

Neolithic Interaction between Taiwan and Northern Luzon: The Pottery and Jade Evidences from the Cagayan Valley

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ABSTRACT

Several hypotheses about the Austronesian homeland and subsequent directions of population dispersal have been proposed. Among these models, there is the north to south theory with Taiwan as the point of origin, as well as the south to north theory with Indonesia and the southern Philippines as the homeland.

Taiwan and the northern Philippines are the key areas that have been explored archaeologically to test both hypotheses. This paper compares the earliest Neolithic assemblages from the Cagayan Valley in northern Luzon, Philippines, with contemporary Middle Neolithic assemblages from Taiwan. The Cagayan sites have yielded artifacts and chronological evidence associated with the use of red-slipped pottery, which probably developed from a late stage in the evolution of fine cord-marked pottery (c.2000-1500 BC) in eastern Taiwan.

Key Words: Taiwan, Northern Luzon, Neolithic, Austronesian, migration

INTRODUCTION

The issues of the Austronesian homeland and subsequent patterns of dispersal are amongst the most important and highly debated topics in Southeast Asian archaeology, ethnology and linguistics. From an archaeological point of view, the prevailing model for

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Austronesian origins favours a movement of Pre-Austronesian speaking populations from South China into Taiwan during the fourth millennium BC. After the Proto-Austronesian linguistic phase in Taiwan, descendant populations dispersed through Taiwan, then into the Philippines and eventually colonized Oceania through Indonesia in a relatively short period. This model has been popularly dubbed the *express train* model. The archaeology of the so-called *early Taiwan-Luzon phase* suggested that the direction of Austronesian dispersal was from north to south. Bellwood writes of Taiwan; "here developed the Initial Austronesian language(s), and after a few centuries one of these languages made the first moves into Luzon and the Philippines. This movement led to the division of Austronesian into its major subgroups, Formosan and Malayo-Polynesian (or Extra-Formosan)" (Bellwood 1995:99). Later Bellwood said of Taiwan; "It is apparent that excavations on this island are well on the way to demonstrating a significant Taiwan-northern Philippine axis of Neolithic continuity" (Bellwood 1997:221).

A contrary model, in which the Austronesians are believed to have migrated from south (the Philippines or Indonesia) to north is supported by a number of scholars. Wilhelm G. Solheim II has offered the *Nusantao Maritime Trade and Communication Network model*, in which Pre-Austronesians developed primarily in Mindanao and northeastern Indonesia. Developing maritime populations moved north through Mindanao and the Visayan Islands, and probably from southern Luzon to Taiwan, then across to South China, north and south along the Chinese coast. This movement was achieved by 5000 BC (Solheim 1984-1985:80). Solheim thought that climatic conditions made southward movement across the Luzon Strait very difficult; "During the winter the winds are so strong from the northeast that no sailors would venture out unless they were protected by land to the northeast. During the summer both winds and currents are going north so it would not be a problem to move north from the Philippines to Taiwan before the typhoon season starts, but it would be difficult to move south. It is not impossible to sail between Taiwan and Luzon, but it is very difficult, and it is much easier to sail north from Luzon to Taiwan" (Solheim 1984-1985:81).

Another matter was raised by William Meacham who wrote that; "while there are a number of shared traits in the ceramics and lithics, the neolithic cultures of Luzon are quite distinct from those of Taiwan. Only very sporadic contact and limited trait movement can be

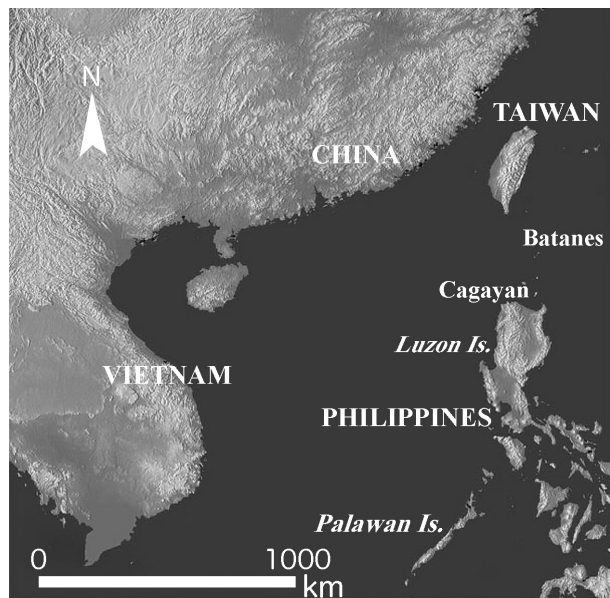


Fig. 1. Map of Taiwan and the Philippines.

supported on the present evidence" (Meacham 1984-1985:96). Meacham favors the local evolution model and he states that the origin of Austronesians was in the broad triangular area with apices in Taiwan, Sumatra, and Timor, which he called *Austronesia* (Meacham 1984-85:94-95).

The two main hypotheses differ from each other. Clearly, Neolithic archaeological relationships between Taiwan and the Philippines must be examined in more detail. From 1996 to 2002, the author worked with a joint team led by Tsang Cheng-hwa of Academia Sinica, Taipei, and Rey A. Santiago of the National Museum of the Philippines, Manila, that undertook archaeological exploration and excavations in the Cagayan Valley in northern Luzon (Fig. 1). In 2004, while undertaking Ph.D. research at the Australian National University in Canberra, the author continued this joint project with the National Museum of the Philippines.

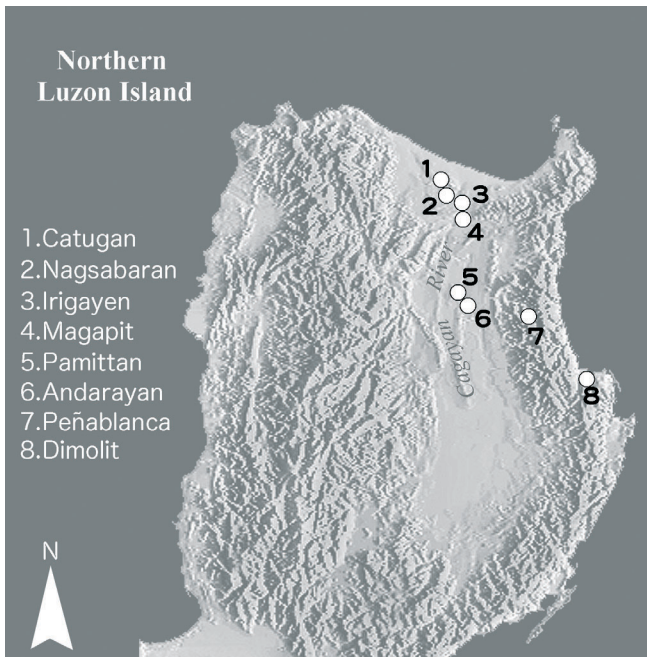


Fig. 2. Map of important sites in northern Luzon.

Cagayan Province lies in northeastern Luzon, occupying a tectonic basin between the Sierra Madre and the Cordillera Central. The valley itself is 190 km long and 60 km wide. The Taiwan-Philippine project intends to construct a northern Luzon chronology and to compare the Neolithic assemblages from here with those in Taiwan. In 2000, 2001 and 2004, archaeological excavations were conducted at the Nagsabaran site, one of the Lal-Lo shell middens (Fig. 2, Location 2).

This paper will focus on a description of the lower (pre-shell midden) Nagsabaran assemblage and those from other Cagayan sites excavated by joint Japanese-Philippine and Taiwan-Philippine teams.

These assemblages will then be compared with Neolithic assemblages from Taiwan. The major purpose of my research is to find evidence for interaction between Taiwan and the northern Philippines during the early Neolithic.

CHRONOLOGY OF NORTHERN LUZON AND TAIWAN

The Cagayan River is the longest river in northern Luzon. Since the 1980s, more than

30 shell midden sites have been explored in the municipality of Lal-lo, Cagayan Province, along the Cagayan riverbanks and low alluvial plains. The majority of these sites occur between the towns of Gattaran and Lal-Lo. Nagsabaran shell midden lies on Zabaran Creek, on the west bank of the Cagayan River, about 22 km above the river mouth. It is around 400 m in length, 70 m in width and 1-3 m in depth.

In 2000 and 2001, the Taiwan-Philippine team conducted two excavations in the Nagsabaran site (Tsang and Santiago, 2001; Tsang *et al.* 2002), and these were continued by the author in 2004. Two cultural layers were exposed: a lower alluvial silt with red-slipped pottery, and an upper shell midden with unslipped black pottery. Nagsabaran has produced twenty C-14 dates; 14 from the upper midden and 7 from the lower silt. The date range for the black pottery layer at the 2-sigma outer limit lies between 1000 BC and AD 670, whereas the red-slipped pottery layer dates between 2050 BC and 1050 BC (excepting a single and obviously preceramic outlier of 6100 BC–4800 BC, of uncertain derivation) (Tsang *et al.* 2002) (Table 1).

Focusing on the earlier red-slipped pottery layer, the Catugan site has the same sequence of cultural deposits as at Nagsabaran. All sherds found in the lower silt layer were red-slipped and plain, while black wares were found in the upper shell midden (Tanaka 1998:159). Crossing the Cagayan River from Nagsabaran, a similar sequence occurs in Irigayen, with black potsherds in the upper shell midden and only red-slipped sherds in the lower silt (de la Torre 2000:96). The Japanese-Philippine team that dug at Irigayen has four C-14 dates from Layer III (with the red-slipped pottery) with a 2-sigma range between 1520 BC and 1020 BC (Ogawa 2002:95).

In the Solana area, ca. 80 km south of Nagsabaran, the Neolithic site of Andarayan has produced red-slipped pottery with an AMS date on a rice husk inclusion of 2050 BC–1400 BC. Another charcoal date from this site is 1950 BC–1050 BC (Snow *et al.* 1986:3). The Pamittan site, adjacent to Andarayan, has two dates of 1940 BC–1440 BC and 2900 BC–1700 BC, associated with red-slipped pottery (Tanaka and Orogo 2000:132), but the older date from Pamittan was rejected by the excavator (Kazuhiko Tanaka, pers. comm.).

According to these dates, the period between probably 2000 BC and 1000 BC (calibrated dates with OxCal Version 3.8) contained red-slipped pottery, and may represent the beginning of the Neolithic in the Cagayan Valley. This ceramic culture then developed continually until ca. AD 1. If we compare the Cagayan chronology with Taiwan prehistory, we might have a better understanding of cultural developments for the whole region. Basically, Taiwan prehistory can be divided into three periods—Palaeolithic, Neolithic and Iron Age. Table 2 shows three phases of cultural development during the Neolithic in Taiwan, from ca. 3500 BC to AD 1. After the Changbin Palaeolithic, pottery first appeared in Taiwan with the Dabenkeng Culture, dated between 3500 BC and 2500 BC. Dabenkeng pottery jars and bowls are characterized by coarse cord marks and painted decoration. Taiwanese archaeologists believe that the Dabenkeng culture was introduced from the southeast coast of mainland China as the first Neolithic culture in Taiwan, and that the fine cord-marked pottery culture was a continuous development from the Dabenkeng. During the Middle Neolithic, the

Table 1: Charcoal dates for red-slipped pottery from Cagayan Valley sites (except NTU-3799, which is on marine shell).

Phase	Site	Lab number	Date	OXCAL, 2	Reference
Early Neolithic	Nagsabaran	NTU-3799	3450 ± 40 BP	1890BC-1680BC	Tsang <i>et al.</i> 2002
		GX-28381	3390 ± 130 BP	2050BC-1400BC	Tsang <i>et al.</i> 2002
		GX-28379	3050 ± 70 BP	1450BC-1050BC	Tsang <i>et al.</i> 2002
	Irigayen	NUTA2-914	3025 ± 20 BP	1380-1130 BC	Ogawa 2002:95
		NUTA2-912	2925 ± 20 BP	1260-1020 BC	Ogawa 2002:95
		NUTA2-913	3165 ± 25 BP	1520-1390 BC	Ogawa 2002:95
		NUTA2-917	3185 ± 25 BP	1520-1410 BC	Ogawa 2002:95
	Andarayan	SFU 86	3240 ± 160 BP	1950BC-1050BC	Snow <i>et al.</i> 1986: 5
		Unknown	3400 ± 125 BP	2050BC- 1400BC	Snow <i>et al.</i> 1986: 5
	Pamittan	GAK17967	3390 ± 100 BP	1940BC-1440BC	Tanaka <i>et al.</i> 2000:132
		GAK17968	3810 ± 200 BP	2900BC-1700BC	Tanaka <i>et al.</i> 2000:132
	Magapit	N5396	2720 ± 135 BP	1300BC-400BC	Aoyagi <i>et al.</i> 1991:50
		N5397	2680 ± 120 BP	1200BC-400BC	Aoyagi <i>et al.</i> 1991:50

Table 2: Chronology of the Taiwan Neolithic

Phase	Date	Pottery / Culture	Regions
Early Neolithic	3500 BC -2500 BC	Coarse Cord-marked Pottery	along the coast
		Dabengkeng culture 大空坑文化	
Middle Neolithic	2500 BC -1500 BC	Fine Cord-marked pottery	north central- west south east
		Xuntangpu Culture 訊塘埔文化	
		Niumatou Culture 牛罵頭文化	
		Niuchouzi Culture 牛稠子文化	
		Fushan Culture 富山文化 *	
Late Neolithic	1500 BC - AD 1	Plain pottery (occasionally with decoration)	north north central- west south east
		Yuanshan Culture 圓山文化	
		Zhishanyan Culture 芝山岩文化	
		Yingpu Culture 營埔文化	
		Dahu Culture 大湖文化	
		Beinan Culture 卑南文化	

*: or called *east fine cord-marked pottery culture*.

Dabengkeng Culture was replaced by regional cultures distinguished by their fine cord-marked pottery, replacing the coarse cord-marked pottery of the Early Neolithic. The four most significant of these regional cultures are the Xuntangpu in the north, the Niumatou in the west, the Niuchouzi in the south, and the Fushan fine cord-marked pottery culture in the east. By 1500 BC, several archaeological cultures were well differentiated in Taiwan.

Examining the chronologies of northern Luzon and southeastern Taiwan, it can be seen that the most striking period of chronological overlap between the two regions is at ca. 2000 BC–1500 BC, during the Middle Neolithic of Taiwan and the Early Neolithic of northern Luzon.

COMPARATIVE PERSPECTIVES

Pottery

The calibrated radiocarbon dates place the earlier Nagsabaran pottery assemblage at around 2000 BC–1500 BC, part of the oldest pottery complex in the Cagayan region, and indeed possibly in the Philippines. The Nagsabaran red-slipped style of pottery exhibits an advanced technology in manufacture, as well as sophisticated stamped and incised decoration. Was this style introduced from Taiwan into the northern Philippines? If it was, it could represent a crucial link in the early pattern of Austronesian dispersal.

Referring to the pottery typology of Hidefumi Ogawa (2000) for the Cagayan valley, we can see that several rim and vessel forms are shared between Nagsabaran and Taiwan. These are as follows:

(1) Everted and internally concave rim. One of the most popular rim forms at Nagsabaran and Irigayen is Ogawa's J2 restricted rim, everted above the neck and generally concave on the inside rim surface (Fig. 3:1-4; Fig. 4). This type of vessel has a maximum diameter at the middle of the body, and a round base (see Ogawa 2002:81, 90). In Taiwan, it occurs in the eastern fine cord-marked pottery phase at sites such as Yuchangnan (see Liu *et al.* 2000:63), Fushan (Liu *et al.* 2000:62, 63, 67), Yanliao, Dakeng (Yeh 2000:82-83), Chaolaiqiao and Shanyuan. The sites date to around 2000 BC to 1500 BC, and continue on through the Beinan Culture, to about 500 BC.

Another feature of the J2 rims, which appears in both the Cagayan and Taiwan pottery, is the polished red slip (Ogawa 2002:81, Liu *et al.* 2000:61). The lip diameter of this type of rim is around 24-30 cm in Taiwan (Liu *et al.* 2000:61), and a similar size range occurs in Cagayan. Most of the rims have no decoration, but a few were painted or have fine cord marking in the Taiwan assemblages.

(2) Everted rim with an outer thickening of the lip. These rims are straight rather than internally concave and have an obvious ridge around the outer edge of the lip (Fig. 3:5-7). They occur in the Magapit site (see Ogawa 2002:98). Similar rims occur in Torongan Cave on Itbayat Island, Batanes (ca. 2200 to 1500 BC; Bellwood and Dizon 2005: *this issue*) and in several sites in south-eastern Taiwan, including Fushan (Shi *et al.* 2001:174), Jialulan (Li 2000:65) and Chaolaiqiao. Some of these rims from eastern Taiwan, Cagayan and Batanes have red-slipped surfaces.

(3) Rim with an inner projecting lip. These rims have an obvious ridge around the inside of the lip and the top of the rim is flat (Fig. 3:8-11; Fig. 5). They occur in the Nagsabaran and Magapit sites (see Fig. 11.6 of Tanaka 2004:178), and in several sites in

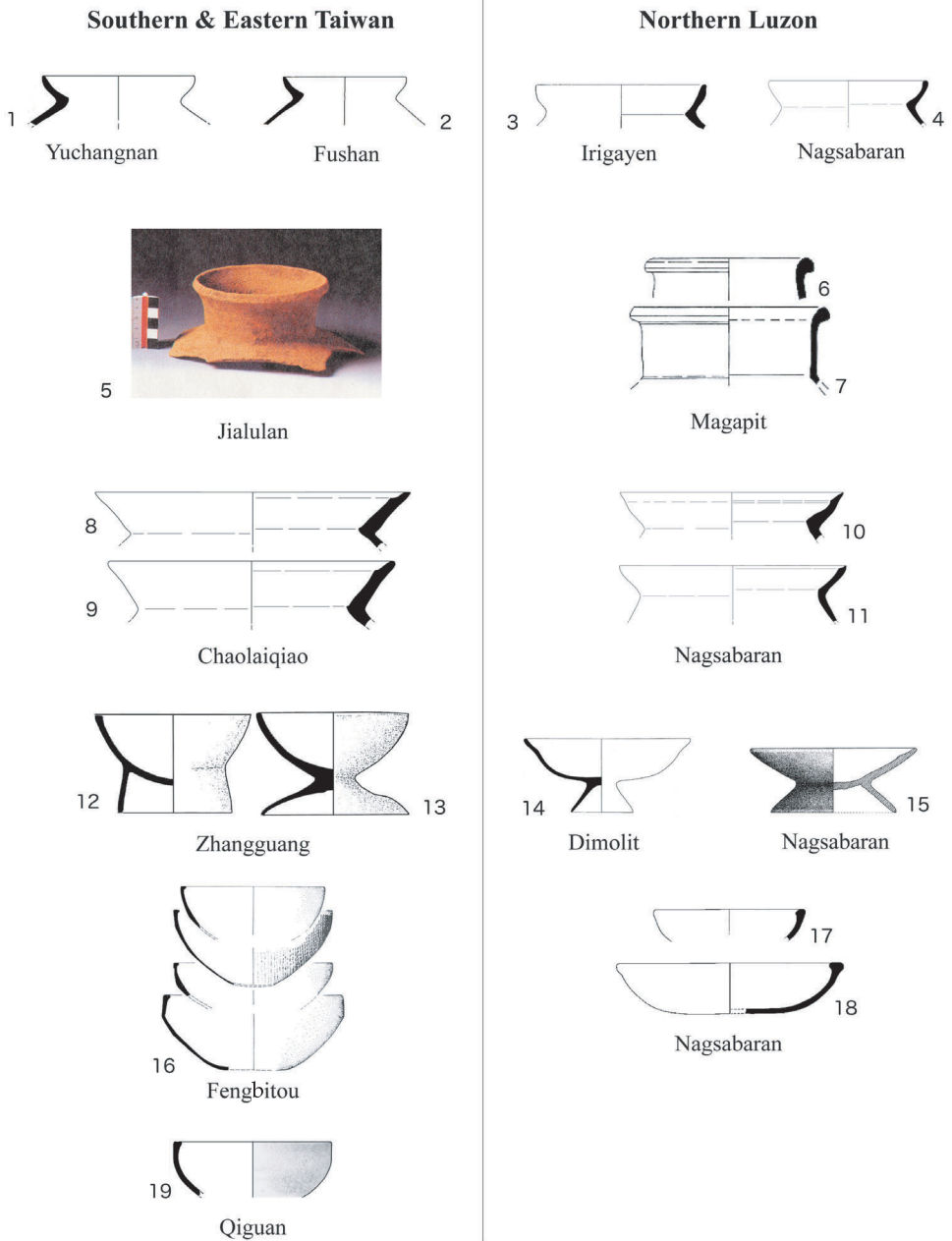


Fig. 3. Similar pottery types from Taiwan and northern Luzon. (1. from Liu *et al.* 2000:63; 2. Li 2000:62; 3. Ogawa 2002:90; 5. Li 2000:65; 6-7. Ogawa 2002:98; 12-13. Chao 1994:80, 14. Peterson 1974:111; 16. from Chang 1969:90; 17-18. Tsang *et al.* 2002; 19. Liu 1990:58, 4, 8-11 and 15. from National Museum of the Philippines and the author).

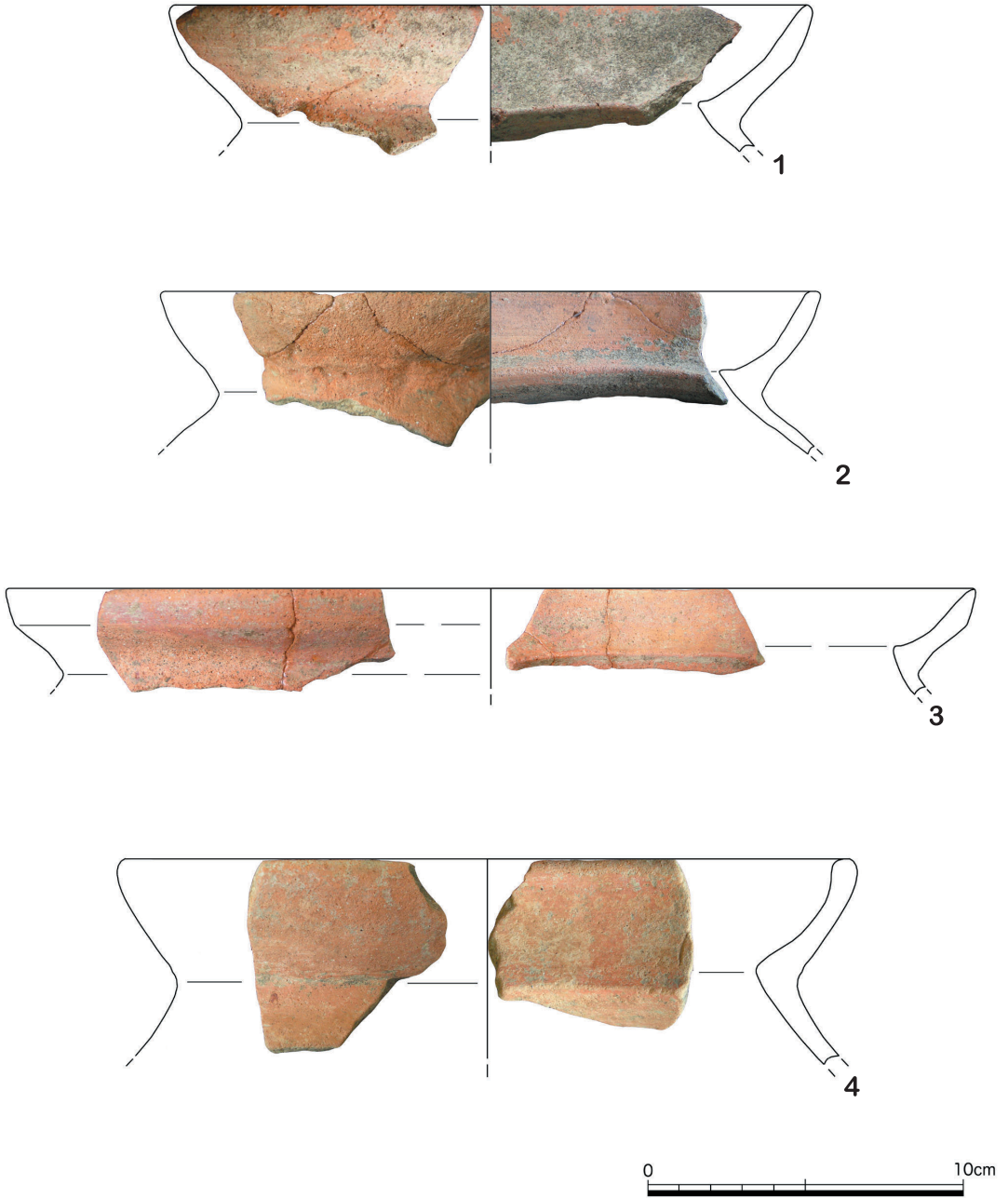


Fig. 4. Everted and internally concave rims from Chaolaiqiao, eastern Taiwan (1, 2, 3) and Nagsabaran, northern Luzon (4).

south-eastern Taiwan, including Fushan (see Fig. 17: CIII of Liu *et al.* 2000:62), Shanyuan and Chaolaiqiao. Most of these rims from Cagayan and eastern Taiwan are plain with red-slipped surfaces.

(4) Open bowl on a ring foot or pedestal. These vessels consist of two basic components—an open bowl supported by a basal ring stand (Fig. 3. 12-15). In northern Luzon, this type of bowl occurs at Nagsabaran in the lower silt layer with the red-slipped pottery (Tsang *et al.* 2002), at Dimolit (Peterson 1974), at Magapit (Ogawa 2002:99) and at Irigayen (Ogawa 2002:92). In Taiwan, K.C. Chang first reported this form in the fine red ware from the fine-corded pottery phase at Fengpitou in southwestern Taiwan (see Fig. 6 of Chang 1969:91). Chang also mentioned that these vessels belonged to the classical Chinese *dou* family. In Taiwan, *dou* were extensively used until the late Neolithic, not only in southern Taiwan but also in sites in eastern Taiwan such as Fushan, Zhangguang (Chao 1994; Lee *et al.* 2001:212) and Beinan.

(5) Basin. These vessels have inverted rims and are shallow, with a wide mouth and a large diameter relative to height (Fig. 3. 16-19). In northern Luzon, such rims are found in the red-slipped pottery layer at Nagsabaran (Tsang *et al.* 2002). In Taiwan, the same form occurs during the fine-corded pottery phase at Fengpitou (see Fig. 9-13 of Chang 1969:90), Beinan (Lien *et al.* 1986:12) and Qiguan (see Liu 1990:58). The surfaces of these vessels are plain red-slipped or have fine cord marks.

Pottery Decoration

One of the most significant characteristics of the earliest Cagayan pottery is the red-slipped surface coating (Fig. 6:1-2). This is common at Nagsabaran, Irigayen, Magapit, Dimolit and Pamittan, and also at Torongan Cave on Itbayat Island and at Sunget on Batan Island (Bellwood *et al.* 2003; Bellwood and Dizon: *this issue*). The technology of red slipping can be used to isolate the probable source of the Cagayan pottery tradition. In Taiwan, there was no red slipping of pottery in the earlier stages of the Dabengkeng Culture, until its later phase after ca. 2600 BC (Tainan SBIP Project 2002:16). Red slipping became popular in the Middle Neolithic, especially around ca. 2000 BC (during the later phase of the Middle Neolithic). The Middle Neolithic in Taiwan is characterised essentially by fine cord-marked pottery. But some sites in eastern Taiwan, such as Fushan, had less than 10% of fine cord-marked sherds at this time and were dominated by plain or red-slipped potsherds (Shi *et al.* 2001:60). These high percentages of red-slipped pottery in eastern Taiwan are quite similar to the situation during the earlier phase of the Cagayan Neolithic.

Furthermore, some sherds with basket marks from Nagsabaran are also identical to sherds of the fine cord-marked pottery phase at sites such as Wangrong Pinglin in eastern Taiwan (from our recent survey in January 2005) and Fengbitou (Chang 1969: plate 59) in southwestern Taiwan (Fig. 6:3-4).

Equally, some sherds with mat impressions from the lower red-slipped pottery layer at Nagsabaran are identical to sherds from the fine cord-marked pottery phase at sites such as Changpanqiao, Yuqiao (Liu *et al.* 2000, plate 44; Liu 1990:57), Donghe-I and

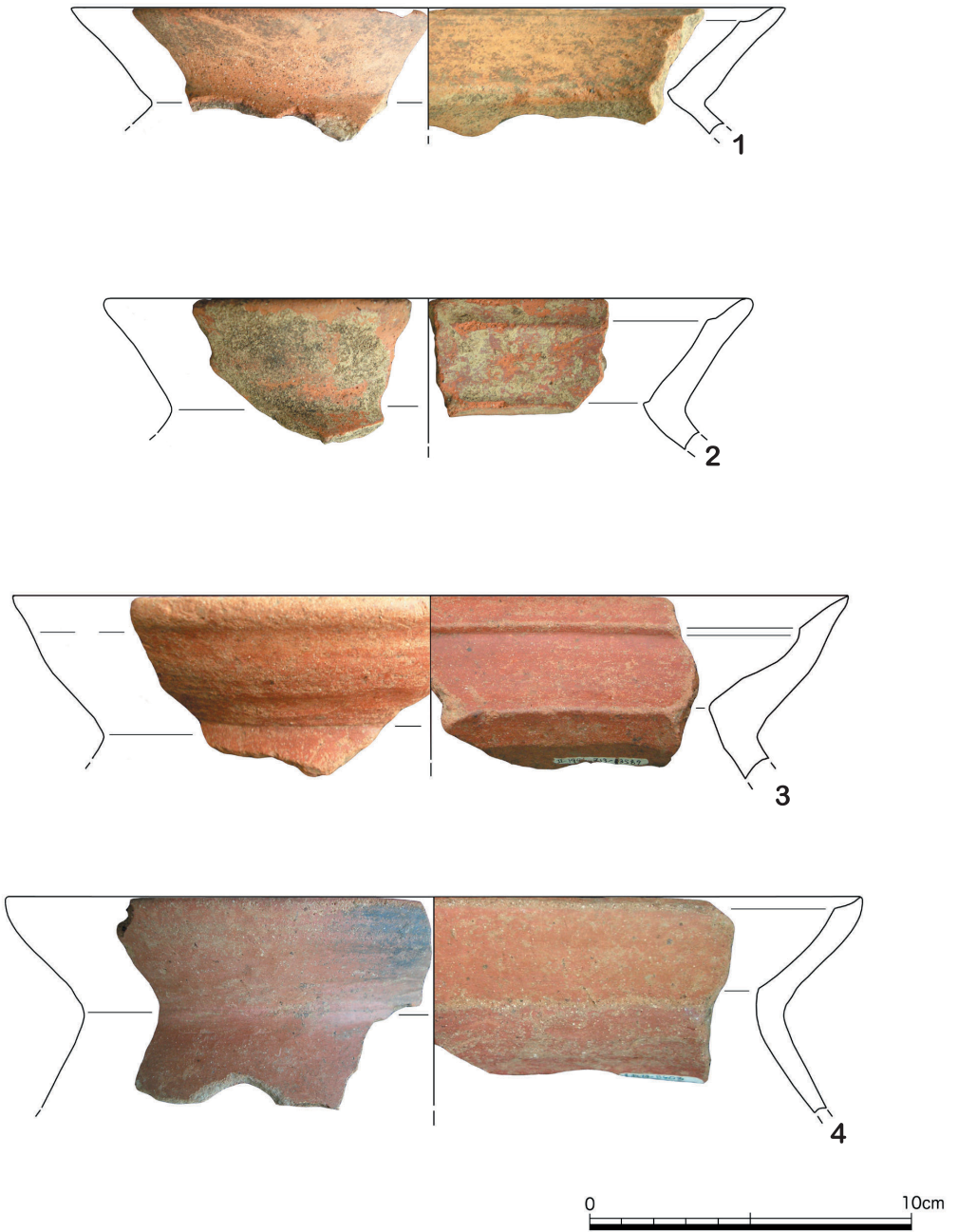


Fig. 5. Rims with an inner projecting lip from Chaolaiqiao, eastern Taiwan (1,2) and Nagsabaran, northern Luzon (3,4).

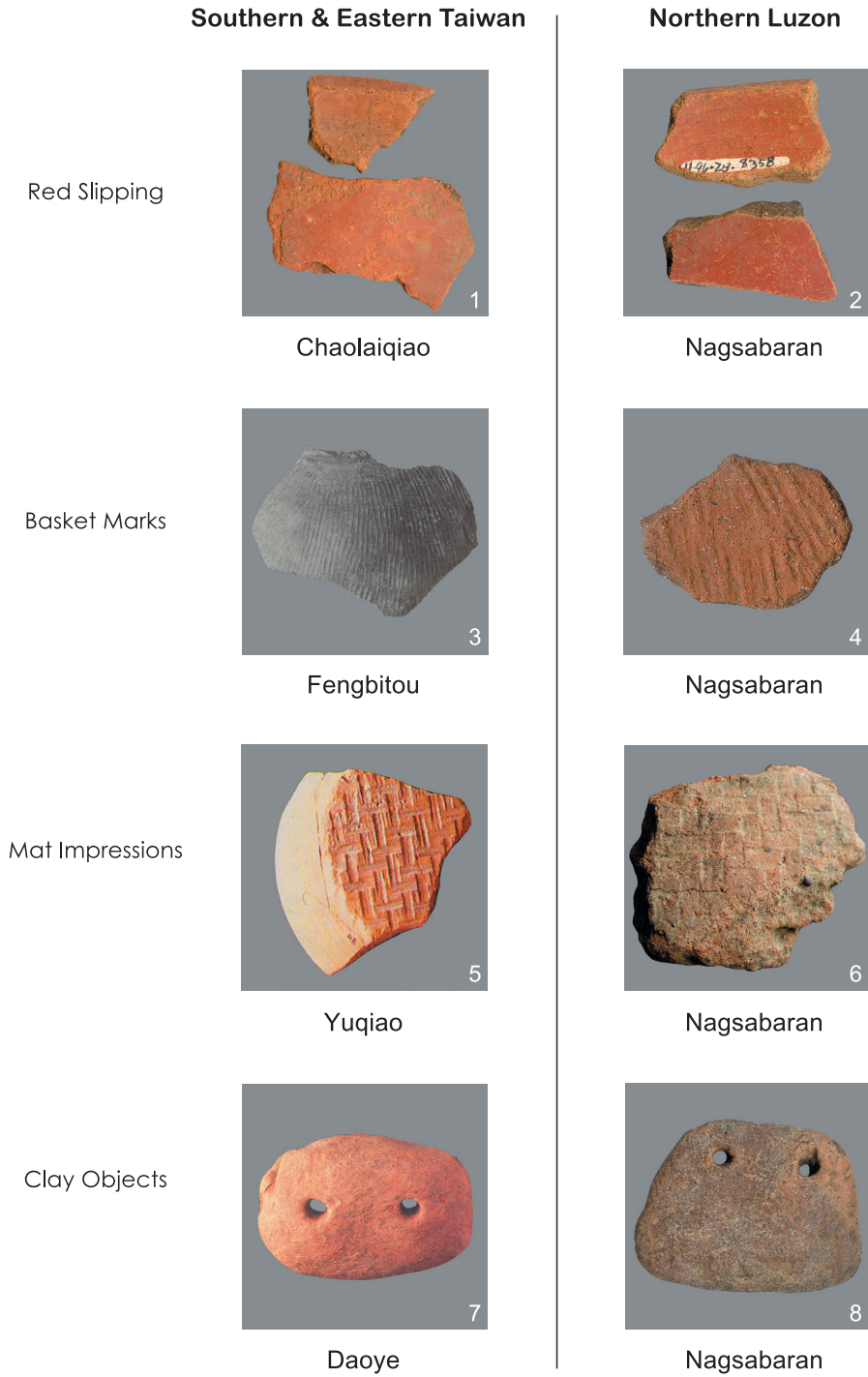


Fig. 6. Similar pottery decoration and clay objects from Taiwan and northern Luzon. (3. from Chang 1969: plate 59; 5. Liu 1990: plate 8.6; 7. Tsang *et al.* 2004: plate 5.51; 1, 2, 4, 6, 8. from National Museum of the Philippines and the author.)

Chaolaiqiao in eastern Taiwan, and Fengbitou (Chang 1969: plate 25) in southwestern Taiwan (Fig. 6:5-6). Although such sherds were never common, their presence indicates that people shared the same techniques of mat weaving in northern Luzon and Taiwan at that time.

Other artifacts such as spindle whorls and clay objects from northern Luzon are also similar to specimens from Taiwan. For example, in 2004 we found in the excavation at Nagsabaran a disk of clay with two holes, from the red-slipped pottery layer. In Taiwan, this type of disk was very popular in the fine cord-marked pottery phase, at sites such as Fengbitou (Chang 1969: plates 16 and 65) and Daoye (Tsang *et al.* 2004:243; Chu Cheng-yi, pers. comm.) (Fig. 6:7-8).

Nephrite artifacts

During the 2001 excavation at Nagsabaran, the recovery of a fragment of a green jade bracelet from the red-slipped pottery layer stimulated my interest in tracing the sources of the jade ornaments found in the Philippines. In the Cagayan Valley, jade earrings have been found in Arku (Thiel 1986-87:241) and Lattu-Lattu Caves (Barbosa 1979:22) in Peñablanca, and in the Lanna open site in Solana (Ronquillo: unpublished data). On the eastern coast of northern Luzon, two jade beads were found in the Dimolit open site (Peterson 1974:143). In southwest Luzon, many jade artifacts have been collected in the Batangas area since the 1940s (Beyer 1948:44-71; Fox 1970; Hung *et al.* 2004). Bato Cave in Sorsogon (southeast Luzon) and Kalanay Cave in Masbate Island have also yielded jade beads (Peralta 1977:226) (Fig. 7).

In Palawan, green jade ornaments such as earrings, bracelets, beads and adzes have been found in Leta-Leta Cave near El Nido and in caves in the Tabon Complex. The later include Duyong, Manunggul, Uyaw, Guri, Rito-Fabian and Tadyaw (Fox 1970:14-17; Fox 1977a:303-308; Fox 1977b:228-234; Peralta 1977:226).

Jade only occurs in nature at particular locations with special metamorphic geological structures. The geological sources of the jades found in Philippine sites, especially the green jade, offer questions of great interest. Nephrite was a highly favoured source of green jade in Taiwan prehistory, being widely distributed and exchanged since the Middle Neolithic, both in Taiwan and in nearby islands such as Penghu, Ludao and Lanyu. So far, more than 108 sites exist with nephrite artifacts in the Taiwan area. The major known source area is that in the vicinity of Fengtian, near Hualien in the middle section of the east coastal region of Taiwan (Hung 2004:60).

In terms of style and context, the nephrite ornaments in the Philippines belong to two phases; Neolithic and Early Metal. Most green jade ornaments from Philippine Neolithic contexts are similar in style with contemporary ornaments in Taiwan. For example, Neolithic green jade bracelets occur at Nagsabaran and Duyong Cave (Fig. 8.11). The measurements of the bracelets from both these sites, and from contemporary sites in Taiwan, indicate close relationships in style and manufacturing technology, as well as almost identical diameters, thicknesses and widths (Table 3). Most of the fine cord-marked

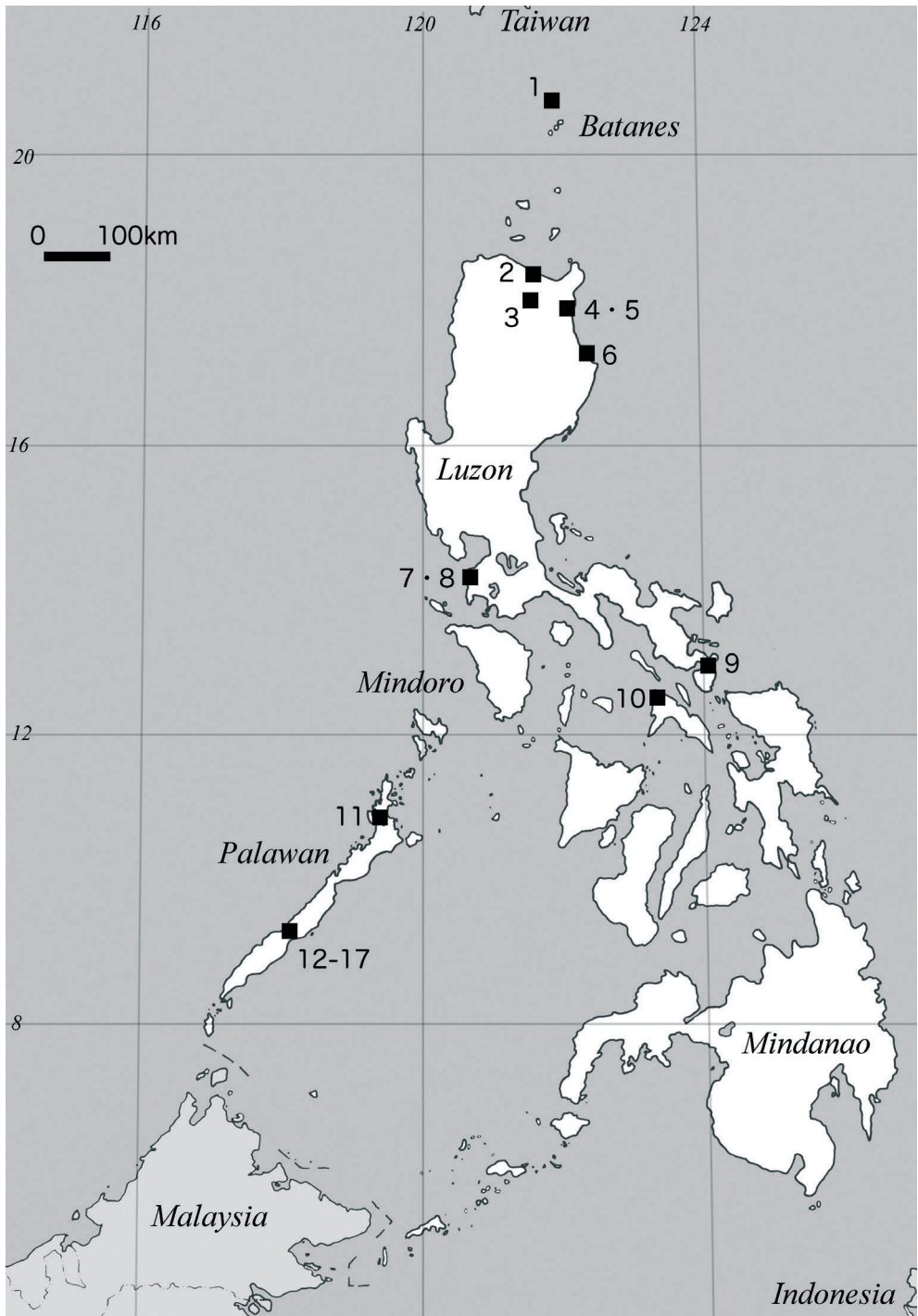


Fig. 7. The distribution of green nephrite ornaments in the Philippines. 1. Anaro, Itbayat Island; 2. Nagsabaran, Cagayan; 3. Lanna, Cagayan; 4. Arku Cave, Cagayan; 5. Lattu-Lattu Cave, Cagayan; 6. Dimolit, Isabela; 7. Calatagan, Batangas; 8. Kay Daing, Batangas; 9. Bato Cave, Sarsogon; 10. Kalanay Cave, Masbate; 11. Lata-Lata, El Nido; 12-17. the Tabon Caves Complex, Palawan.

pottery sites located in eastern Taiwan, such as Fushan and Beinan (lower layers) (Yang 1997:12), or in southern Taiwan, such as Fengbitou (Chang 1969:106), Youxianfang (Tainan SBIP Project 2002:11) and Daoye (Tsang *et al.* 2004:223), produced greater numbers of jade bracelets of the Nagsabaran type at this time than during following periods. Moreover, the jade bell-shaped (Hung *et al.* 2004) (Fig. 8.13) (Table 4) and tube beads (Figs. 8.2, 8.7-10) from both Taiwan and the Philippines are almost identical. During the Early Metal phase, green jade ornaments from the Philippines (Fig. 8.12) show many similarities with those from Ludao and Lanyu islands off southeastern Taiwan.



Fig. 8. The Taiwan nephrite ornaments from Taiwan and the Philippines. 1-6. Wangrong Pinglin, Taiwan; 7. Fengbitou, Taiwan; 8-12. Tabon Caves, Palawan, Philippines; 13. Kay Daing, Batangas, Philippines.

After preliminary examination of the jade collections in the National Museum of the Philippines, I have observed that there were at least two kinds of jade raw material that were used in the Philippines. The green jade, used for the ornaments discussed above, probably came from Taiwan. The white jade found in many Batangas sites was only used for tool making (especially adzes and chisels), and this may have been acquired from a local Luzon source.

In order to identify the sources of the green jade artifacts in the Philippines and to compare them with the similar artifacts from Taiwan, I have worked with Lin Shu-fen from the Institute of History and Philology and Yoshiyuki Iizuka and Yui Tzeng-fu from the Institute of Earth Sciences at Academia Sinica, Taipei, using X-ray diffraction, stable oxygen isotope analysis and electron probe micro-analysis (EPMA) (Hung *et al.* 2004; Hung and Iizuka 2004; Iizuka and Hung 2005: *this issue*). The results indicate that all the green raw materials are of nephrite from the source at Fengtian in eastern Taiwan.

An earring with three-pointed circumferential protuberances, a type called by Robert Fox (1970) the "Sa Huynh type *lingling-o*" (Fig. 8.12), has been the most noticeable form among the green jade ornaments that belong to the Southeast Asian Metal Age. Before this type of *lingling-o* was discovered in the Tabon Cave Complex, Palawan, Philippines, similar artifacts had already been found in Sa Huynh sites in southern Vietnam. Recently, I have investigated the occurrences of this type of artifact in the South China Sea region, and find that they have been found not only near El Nido (northern Palawan) and in the Tabon Cave Complex, but also on Lanyu Island to the southeast of Taiwan, in Central Vietnam, and in Niah Cave, Sarawak, East Malaysia. All these earrings are similar in style, manufacturing technology and size, being about 3 cm in diameter. Two such earrings from the Tabon Caves (Hung and Iizuka 2004) and one from Niah Cave (Iizuka and Bellwood, in perp.) have been analyzed by LVSEM/EDS, and identified as being of Taiwan nephrite.

Table 3: The diameter, thickness and width of three nephrite bracelets from Taiwan and the Philippines.

Site name	outer diameter (cm)	thickness (cm)	width (cm)
Nagsabaran, northern Philippines	6.2	0.3	1.0
Duyong Cave, Palawan, Philippines	6.7	0.4	1.2
Beinan, eastern Taiwan	6.7	0.4	1.2

Table 4: Size of Bell-shaped Jade Beads from Taiwan and the Philippines (Hung *et al.* 2004).

Site name	weight (mg)	length (mm)	width (mm)	height (mm)	hole dia. (mm)	note
Kay Daing, Philippines	76.0	5.0	4.3	3.2	0.8	1 piece
Beinan, Taiwan	88.1	5.2	4.4	3.1	0.9	43 pieces

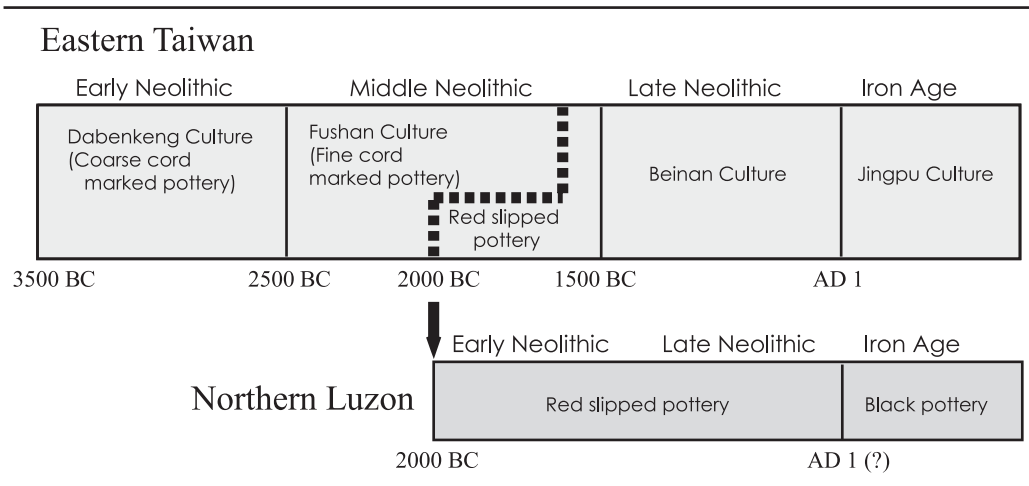


Fig. 9. Chronology of eastern Taiwan and northern Luzon.

In a recent excavation, Peter Bellwood and Eusebio Dizon (this issue) have found two drilled cores, possibly waste from lingling-o earrings of the Sa Huynh type, in the site of Anaro on Itbayat Island, Batanes, half way between Taiwan and the Philippines. After analysis of their mineral chemistry using a non-destructive LV-SEM/EDS technique, both have been confirmed as Taiwan nephrite (Iizuka *et al.* 2005: *this issue*). These results indicate that the Anaro site was a jade (nephrite) workshop, most probably during the Iron Age during the first millennium AD. Based on similarities in pottery decoration, jade ornaments and jar burial practices on Ludaο, Lanyu and Itbayat Islands, I believe that their Early Metal phase inhabitants shared closely related cultures and created new fashions in jade artifacts that spread into the Philippines.

In Cagayan, there is no source of nephrite. Ancient people used other rocks as substitutes to manufacture nephrite-like ornaments. For example, two earrings from the red-slipped pottery layers at Magapit (Ogawa 2002:100) and Irigayen (de la Torre 2000: 128) were of andesite and mica (Kazuhiko Tanaka and Yoshiyuki Iizuka, pers. comm.), but both were of a typical Taiwan style. Probably, this activity of substitution carried symbolic meaning for the Neolithic population of Cagayan.

Based on the above evidence, it can be suggested that ancient Austronesians were very active in trading or exchanging jade from Early Neolithic times through into the Metal Age in the South China Sea region. The whole sequence of quarrying, transport of raw material, ornament manufacture, and subsequent trading of nephrite artifacts forms a complicated series of activities. In the future, more detailed research on this topic is needed. The samples from Taiwan, the Philippines, Vietnam and Sarawak should be brought together for further examination with respect to the sources of their raw materials.

Plant Remains and Animal Bones

Besides the jade artifacts and pottery, the evidence for Neolithic agricultural systems in Taiwan and northern Luzon also plays a key role in understanding prehistoric relationships. The Andarayan site, situated east of Solana in the Cagayan Valley, has rice husk inclusions in pottery that appear in morphological terms to be between cultivated rice (*O. sativa*) and its closest wild relatives and likely ancestors, the perennial *O. rufipogon* Griff. or the annual *O. nivara* Sharma and Shastry (Snow *et al.* 1986:3-4).

Remains of rice have been found in several archaeological sites in Taiwan. These include Zhishanyan in the Taipei Basin; Yingpu and Huilaili in central Taiwan; Nanguanli, Nanguanlidong, Youxianfang, Sanbaozhu and Kending in southern Taiwan; Zhangguang in eastern Taiwan; and Suogang and Chikan B in the Penghu Islands. The oldest dated discoveries of rice and foxtail millet so far come from the Nanguanli and Nanguanlidong sites, located in the Tainan Science-Based Industrial Park in southern Taiwan, dated between 3360 and 1690 BC at the 2 sigma range (Tainan SBIP Project. 2002). During the period of the fine cord-marked pottery (Niuchouzi) culture, rice, foxtail millet, Job's tears and beans were quite common in these Tainan sites (Tainan SBIP Project 2002:4-10). The occurrence of prehistoric rice remains in Taiwan from at least 3000 BC onwards has significant historical and ecological implications for the

evolution of agricultural systems in northern Luzon.

During the Neolithic period in both Taiwan and the northern Philippines, pig and deer bones are very common. In Nagsabaran, we excavated a carabao (water buffalo) skull from the lower silt layer with the red-slipped pottery, and this now requires detailed study and dating.

From Taiwan to Luzon?

The earliest Neolithic in northern Luzon and Batanes (Bellwood and Dizon, this issue) has a very similar assemblage to that of the middle Neolithic in Taiwan. Similarities extend to the shapes of vessels, to the red-slipped, mat-impressed and basket marked pottery decoration, and to the styles of jade ornaments, spindle whorls and clay objects. All of this evidence indicates a close cultural relationship between Taiwan and the Philippines between 2000 BC and 1500 BC. But does the 3500 year old pottery from Nagsabaran, Catugan and Irigayen reveal a direct derivation from the Formosan pottery tradition? This is our current interpretation, given that there is no evidence for an alternative.

The middle Neolithic culture in eastern Taiwan has not been well defined and understood until very recently. In 1968, Richard Pearson pointed out that there were 3 major pottery groups in eastern Taiwan; the early corded complex, and the Tai Yuan Phase and the Ami Complex (Pearson 1968; Pearson 1969:105-106, 128). This hypothesis was not accepted by some archaeologists. Some disagreed, or doubted the existence of corded pottery in eastern Taiwan. However, due to recent excavation, we now have more understanding of prehistoric chronology in eastern Taiwan. Today, most researchers agree there are at least 4 cultural phases in eastern Taiwan following the Changbin Palaeolithic, these being the Dabengkeng (coarse cord-marked pottery), the Fushan Culture (also called fine cord-marked pottery culture), the Beinan Culture (Richard Pearson's Tai Yuan phase), and finally the Jingpu Culture (sometimes referred to as the Amei Culture, probably ancestral to modern Amis).

Before 1500 BC in eastern Taiwan, the middle Neolithic was characterised by fine cord-marked pottery and can be subdivided into 2 chronological phases—an earlier Xiaoma phase and a later Fushan phase (Liu *et al.* 2000:144-147). The Xiaoma phase, ca. 2500 BC-2000 BC, was still dominated by fine cord-marked pottery, as in the lower layer at Laofanshe, Zhihang, and the middle layer of Xiaoma III Cave in Taidong County. During the Fushan phase, ca. 2000 BC-1500 BC, there was a decrease in the quantity of fine cord-marked pottery and an increase in red-slipped pottery. This can be seen in the lower layer of Xiaoma I Cave, and in Yuqiao, Fushan and Yuchang, eastern Taiwan.

The newly-excavated (April 2005) Chaolaiqiao site lies on a hilltop above Doulan Bay, near Taidong, in eastern Taiwan, facing the Pacific Ocean and Luda Island. The assemblage is characterised by mainly red slipped pottery, occasionally with painted decoration on the lips. Pieces of green Fengtien jade were also unearthed from the red slipped pottery layer. As mentioned above, several rim types are shared between

Chaolaiqiao and sites in the Cagayan Valley of northern Luzon. Recently, we have received a C14 date on charcoal from Chaolaiqiao: 3736 ± 43 uncal. BP (WK 17011, 2290-2020 BC calibrated with OxCal Version 3.8). We believe this date indicates the most popular period of the use of red slipped pottery in eastern Taiwan. Therefore, the chronology of the arrival of the Neolithic in northern Luzon can be connected directly with the later phase of the Middle Neolithic in Taiwan (Fig. 9).

If we examine the numbers of archaeological sites from the Early into the Middle Neolithic in eastern Taiwan, we can perhaps infer the nature of the demographic history of the region at this time, in order to seek reasons for the movements to the Philippines. Before 2500 BC, there were only around 6 Dabengkeng sites reported along the eastern coast. But between 2500 BC and 1500 BC, more than 43 fine cord-marked sites are recorded (see attached map of Tsang and Yeh 2000). This could imply considerable population increase during that period.

In terms of the locations of these 43 fine cord-marked sites, about 30 are located between the mouths of the Mawuku and Beinan Rivers. Nowadays, the only available harbour in this region is Doulan Bay, with archaeological sites at Zhihang, Jalulan, Fushan, Shanyuan and Chaolaiqiao. At present, we estimate that more than 15 fine cord-marked pottery sites exist around the Bay. From the quantities of potsherds recovered, it appears that there were several big villages located in this area after 2500 BC. It is in these sites that we find the most cultural similarities with the Nagsabaran assemblage.

In a place with relatively restricted flat land, such as Doulan Bay, what would have been the resources that enabled a large population to survive 4000 years ago? Did the ancient people have enough economic resources to support themselves in such a narrow space, or were there motivations for them to cross the sea to search for new land in the Philippines? According to a recent pollen analytical study in the I-Lan area, adverse environmental and climatic changes occurred in northeastern Taiwan between 2000 BC and 1500 BC (Lin 2004), and these could have exacerbated the situation.

Perhaps there were several motives for Austronesian migration beyond Taiwan, and we are now uncovering evidence about the key formative stage in this process. In 1970, K.C. Chang noted ". . . the strong probability that the bulk of the modern Malayopolynesian speakers on the island [of Taiwan] descend from the two major prehistoric cultures, Lungshanoid (the fine-corded marked pottery culture) and Yuanshan (Chang 1970:74)." After more than 30 years of subsequent research, we now know that Yuanshan was a Late Neolithic culture in northern Taiwan that followed the fine cord-marked cultures in time. It was the preceding phase of the fine cord-marked pottery cultures, especially in southern and eastern Taiwan, that was the most significant period in terms of Neolithic relationships between Taiwan and the Philippines.

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Appendix 1: Archaeological site names used in this report.

Amei	阿美	Nanguanlidong	南關里東
Beinan	卑南	Niuchouzi	牛稠子
Chaolaiqiao	潮來橋	Niumatou	牛罵頭
Changpanqiao	常盤橋	Penghu	澎湖
Chikan B	赤崁B	Pinglin	坪林
Dabengkeng	大埕坑	Qiguan	奇觀
Dakeng	大坑	Sanbaozhu	三抱竹
Daoye	道爺	Shanyuan	杉原
Donghe-I	東河-I	Xiaoma	小馬
Fengbitou	鳳鼻頭	Xuntangpu	訊塘埔
Fushan	富山	Yanliao	鹽寮
Huilaili	惠來里	Yingpu	營埔
Jialulan	加路蘭	Youxianfang	右先方
Jingpu	靜浦	Yuchang	漁場
Kending	墾丁	Yuchangnan	漁場南
Lanyu	蘭嶼	Yuqiao	漁橋
Laofanshe	老番社	Zhangguang	長光
Ludao	綠島	Zhihang	志航
Mawuku	馬武窟	Zhishanyan	芝山岩
Nanguanli	南關里		

in alphabetical order, using Pinyin spelling with Chinese Traditional.

台灣和菲律賓北部新石器時代的文化關係： 從卡加煙河谷出土的陶器及玉器談起

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關於古南島語族的起源與擴散方向，在考古學上有許多不同的觀點，其中主要的理論包括以台灣為起源地的由北向南說或是以印尼或菲律賓為起源地的由南向北說。對於這些理論的檢視，台灣與菲律賓北部的史前文化關係扮演了一個關鍵性的地位。

本文透過菲律賓呂宋島卡加煙流域最早期的新石器文化與台灣新石器文化間的器物比較，尤其是卡加煙諸遺址底層所出土的陶器、陶飾品及玉器和台灣同類器物在型態、紋飾和質地上的分析，結果發現呂宋島北岸新石器早期文化中的許多要素皆可見於台灣新石器中期文化的內涵。

除了器物的比較之外，本文結合年代學的證據，而認為菲律賓呂宋島北部的新石器早期文化，即紅彩陶文化，很可能來自台灣新石器時代中期文化的擴張發展，而其中又與台灣東海岸細繩紋陶文化晚期，距今3500到4000年間的紅彩陶階段最有關連性。

關鍵字：台灣，北呂宋，新石器時代，南島語族，遷移。
