plain, cord-marked or carved paddle impressed on the body, concave everted rimmed independent restricted vessels, rare oval-shaped vessels with everted rims and pedestals, and rectangular-bodied restricted vessels with everted rims, pedestals and incised and impressed decorations. Most of the rim forms were everted, and the globular vessels with a flat or rounded lip have been identified as cooking pots. These cooking pots were not decorated with incised designs, but were cord-marked or impressed with geometric or cross-ribbed patterns, presumably applied with a carved paddle. Other vessels were incised with an S-shape motif, like the Phùng Nguyễn ceramics, although these were rare in the Mán Bạc assemblage (Figure 9.13). The vessels were predominantly tempered with laterite particles and pulverised mollusc shells. Other ceramic artefacts included pediform items that may have served as vessel supports, anvils (see Figure 9.13), and clay pellets. The bone items included points, harpoons, earrings and fish-vertebrae beads, and the shell artefacts included beads with evidence of perforation (Nguyễn 2006).

Many vessels at Mán Bạc had incision, impressed zigzag lines or punctate dots at the rim. Another decoration, impressed or punctate hollow circles, at the site was observed at Phùng Nguyễn sites like Xóm Rền (Hán 2009) and more frequently in northern Philippines sites (Bellwood and Dizon 2005). Incised curvilinear motifs filled with roulette stamping, linear dentate or comb stamping, or small incised lines were a rare but important addition to the assemblage, linking Mán Bạc to Phùng Nguyễn culture sites. These incised and impressed wares were commonly everted rimmed simple unrestricted dishes on pedestals, or everted rimmed independent unrestricted vases with low foot rims. One dish was decorated with continuous semi-circular incisions around the base, which were infilled with incisions. This was similar to the An Sơn vessel with similar infill incisions and triangular incisions on the foot. The ceramic anvils that were probably for making pottery were also decorated with rolled cord/knotted impressions (Figure 9.13).

A summary of the material culture identified in neolithic occupational and burial contexts (Table 9.14), and a sample of vessel forms and modes of decoration (Figure 9.13) at Mán Bạc are provided below. The data in Appendix C and the CA for Mán Bạc were adapted from reported information (Nguyễn 2006), and from personal observations at the Institute of Archaeology, Hanoi in 2009.

Table 9.14. The material culture contents of the neolithic occupation layers and burials at Mán Bạc.

Occupation	Burial
bone earring	animal bone tool
bone harpoon	ceramic vessel
bone point	nephrite bangle
ceramic pediforms	nephrite bead
ceramic vessel	shell disc bead
clay anvil	whetstone
clay pellet	
fish vertebrae bead	
nephrite bangle	
nephrite bead	
ceramic vessel	
red ochre	
shell disc bead	
stone adze (most unshouldered)	
stone axe	
stone bangle	
stone chisel	
whetstone	

Source: Data from Nguyễn 2006.



Figure 9.13. Mán Bạc vessel forms and modes of decoration, 2003, 2004, 2005, 2007 and 2008 excavations.

Source: Photos, K.D. Nguyễn and C. Sarjeant, as credited. Illustrations, C. Sarjeant (After: Images courtesy of K.D. Nguyễn).



### *Xóm Rền and Phùng Nguyên*

The Phùng Nguyên culture of northern Vietnam shares similarities with some of the ceramics from Mán Bạc. These sites contained stone rectangular-sectioned unshouldered adzes, whetstones, chisels and gouges, drill points, blades, and arrowheads. Some of the stone materials have been linked to the successive bronze technology at Dong Sơn sites. Stone bangles, with varied cross-sections and shapes, and stone beads between 6 and 8 mm in diameter and 4 to 20 mm long were also recovered. The ceramic materials included spindle whorls, which were not observed in neolithic contexts at Mán Bạc, An Sơn or any other neolithic sites in mainland Southeast Asia, unlike clay pellets that were present at all sites. There was evidence of local manufacture of clay pellets at the site of Phùng Nguyên, since many were found in a firing pit. Many of the cooking pot forms at Phùng Nguyên were similar to those at Mán Bạc, and the assemblage also included curvilinear incised motifs and pediform supports, as shown in Figure 9.13 (Nguyễn 1980).

While there is evidence for both indigenous and introduced elements at Mán Bạc, Vietnamese scholars tend to posit continuity between the neolithic groups of northern Vietnam and the Phùng Nguyên and then Dong Sơn cultures. The two layer hypothesis suggests that there was influence and immigration of individuals from the north at the time of introduced rice cultivation at Mán Bạc (Matsumura *et al.* 2008), which would have had the effect of continuing interaction into the later metal age periods in northern Vietnam.

Xóm Rền is used as an example of a Phùng Nguyên site for comparative analysis with An Sơn. Xóm Rền is located on the left bank of the Lô River in Phú Thọ Province, northern Vietnam, and was most recently excavated in 2006. The site contained a wide variety of stone artefacts including nephrite items, and revealed material culture affinities with the nearby Phùng Nguyên site. Xóm Rền revealed evidence of habitation and burial remains (Hán 2009).

A summary of the material culture identified at Xóm Rền (Table 9.15) is provided. The data in Appendix C and the CA is adapted from reported information (Hán 2009).

Table 9.15. The material culture contents of the occupation layers at Xóm Rền.

Occupation
ceramic pediforms
ceramic vessel
clay bangle
clay counter
clay figurine
clay pellet
clay spindle whorl
nephrite bangle
nephrite bead
nephrite yazhang
stone adze
stone arrow point
stone axe
stone bangle
stone flake

Source: Data from Hán 2009.

### Comparison with An Sơn: Correspondence analysis

The identified variables for the CA included the major ceramic vessel forms, modes of decoration and surface treatment, location of decoration on ceramic vessels, ceramic temper when possible, and the presence (or absence) of animal bones, specific stone tools, other stone and bone/ivory tools and ornaments, and ceramic/clay items like roundels and pellets at An Sơn and the other fourteen assessed sites. The presence and absence data for these variables applied in the CA are in Appendix C. A total of 131 cultural variables were included in the CA, of which 73 were ceramic vessel variables and the remaining 58 were other variables. Two CAs are presented here, one that separates the occupational and burial phases for each site when possible (Figure 9.14), and one that combines this data for each site except An Sơn (Figure 9.15). Each CA is separated into two plots, the first plotting the sites and the second the variables. The variables are coded with an abbreviation, and this section should be read in conjunction with these codes in Appendix C. To relate the chronology of the analysed sites to the sequence at An Sơn, the material culture at An Sơn is divided into a burial phase and early, middle and late phases of occupation.

When the sites are separated into occupational and burial phases, the CA plot (Figure 9.14) shows a clustering of sites from the various regions, regardless of the different chronologies. There was a concentration of the sites from northern and central Vietnam, Cambodia, together with An Sơn, Nong Nor, and the occupational phases from the northeast Thailand sites (Ban Non Wat, Ban Lum Khao, Non Nok Tha, and Ban Chiang) and Khok Phanom Di. Mán Bạc (occupation) and Xóm Rền were closely related to each other because of the presence of nephrite artefacts, shell temper in the ceramics, and geometric impression, scroll incision and eye-shaped incision. The majority of the variables were associated with the main cluster of sites, which included Nong Nor, Samrong Sen, Krek, Bàu Tró, Mán Bạc (burial), An Sơn (early occupation), An Sơn (middle occupation), An Sơn (late occupation), Laang Spean, Ban Non Wat (occupation), Non Nok Tha, Ban Chiang, Khok Phanom Di (occupation), An Sơn (burial), Khok Charoen (burial), and Ban Lum Khao (occupation).

There is closer correspondence between the late occupation and burials at An Sơn in terms of material culture, which is concordant with the dates for the burials (see Chapter 4). The majority of the occupation assemblages from Ban Non Wat and Khok Phanom Di may also have predated the burials, as at An Sơn. This may explain why these occupation phases cluster with the An Sơn occupation rather than with the burial phases for these sites. Outliers of the CA plot included Khok Charoen (occupation), because of the presence of clay beads and marble items; Ban Lum Khao (burial), because of an absence of artefact variability; Ban Non Wat neolithic burial phases 1 and 2, because of the presence of a range of shell, ivory and marble ornaments and curvilinear incision and painting on the ceramic vessels; Tha Kae, because of the presence of painted curvilinear designs, and Khok Phanom Di because of the presence of a wide range of shell items. No further commentary for the CA plot of Figure 9.14 is provided as a different CA plot (Figure 9.15) revealed clearer relationships between the sites.

When the occupational and burial phases were combined to increase the number of variables that were present for each site, the CA plot in Figure 9.15 was clearer. The differences were emphasised between sites that previously clustered together, in spite of known marked differences in material culture at the sites. Seven approximate groups can be identified in this second CA plot (Figure 9.15), and the corresponding variables shared by the sites within each group are summarised in Table 9.16. The previously discussed corresponding variables for Figure 9.14 remain relevant to Figure 9.15. Some of the groups corresponded tightly, such as group 4, while others corresponded loosely, such as group 5. Ban Lum Khao and An Sơn (burial) were the main outliers, but the An Sơn (burial) somewhat corresponds to group 1, particularly the late occupation at An Sơn.

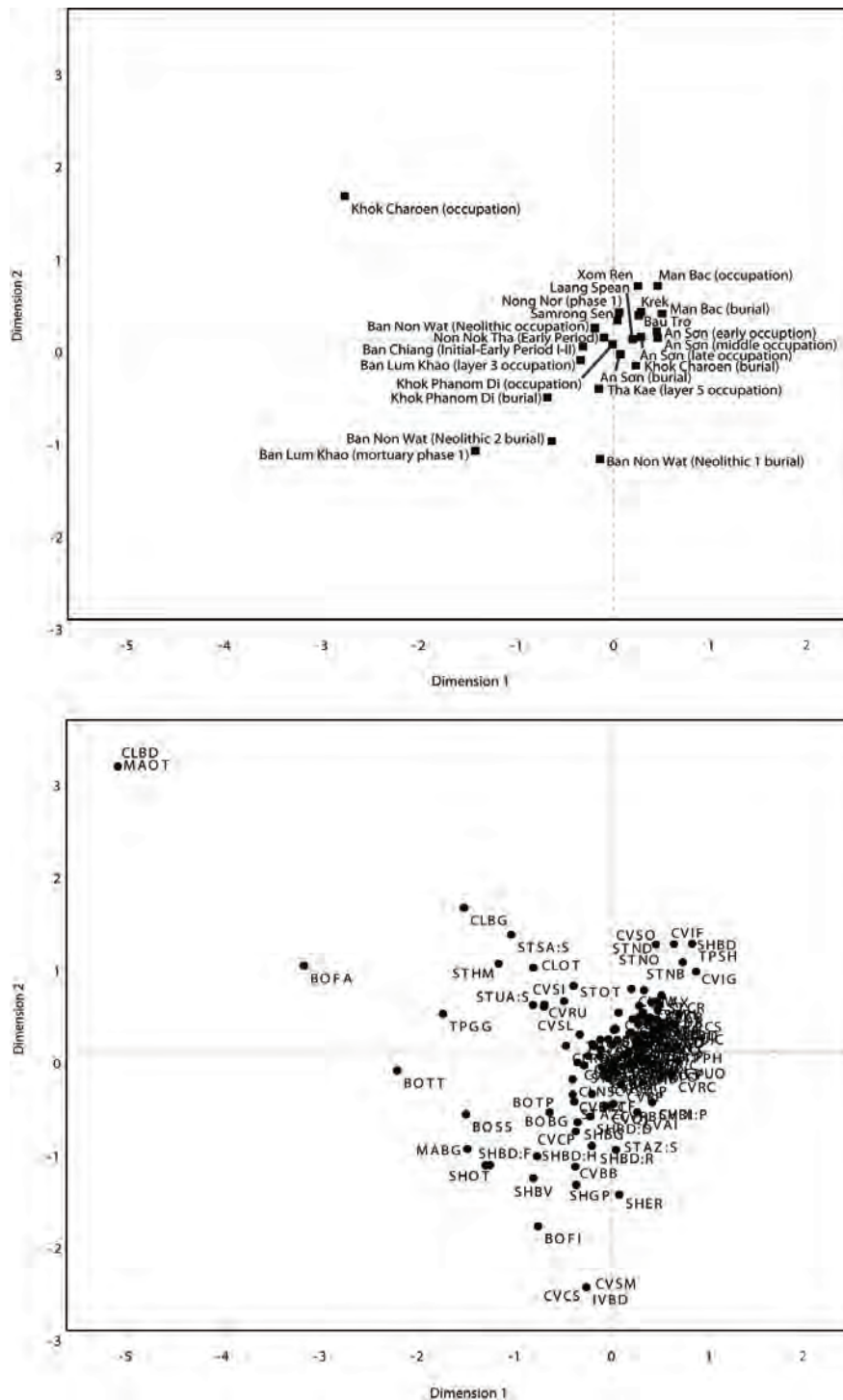


Figure 9.14. CA plots for the Southeast Asian neolithic cultural variables. Occupational and burial data separated. Top: sites, bottom: variables. Refer to Appendix C for variable codes.

Source: C. Sarjeant.

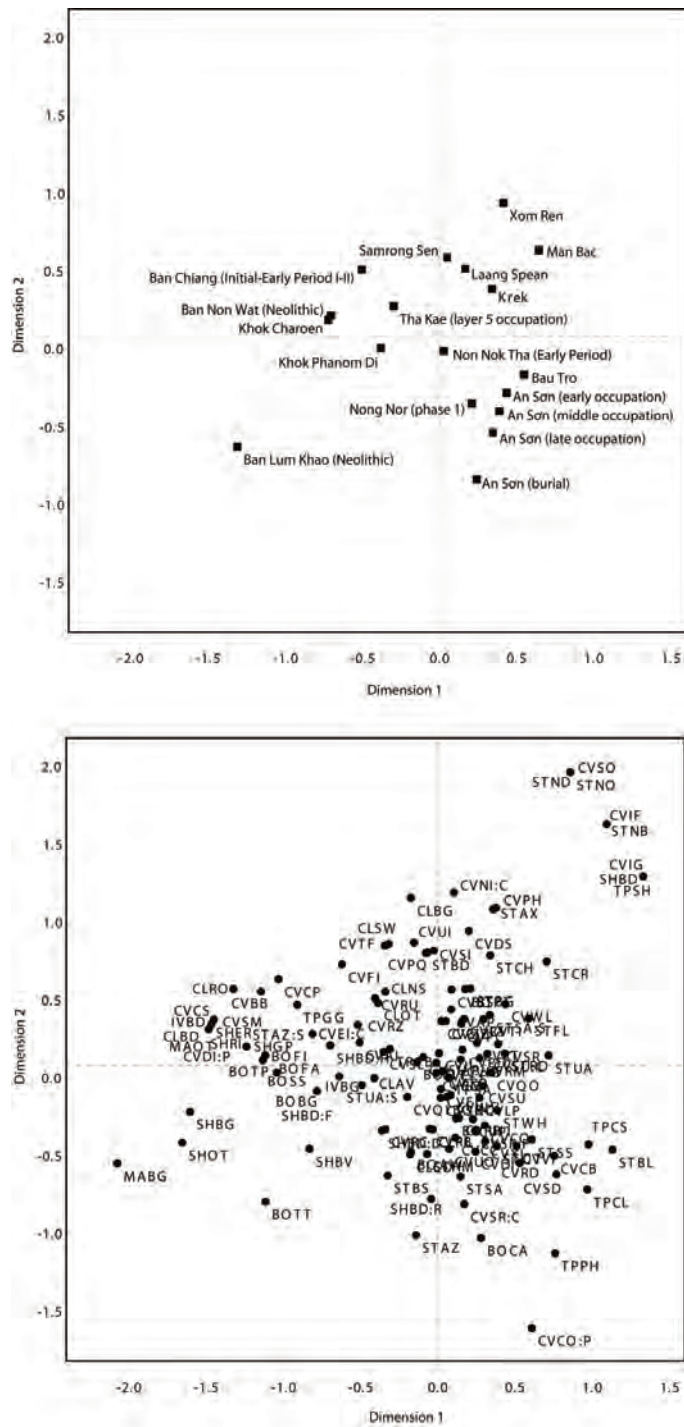


Figure 9.15. CA plots for the Southeast Asian neolithic cultural variables. Occupational and burial data combined, except for An Son. Top: sites, bottom: variables. Refer to Appendix C for variable codes.

Source: C. Sarjeant.

Table 9.16. Groups in Figure 9.14 and Figure 9.15 CA plots and the contributing variables. Not all variables are applicable for all sites of each group. Refer to Appendix C for presence or absence of the variables at each site.

Group number	Corresponding sites	Corresponding variables
1	Bàu Tró	Shell rectangular beads
	An Sơn (early occupation)	Circular and semi-circular incisions on ceramic vessels
	Nong Nor (phase 1)	Shouldered and unshouldered adzes, varying sizes
	An Sơn (middle occupation)	Concave rim ceramic vessels
	An Sơn (late occupation)	
2	An Sơn (burial)	Concave rim ceramic vessels with pedestal
3	Ban Lum Khao (neolithic)	Absence of artefact variability
4	Ban Non Wat (neolithic) Khok Charoen	Shell artefacts
		Marble artefacts
		Ivory artefacts
		Small adzes
		Curvilinear incision and painting on ceramic vessels
5	Ban Chiang (Initial–Early Period I–II) Tha Kae (layer 5 neolithic) Non Nok Tha (Early Period) Khok Phanom Di	Shell artefacts
		Ivory artefacts
		Unshouldered adzes
		Zigzag incision on ceramic vessels
		Black surface treatment on ceramic vessels
		Curvilinear incision and painting on ceramic vessels
		S-shaped incision with impressed fill on ceramic vessels
6	Xóm Rền Mán Bạc	Nephrite artefacts
		Geometric impression on ceramic vessels
		Shell temper in ceramic fabrics
		Scroll incisions on ceramic vessels
		Eye-shaped incisions on ceramic vessels
7	Laang Spean Samrong Sen Krek	Flake and core stone tool artefacts
		Hollow circle punctate stamping on ceramic vessels

Source: Compiled by C. Sarjeant.

The CA analyses (Figure 9.14, Figure 9.15, Table 9.16) and previous research on parallels between the ceramics of mainland Southeast Asian sites (Wiriayaromp 2011, 2007; Rispoli 2007, 1997; Vincent 2004, 2003) permit the following observations about cross-cultural connections within material culture:

1. **Sequence of fibre temper:** Fibre or rice-chaff temper was widespread during the neolithic. The ceramics of Khok Phanom Di were only tempered with rice in the latest phase of occupation, and the earlier ceramics were tempered with sand, then grog (Vincent 2003). This differs from An Sơn, where the temper sequence began with a short early phase of only sand-tempered ceramics, followed by two major temper groups, one of sand and one of rice chaff. These two groups continued until the end of the prehistoric occupation at An Sơn. Even though the inhabitants of Khok Phanom Di may have grown rice during the second millennium BC, the potters did not utilise it for temper until later (Vincent 2003). Other sites are less clear about this sequence, and there is as yet no published information about the presence of rice-chaff temper during neolithic Ban Non Wat, however analysis of the bronze



age ceramics suggests that fibre temper was introduced during the bronze age, after sand temper (Sarjeant 2010). While many sites are known to have ceramics with rice chaff and other organic tempers, further studies are necessary.

2. **Sand temper is ubiquitous in the region:** Sand temper commonly comprised of quartz, although feldspar and laterite sands were also common, and can be coarse or fine.
3. **Shell and calcareous temper:** This temper was limited at An Sơn and Khok Phanom Di, but appeared more frequently at other sites that lacked fibre tempers, such as Mán Bạc and Bàu Tró. Related phosphatic tempers (fossilised shell or bone) were also identified at An Sơn.
4. **Grog temper:** Grog temper was absent at An Sơn but was present at Khok Phanom Di, Ban Chiang and Khok Charoen.
5. **Roulette/rocker stamping:** This decorative mode was observed at most sites, but the range in stamping shapes and the detail of the stamp at An Sơn was unparalleled at other sites. Ban Non Wat had similar roulette stamping to An Sơn, but many examples were rough. Other sites with roulette stamping included Khok Charoen, Khok Phanom Di, Nong Nor, Samrong Sen, Laang Spean, Krek, Xóm Rền, Mán Bạc, Non Nok Tha and Ban Chiang.
6. **Punctate stamping:** Punctate stamping was widespread and was generally coarser than roulette stamping, sometimes using large circular stamps. This mode was present at Ban Non Wat, Laang Spean, Mán Bạc, Xóm Rền and Krek. Punctate stamping in general was rare, and was coarse when present at An Sơn.
7. **Triangular incisions with diagonal or zigzag line fill:** Since this motif appeared at Xóm Rền and continued into Sa Huỳnh times, later in prehistory, it was originally thought this decorative mode dated to the late neolithic/early metal age. However, it was present at Khok Phanom Di, Ban Non Wat, Samrong Sen and Xóm Rền.
8. **Geometric infilled incision:** This motif was more common at An Sơn than the painted, slipped or more ornate 'S'-shaped incised designs identified in northeast and central Thailand and northern Vietnam. The An Sơn incisions were commonly triangular or diamond-shaped, but rectangular incised meanders were also present. Other sites with this mode included Ban Non Wat, Khok Phanom Di, Samrong Sen, Krek, Khok Charoen, Mán Bạc, Xóm Rền and Bàu Tró. These motifs were infilled with roulette or punctate stamping, combed impression, or short stroke incisions.
9. **Curvilinear incision:** This appeared at An Sơn in spiral or multiple combed waves or concentric circle motifs. Curvilinear incision was widespread in neolithic Southeast Asia and generally associated with impressed fill. These incised motifs were highly variable compared to the following scroll/'S'-shaped incisions, which were more restricted geographically.
10. **Scroll/'S'-shaped incision:** Scroll incision was identified in northern Vietnam at Xóm Rền and Mán Bạc, and has been linked to 'Phùng Nguyên culture' sites. The similar-themed 'S'-shaped incisions appeared as curvilinear motifs that can resemble snakes, waves or human figures, depending on how the motif has been interpreted. Rispoli (1997) has noted that many of these 'S'-shaped incised motifs are filled with scale pattern-impressed decoration (SPID), or other forms of impressed decoration. 'S'-shaped incision was identified in the occupation layers at Mán Bạc, and also at Xóm Rền, Tha Kae, Non Nok Tha, Ban Chiang, Krek and Khok Charoen. Only one example has been identified from Ban Non Wat in Neolithic phase 1 (Higham and Wiriyaromp 2011b; Wiriyaromp 2011: 110).
11. **Band design:** This was an incised and impressed motif within a band across the shoulder of ceramic vessels. It was the most frequent mode of decoration at An Sơn, rather than the incised and impressed motifs that covered the entire body of the vessel at Tha Kae, Mán Bạc, Ban Non Wat and Khok Phanom Di. Complete vessel coverage with incised and impressed motifs was typically only seen on a few complete vessels from burial contexts at An Sơn.

12. **Geometric impression:** This carved paddle impression was observed in place of cordmarking on the body of ceramic vessels and was only identified at Mán Bạc in this study. It recalls decorative modes in southeastern China and Hong Kong (Jiao 2007; Ng *et al.* 2005; Meacham 1978; Chang 1977).
13. **Curvilinear red painted designs:** These were present at Ban Chiang, perhaps later than the neolithic occupation studied here, and were observed during the neolithic of Ban Non Wat and Tha Kae (Rispoli 1997). No painted or slipped motifs were identified at An Sơn.
14. **Concave rim independent restricted vessels:** This is one vessel form that is singled out in this analysis because of its apparent importance throughout the sequence at An Sơn (form A2a). This form also appeared at Khok Phanom Di in occupation layers, Mán Bạc in burial contexts, and at Krek in Cambodia.
15. **Nephrite artefacts were only present during the neolithic in northern Vietnam (Hung *et al.* 2007).**
16. **Shell artefacts were the main prestige or exotic item during the neolithic:** Additional exotic or prized items included marble and ivory, both of which were at Ban Non Wat during the neolithic, marble at Khok Charoen and Ban Lum Khao, and ivory at Khok Phanom Di, Ban Chiang and late An Sơn.
17. **Restricted ornamentation of buried individuals at An Sơn:** Only shell beads were present as jewellery, although there was variability in the bead shapes in the middle and later phases of An Sơn. There was a greater range of beads at Tha Kae, Khok Phanom Di and Ban Non Wat, while Ban Lum Khao, Khok Charoen, Khok Phanom Di and Ban Non Wat had both shell beads and bangles, and sometimes earrings.
18. **Stone ornament artefacts:** Stone ornaments were present in many neolithic sites in addition to stone tools, including at the sites of An Sơn, Khok Charoen, Khok Phanom Di, Mán Bạc, Samrong Sen, Xóm Rền, and Krek. The range of stone tools was greater at Krek, Samrong Sen, Mán Bạc and Khok Phanom Di than at An Sơn.
19. **Stone adze size and shape differed regionally:** The adzes were generally small with an ovoid cross-section in northeast Thailand, while the adzes of southern Vietnam and Cambodia were more varied in size and rectangular-sectioned. However, Samrong Sen had both ovoid and rectangular-sectioned adzes.
20. **Shouldered adzes were rarer in northern regions:** This includes Samrong Sen, Mán Bạc and Ban Non Wat, and may be indicative of an early neolithic sequence at these sites, since An Sơn displayed a transition from early to late neolithic occupation with shouldered to unshouldered adzes.

While ceramic vessel forms were highly variable and difficult to compare in such an analysis and ceramic temper sequences for most sites in the region are incomplete, the disentangling of incised and impressed designs (as previously analysed by Rispoli 2007, 1997) that predominate the decorative modes of the assemblages has added to understanding their movements during the neolithic. This extends to the relationship between these motifs and other material cultural variables within Southeast Asia. The distributions of selected analysed variables in the CA are presented in Figure 9.16, Figure 9.17 and Figure 9.18. These spheres of variable presences are intended to be open-ended areas rather than rigid outer limits. The absence of central Vietnamese sites in this study is notable, and limits interpretations for the region. Future research in all regions is needed to add to these observations.

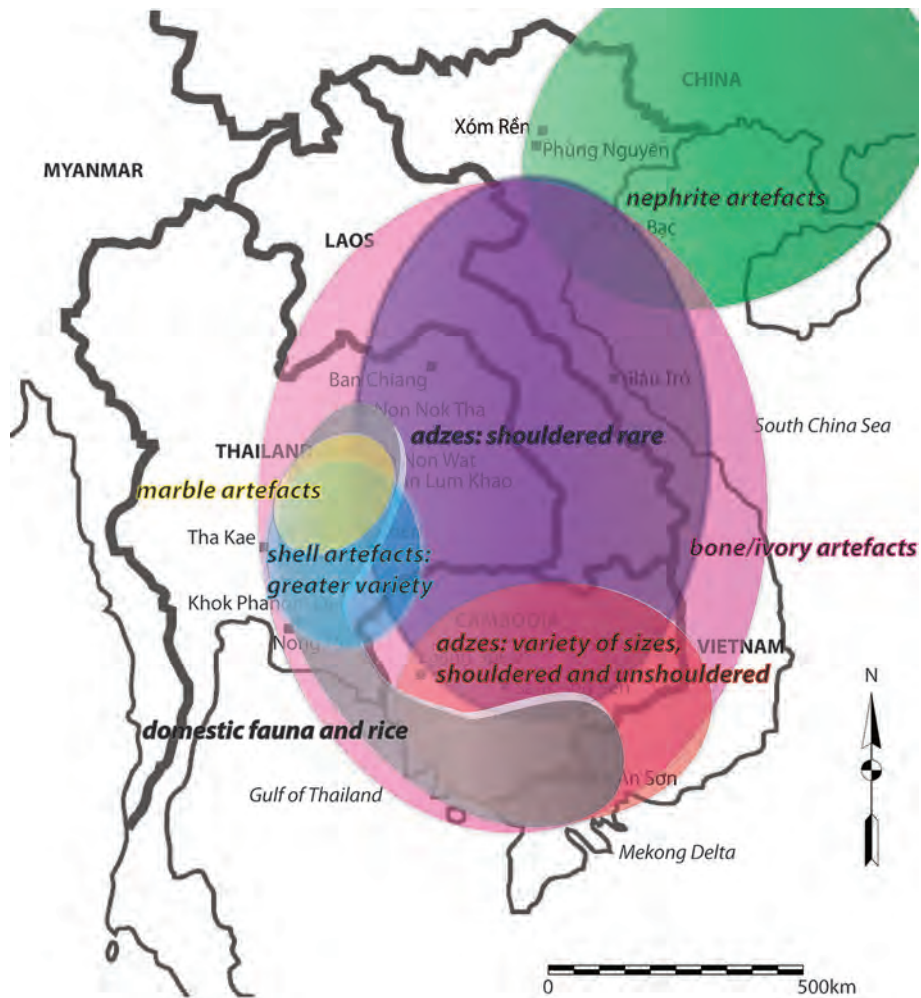


Figure 9.16. Distribution of notable non-ceramic material culture in mainland Southeast Asia.

Source: C. Sarjeant.

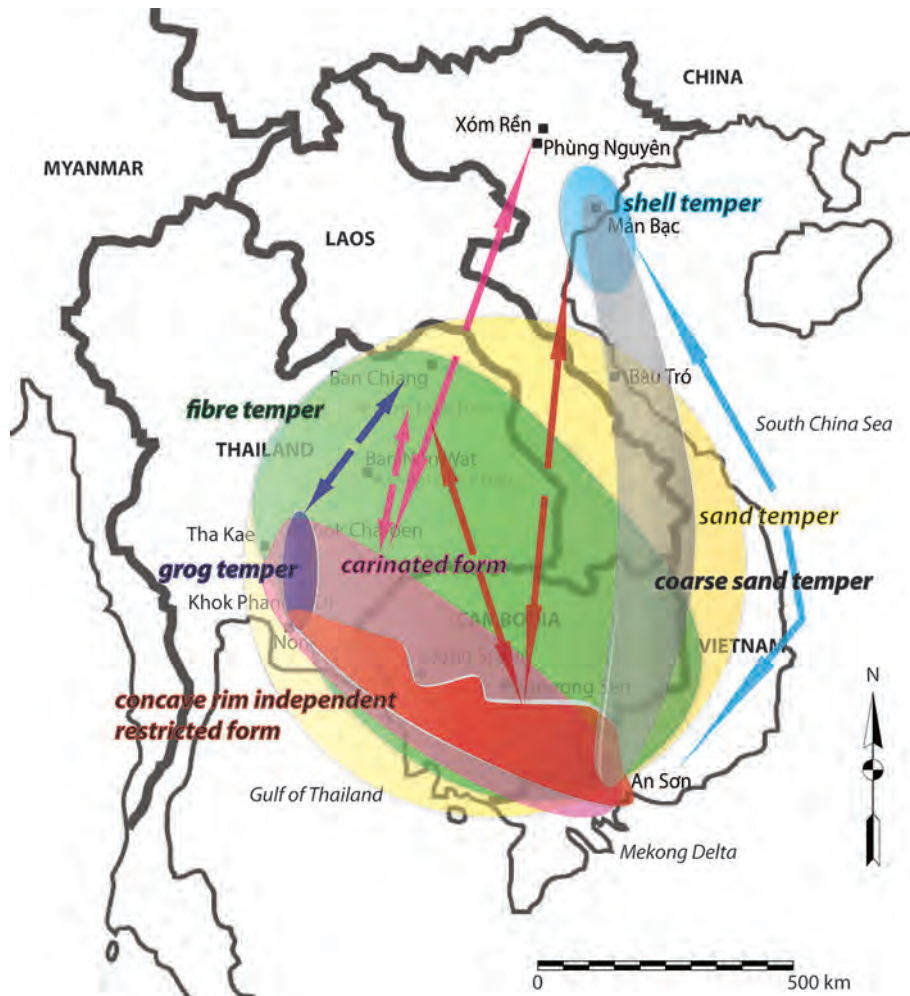


Figure 9.17. Distribution of notable An Sơn ceramic vessel forms and dominant tempers in mainland Southeast Asia. The arrows point to sites beyond the coloured sphere with the specified variable.

Source: C. Sarjeant.



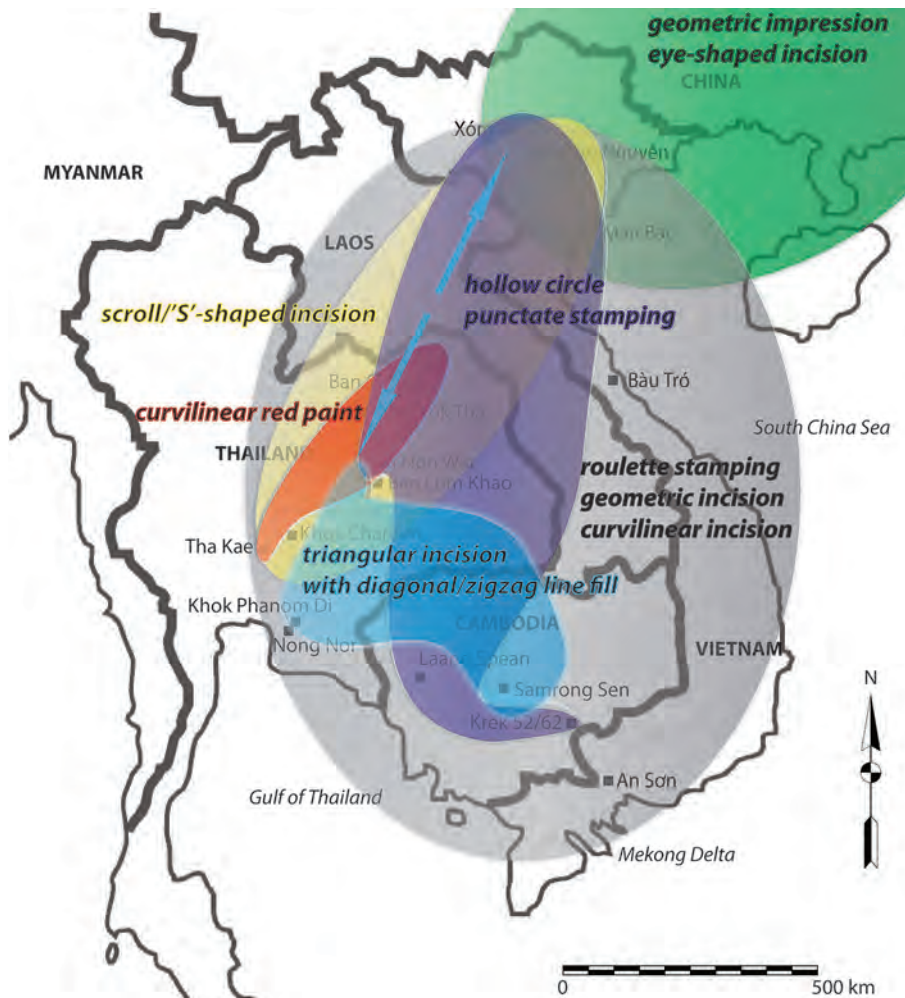


Figure 9.18. Distribution of notable modes of decoration on ceramic vessels in mainland Southeast Asia. The arrows point to sites beyond the coloured sphere with the specified variable.

Source: C. Sarjeant.

### Summary: The material culture comparison of Southeast Asia

Many of the material culture variables studied in the CA indicate relationships of time and geographical proximity. The variables are highly susceptible to differences in chronology, which cannot be avoided in such comparative studies. While An Sơn displayed the greatest correspondence with Nong Nor (phase 1) and Bàu Tró in the CA (Figure 9.15), certain variables also signified the proximity between southeastern Cambodia and southern Vietnam, especially between Krek and An Sơn. A visual representation of the paralleled vessel forms and modes of decoration is shown in Table 9.17. The variability of material culture at Krek was limited, due to the lack of survival of bone and shell artefacts in the local soil conditions, while An Sơn had good preservation of such items. However, they were generally quite rare and not as varied as some other sites in the region, namely Ban Non Wat and Khok Phanom Di. In many ways, An Sơn shared closer affinities with Nong Nor (phase 1) rather than with any other neolithic sites beyond southern Vietnam, particularly in the band designs on the shoulder of ceramic vessels. This correspondence may be indicative of an earlier neolithic occupation at An Sơn. Another



possibility is that the An Sơn region was not exposed to the exchanges and movements that may have introduced a wider range of shell and marble artefacts, which would have linked An Sơn to Khok Phanom Di and other sites in central and northeast Thailand.

The environment of Long An Province was alluvial, much like southeastern Cambodia. However, unlike Đồng Nai Province and southeastern Cambodia, the sites along the Vàm Cỏ Đông River were not near significant basalt resources. Thus, An Sơn was restricted in its stone resources. The range in sizes and the shape of the adzes was probably related to the technology based in the Đồng Nai region, and the tools were reduced and reworked at An Sơn to result in the observed variation in size. The sites of the Khorat Plateau in northeast Thailand were also situated on quaternary alluvium and basaltic landscapes. The small, ovoid-sectioned adze technology of northeast Thailand was connected to a localised stone technology unrelated to that for rectangular-sectioned adzes of the Đồng Nai region. Khok Phanom Di and Nong Nor were also situated in quaternary alluvium and mangrove environments with nearby granitic resources for stone working (Vimuktanandana 1999; Fromaget *et al.* 1971).

The absence of marble artefacts at An Sơn may be attributed to its distance from limestone and marble deposits, which are located in the Lopburi region, near Mán Bạc, Bàu Tró, Samrong Sen and Laang Spean (Vimuktanandana 1999; Fromaget *et al.* 1971). The lack of shell artefacts may be due to restricted access to a marine environment with suitable shells, unlike Khok Phanom Di and Nong Nor. In the case of Ban Non Wat and northeast Thailand, exchanges from the coast for shell and Lopburi for marble to the Khorat Plateau may have been established in a way that never transpired for An Sơn during the neolithic.




























Strong parallels were established in Chapter 8 between the ceramic vessel forms of An Sơn and those at other neolithic sites in southern Vietnam. Although such parallels were limited in this study, and the dominant vessel form with a concave rim (form A2a) at An Sơn was only noted in the southern region of this study, at Khok Phanom Di and Krek, while some variations of this form were observed at Mán Bạc. The concave rim forms were associated with band designs on the shoulder, typically roulette stamping between two horizontal incised lines. Many decorated vessels in mainland Southeast Asia had incised and impressed motifs that covered a greater area of the body than just the shoulder. This was not the case at An Sơn. Additionally, the roulette/rocker stamping impression, while highly sophisticated, detailed and varied at An Sơn, was in fact a widespread mode of decoration in mainland Southeast Asia. Roulette stamping appeared alongside many other modes associated with incised and impressed motifs, such as SPID, during the neolithic at other sites (see Rispoli 1997).

The limited variation in decorative mode, but focus on variation within a single mode of decoration on one vessel form frequently produced at An Sơn, indicates an intensity in the ceramic manufacture of form A2a at An Sơn. An Sơn was part of the incised and impressed tradition in neolithic Southeast Asia, but it was not exposed to the traditions of painted motifs or 'S'-shaped incised motifs, which were part of a tradition restricted to northeast and central Thailand and northern Vietnam. These more northern traditions never manifested in the material assemblages of southern Vietnam. Roulette stamping spread to this region and developed further, but painting and other incised and impressed modes were never transferred. Sites like Ban Non Wat were centrally located to obtain goods and technological ideas from both the south and north, visible in shell and marble artefacts and ceramics, respectively, but the directions and area of contact appear to have been more limited in southern Vietnam.

While the occurrence of roulette stamping is not unique to mainland Southeast Asia, and does not necessarily stipulate contact between sites from its presence alone, the overall combination of neolithic features at An Sơn (domestic rice, dog and pig, polished stone technology, and incised








and impressed ceramic vessels) implies an associated transference of this mode of decoration with neolithic settlement. At the point of transference to southern Vietnam, certain material cultural variables were adopted and others were omitted. Those variables that were initially adopted developed locally over time, but contacts inclusive of ornate shell and marble ornaments, painted ceramics and increasingly variable incised ceramics, did not extend into the wider neolithic environment. An Sơn was one of the sites at the 'end of the line' in terms of these neolithic traditions in mainland Southeast Asia. The CA indicates that certain traits in material culture at An Sơn were descended from those in northeast and central Thailand, while there were more specific parallels between An Sơn, Nong Nor (phase 1) and Krek. There is evidence of long-lasting and widespread neolithic traditions extending to southern Vietnam, but little direct contact between An Sơn and sites further north was apparent over the 1000 years of occupation. Contact via material culture was limited to the more immediate vicinity of southern Vietnam and southeastern Cambodia.

Table 9.17a. Table of comparative ceramic traits from the studied Southeast Asian sites in Chapter 9. Not to scale.

	An Som	References	Ban Non Wat	References	Khok Charoen	References	Tha Kae	References	Khok Phanom Di	References
Roulette stamped band		C. Sarjeant		C. Sarjeant						
Roulette stamped band		C. Sarjeant		C. Sarjeant						
Roulette stamped band		C. Sarjeant		C. Sarjeant						
Roulette stamped band		C. Sarjeant								
Curvilinear incision		C. Sarjeant								
Zigzag incision		C. Sarjeant		C. Sarjeant		C. Sarjeant (After: Illustration courtesy of H. Looft-Wissowa)				
Wavy incision		C. Sarjeant		C. Sarjeant						
Red paint fill		C. Sarjeant								
Lime infill		C. Sarjeant								
Geometric incision		C. Sarjeant								C. Sarjeant (After: Vincent 2004: 265, fig. 105)
'S'-shaped incision and impression		C. Sarjeant		C. Sarjeant		C. Sarjeant (After: Illustration courtesy of H. Looft-Wissowa)		C. Sarjeant (After: Rispoli 2007: 236, fig. 1)		
Curvilinear incision and impression		C. Sarjeant		Higham and Wiriayomp 2011b: 99, fig. 5.7						After: Hall 1993: 248, fig. 102
Hollow circle punctate stamp				C. Sarjeant						
Curvilinear red paint				C. Sarjeant				C. Sarjeant (After: Rispoli 1992: 86, fig. 4)		

Source: Compiled by C. Sarjeant.

Table 9.17b. Table of comparative ceramic traits from the studied Southeast Asian sites in Chapter 9. Not to scale.

	Hong Nor	References	Krek	References	Laang Spean	References	Samrong Sen	References	Mán Bạc	References	Bàu Tró	References
Roulette stamped band												
Roulette stamped band												
Roulette stamped band		C. Sarjeant (After: O'Reilly 1996b: 112, fig. 42)				C. Sarjeant (After: Mourer and Mourer 1970: 138, fig. 5)						
Roulette stamped band												
Curvilinear incision												
Zigzag incision												
Wavy incision												
Red paint fill												
Lime infill												
Geometric incision						C. Sarjeant (After: Mourer and Mourer 1970: 138, fig. 5)				C. Sarjeant		
'S'-shaped incision and impression										C. Sarjeant		
Curvilinear incision and impression										K.D. Nguyễn		
Hollow circle punctate stamp										K.D. Nguyễn		
Curvilinear red paint												

Source: Compiled by C. Sarjeant.




















Table 9.17c. Table of comparative ceramic traits from the studied Southeast Asian sites in Chapter 9. Not to scale.

	An Son	References	Ban Non Wat	References	Khok Charoen	References	Tha Kae	References	Khok Phanom Di	References
Independent restricted vessel with everted rim		C. Sarjeant		C. Sarjeant		C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)		C. Sarjeant (After: Rispoli 2007: 236, fig. 1)		C. Sarjeant (After: Vincent 2004: 231, fig. 89)
Independent restricted vessel with concave everted rim		C. Sarjeant								
Simple restricted vessel		C. Sarjeant		C. Sarjeant		C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)				C. Sarjeant (After: Vincent 2004: 135, fig. 45)
Simple unrestricted vessel		C. Sarjeant		C. Sarjeant						
Simple unrestricted vessel		C. Sarjeant		After: Higham and Wiriyaromp 2011c: 18, fig. 3.3		C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)				C. Sarjeant (After: Vincent 2004: 268, fig. 108)
Simple unrestricted vessel with pedestal		C. Sarjeant		After: Higham and Wiriyaromp 2011c: 17, fig. 3.2		C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)				
Simple unrestricted vessel with everted rim and pedestal		C. Sarjeant						C. Sarjeant (After: Rispoli 2007: 236, fig. 1)		
Simple restricted vessel with inverted lip and pedestal		C. Sarjeant		After: Higham and Wiriyaromp 2011c: 17, fig. 3.2						
Cannulated independent restricted vessel		C. Sarjeant				C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)				C. Sarjeant (After: Vincent 2004: 279, fig. 119)
Independent unrestricted vessel with pedestal		C. Sarjeant								C. Sarjeant (After: Vincent 2004: 265, fig. 105)
Independent restricted vessel with pedestal		C. Sarjeant								
Simple unrestricted vessel with everted lip		C. Sarjeant								C. Sarjeant (After: Vincent 2004: 285, fig. 125)
Independent restricted vessel with direct rim		C. Sarjeant				C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)				
Ridge with incision at shoulder of vessel		C. Sarjeant. Vessel from Loc Giang (Form also at Binh Da.)				C. Sarjeant (After: Illustration courtesy of Helmut Looft-Wissowa)				

Source: Compiled by C. Sarjeant.



Table 9.17d. Table of comparative ceramic traits from the studied Southeast Asian sites in Chapter 9. Not to scale.

	Nong Nor	References	Krek	References	Laang Spean	References	Samrong Sen	References	Mán Bạc	References	Bàu Tró	References
Independent restricted vessel with everted rim						C. Sarjeant (After: Mourer and Mourer 1970: 138, fig. 5)		C. Sarjeant (After: Vanna 2002: 287, fig. 6)		C. Sarjeant (After: Illustration courtesy of K.D. Nguyễn)		C. Sarjeant (After: Pham 1997: 16, fig. 3; Vessel from Ba Don II)
Independent restricted vessel with concave everted rim		C. Sarjeant (After: O'Reilly 1998b: 112, fig. 42)		C. Sarjeant (After: Albrecht et al. 2000: 39, fig. 13)				C. Sarjeant (After: Vanna 2002: 306, fig. 25)		C. Sarjeant (After: Illustration courtesy of K.D. Nguyễn)		
Simple restricted vessel								C. Sarjeant (After: Vanna 2002: 287, fig. 6)				C. Sarjeant (After: Pham 1997: 16, fig. 3; Vessel from Ba Don II)
Simple unrestricted vessel								C. Sarjeant (After: Vanna 2002: 305, fig. 24)				
Simple unrestricted vessel		C. Sarjeant (After: O'Reilly 1998b: 112, fig. 42)						C. Sarjeant (After: Vanna 2002: 288, fig. 7)				
Simple unrestricted vessel with pedestal										C. Sarjeant (After: Illustration courtesy of K.D. Nguyễn)		
Simple unrestricted vessel with everted rim and pedestal						C. Sarjeant (After: Mourer 1977: 35, fig. 2)						
Simple restricted vessel with inverted lip and pedestal								C. Sarjeant (After: Vanna 2002: 303, fig. 22)				
Carinated independent restricted vessel		C. Sarjeant (After: O'Reilly 1998b: 112, fig. 42)										
Independent unrestricted vessel with pedestal												
Independent restricted vessel with pedestal												
Simple unrestricted vessel with everted lip				C. Sarjeant (After: Albrecht et al. 2000: 40, fig. 14)				C. Sarjeant (After: Vanna 2002: 287, fig. 6)				
Independent restricted vessel with direct rim												
Ridge with incision at shoulder of vessel												

Source: Compiled by C. Sarjeant.

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