

**PREHISTORIC POTTERY SOURCES AND TECHNOLOGY IN
PENINSULAR MALAYSIA BASED ON COMPOSITIONAL
AND MORPHOLOGICAL STUDIES**

by

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SUMBER DAN TEKNOLOGI TEMBIKAR PRASEJARAH DI SEMENANJUNG MALAYSIA BERDASARKAN KAJIAN KOMPOSISI DAN MORFOLOGI

ABSTRAK

Kajian ini cuba mengenalpasti sumber-sumber tembikar prasejarah untuk menentukan kawasan-kawasan pengeluarannya di Semenanjung Malaysia. Penentuan kawasan-kawasan ini akan dapat menyumbang terhadap penyelesaian isu mengenai asal-usul tembikar "Black Ware" dari Bukit Tengku Lembu yang telah dikatakan mempunyai asal-usul asing.

Kaedah komposisi, yang digunakan kali pertama dalam kajian tembikar prasejarah di Malaysia, digabungkan dengan kaedah morfologi untuk mengkaji sebanyak sembilan puluh tujuh serpihan tembikar. Sampel-sampel tembikar ini diperolehi dari tapak Bukit Tengku Lembu, Kodiang, Gua Cha, kompleks gua Lenggong, Gua Kecil, Gua Sagu, dan Jenderam Hilir. Kaedah komposisi melibatkan analisis pendarflour sinar-X untuk menentukan komposisi unsur manakala analisis pembelauan sinar-X dan analisis petrografi (keratan nipis) digunakan dalam penentuan komposisi mineral. Kaedah morfologi pula melibatkan analisis warna, tekstur, ketebalan, keporosan, pengeemasan permukaan, dan hiasan pada sampel-sampel tembikar supaya dapat memahami teknik-teknik pembuatan.

Hasil kajian ini mencadangkan bahawa kawasan-kawasan pengeluaran tembikar prasejarah terletak berdekatan dengan tapak-tapak yang dikaji. Ini dilihat dalam analisis "multivariate statistical", yang melibatkan

analisis "scatterplots" dan analisis "discriminant". Dalam analisis ini, sampel-sampel tembikar dari setiap tapak membentuk kumpulan komposisi masing-masing. Tujuh unsur: titanium, ferum, rubidium, strontium, yttrium, zirconium, dan barium, telah dikenalpasti sebagai petunjuk yang sesuai untuk membezakan tembikar-tembikar dari setiap tapak.

Tembikar "Black Ware" dari Bukit Tengku Lembu pula didapati merupakan tembikar buatan tempatan. Berdasarkan atas kajian komposisi dan morfologi, tembikar ini membentuk kumpulan komposisinya tersendiri dan didapati menggunakan tanah liat tempatan dengan teknologi pembuatan yang sama seperti tembikar dari tapak-tapak yang lain. Kajian ini juga menunjukkan bahawa sumber tanah liat dan teknologi pembuatan yang sama digunakan secara berterusan untuk satu jangka masa yang agak lama. Ciri-ciri teknologi ini terdiri dari suhu pembakaran yang rendah (500°C sehingga 600°C), penggunaan kuartza dan grog sebagai bahan pewajaan, dinding sederhana berpurata di antara 0.50 mm dan 0.25 mm, keporosan tinggi yang berpurata di antara 25% dan 35%, dan pengemasan dan hiasan permukaan di dalam bentuk bertanda tali, bergilap, dan bersalutan.

Pendekata, penggabungan kaedah komposisi dengan kaedah morfologi dalam kajian ini menunjukkan bahawa tembikar presejarah dihasilkan berdekatan tapak-tapak yang dikaji. Didapati juga, tembikar "Black Ware" adalah tembikar buatan tempatan, dan perkembangan teknologi tembikar adalah perlahan dan tiada pertukaran tembikar berlaku diantara tapak-tapak yang dikaji.

ABSTRACT

This study attempts to identify prehistoric pottery sources in order to locate areas of prehistoric pottery production in Peninsular Malaysia. The identification of pottery production areas can help resolve the issue of the origins of the "Black Ware" from Bukit Tengku Lembu, which was said to have had foreign origins.

The compositional approach, used here in pottery studies for the first time in Malaysia, was combined with the traditional morphological approach to study a total of ninety-seven pottery sherds. These samples were obtained from the sites of Bukit Tengku Lembu, Kodiang, Gua Cha, the Lenggong cave massifs, Gua Kecil, Gua Sagu, and Jenderam Hilir. In the compositional approach, X-ray fluorescence analysis was used to determine the elemental composition of the sherds while thin-section petrographic analysis and X-ray diffraction analysis were applied to identify the mineralogical composition. The morphological approach involved analyses of the pottery colour, texture, thickness, porosity, surface finish, and decoration in order to understand the manufacturing techniques.

Results of this study strongly suggested that areas of pottery production were located within each of the sites studied. This was shown in the multivariate statistical analysis, involving scatterplots and discriminant analysis, where each of the sites studied formed its own compositional group. In this analysis, seven elements: titanium, iron, rubidium, strontium, yttrium, zirconium, and

barium, were found to be the best indicators for distinguishing pottery sherds from the different sites studied.

The "Black ware" from Bukit Tengku Lembu was also found to be locally made. Based on the compositional and morphological studies, this pottery was found to form its own compositional group and was made using local clays and technology similar to pottery from the other sites studied. This study also indicated that prehistoric potters generally used the same clay source(s) and pottery technology continuously over a substantial period of time. Technological characteristics prevalent over several thousand of years include low fired pottery (500°C to 600°C), quartz and grog tempered, medium paste texture of between 0.50 mm and 0.25 mm, medium walls averaging 8.0 mm in thickness, high porosity averaging between 25% and 35%, and common surface finishing and decoration in the form of cord-marking, burnishing, and slipping.

In short, this study shows that the use of the compositional approach combined with the morphological approach has been able to indicate that prehistoric pottery were produced within each of the sites studied. Also, the "Black Ware" was found to be of local origin and that there was a slow development in pottery technology and no bartering in pottery among the sites studied.

CHAPTER 1

PREHISTORIC POTTERY IN SOUTHEAST ASIA

Statement of problem

Pottery represents one of prehistoric man's most tangible products. Its universal occurrence and its relatively imperishable nature have made it an important "tool" for archaeologists and prehistorians to reconstruct past cultures and also to use as an indicator of a cultural stage i.e. "Neolithic". Up until the 1930s, pottery shape, decoration, and techniques of manufacture have been widely used in extracting and interpreting cultural information on technology, culture contact, population movement, art and even religion (MacNeish *et al.* 1970, Grieder 1975).

In Malaysia, this morphological approach has thus far been the only method used in pottery studies. Such a traditional approach, though fundamental, can and has often led to much ambiguity. This is mainly because shape and decoration, the only criteria used in classification, can be replicated through population movement or culture contact. The "Black Ware" of Bukit Tengku Lembu in Perlis is a good example of the use of morphological approach that led to ambiguities and controversies. Based on its shape and decoration, the "Black Ware" was said to have originated from Attic Greek (Williams-Hunt 1952), Lung Shan (Peacock 1959), and even Northern India (Sieveking 1962). These findings were highly debatable and were shown to lack strong evidence. In order to avoid such disputable interpretations, pottery studies should incorporate more reliable methods.

The present study uses compositional and morphological approaches to study prehistoric pottery in Peninsular Malaysia. In the compositional approach, chemical and mineralogical techniques were used to analyse the pottery composition in order to identify pottery sources and technology. Distinctive trace elements and minerals in the pottery composition were used in identifying pottery sources. Pottery technology can also be derived using the compositional approach e.g. the choice and preparation of raw materials is reflected directly by the pottery composition. The range of firing temperatures used can also be known from thermal changes in certain minerals. Such technological traits in pottery manufacture can also be a useful way of recognizing cultural connections and provide stronger evidence of tradition and culture than shape and decoration (Kempe and Harvey 1983:312).

In Europe and America, archaeologists have long acknowledged the importance of the compositional approach in pottery studies since the 1930s and 1940s e.g. pioneering studies done by Buttler (1935), Shepard (1942), and Peacock (1968). This approach has also been used in Europe to define pottery "type" based on form-plus-paste (Hulten 1974). Form can be defined here as shape, texture, colour and surface finish. Paste (or fabric) means the constituents of fired pottery, including inclusions, pores, and glass, but excluding surface coatings (Rye 1981).

In Southeast Asia, however, there is yet no adoption of the compositional approach in defining such standardised terminology (Vincent 1990). Traditionally, archaeologists and prehistorians used only the morphological approach. They have only begun in the last decade to use the compositional

approach. This can be seen in pottery studies conducted in Thailand, Philippines, Singapore, and the Andaman islands which produced rewarding results (Vincent 1984, 1987, 1988, Pookajorn 1984, McGovern *et al.* 1985, Coutts *et al.* 1985, Copper and Raghavan 1989, and Miksic and Yap 1990, 1990a). However, in Malaysia, this approach has yet to be used. The present study is, therefore, a pioneering attempt at using such an approach on prehistoric pottery in Malaysia.

Pottery in cultural interpretation

In this section, we will survey the current paradigms in pottery studies in Southeast Asia. Discussions will be divided into two major geographical areas, namely mainland Southeast Asia and island Southeast Asia. These two areas appear to form separate entities in pottery chronology and typology. Thus, this section will also survey these two regions in order to identify the differentiating and unifying features within each area.

In terms of chronology (Table 1.1), pottery appeared in mainland Southeast Asia much earlier, dating to about 7000 B.C. (Gorman 1970), compared to those in island Southeast Asia which was dated mostly to around 3000 B.C. (Peterson 1974, Bellwood 1985).

Local variations also existed within mainland and island Southeast Asia as seen from the shapes and decoration of the pottery (Table 1.2). On mainland Southeast Asia, pottery with cord-marked decoration was very common over time and space. However, in island Southeast Asia, cord-

marked pottery and the associated "Hoabinhian-like" stone tools were not common or virtually absent from most of the known sites (Table 1.2). Instead, a majority of the pottery found in island Southeast Asia were either plain, red-slipped or decorated with carved- paddle impressed designs (Table 1.2).

Pottery shape also differed between these two regions e.g. the tripod pottery found in Ban Kao in Thailand and Jenderam Hilir in Peninsular Malaysia was not found in the island regions (Table 1.2). On the other hand, burial jars, a late phenomenon in Southeast Asian prehistory, dating from around 1000 B.C., were commonly found in the island regions, for examples, Tabon Caves in the Philippines and Melolo in Indonesia but were rare on the mainland except at Sa-Huynh in central Vietnam (Map 1.1). However, the Sa-Huynh burial jars were believed to have been brought by the first Chamic settlers from the Indo-Malaysian islands as such jar burial tradition was not common on the mainland (Bellwood 1979:191). Other pottery shapes, such as spouted vessels recovered from Niah Cave in Sarawak, the Madai-Baturong cave massifs in Sabah, and Tabon Cave in the Philippines were also virtually absent in mainland Southeast Asia.

Mainland Southeast Asia

In mainland Southeast Asia, archaeologists and prehistorians have traditionally used pottery shape and decoration as time markers in defining cultures and in establishing relative and regional chronologies e.g. the sites of Non Nok Tha and Ban Na Di in Thailand (Bayard 1970, Higham and Kijngam 1984).

Table 1.1: Chronology of pottery sites in Southeast Asia

dates (B.C.)	Mainland Southeast Asia					Island Southeast Asia		
	Thailand	Burma	Vietnam	Cambodia	Peninsular Malaysia	Philippines	East Malaysia	Indonesia
7,000	Spirit Cave							
6,000		Padah Lin Cave						
5,000			Da But			Laurente Cave Sanga-Sanga		
4,000	Non Nok Tha			Laang Spean	Gua Teluk Kelawar			
3,000	Ban Chiang		Phung Nguyen Quyinh Van		Gua Kecil Jenderam Hilir Gua Harimau	Dimolit		Bui Ceri Uato Leang Tuiwo Mane'e Ulu Leang Uai Bobo
2,000	Ban Kao Suang Bep Lang Rongrien Ban Na Di Khao Kansab Nam Na Ching Khao Sam Liam		Long Thanh		Gua Bt. Tukang Gua Cha	Arku Cave Lal-Lo Edjek Bagumbayan Ngipet Dulgut Leta-Leta	Gua Sireh Agop Atas	Minanga Sipakko Kalumpang
1,000			Phu Hoa Hang Gon Sa-Huyrh	Somrong Sen	Gua Taat	Manunggul A Tabon Cave Batungan Cave Duyong Cave Uyau Kalanay Pagoyona Tadyaw Manunggul B Guri	Lubang Angin Bkt. Tengkorak	
0						Rito-Fabian	Pusu Samang Tas	

Table 1.2: Southeast Asian Prehistory Pottery Comparison.

Pottery Characteristics	Mainland Southeast Asia					Island Southeast Asia		
	Peninsular Malaysia	Thailand	Burma	Vietnam	Cambodia	East Malaysia	Indonesia	Philippines
<u>Decoration:</u>								
1) Cord-marked	v.common	very (v.) common	common	common	present	present	present	present
2) Carved; paddle-impressed	common	rare	absent?	present	rare	v.common	common	common
3) Incised and impressed	rare	present	absent?	common	common	common	common	common
4) Incised	rare	common	absent?	common	common	common	common	common
5) Basket-marked	rare	present	rare	present	rare	present	rare	rare
6) Red slipped	present	present	absent?	present	rare	common	common	v.common
7) Plain	present	rare	absent?	present	rare	common	common	v.common
8) Burnished	present	present	absent?	rare	rare	present	rare	rare
9) Black burnished	present	present	absent?	absent	absent	absent	absent	absent
10) Painted	absent	present	absent?	present	v.rare	present	v.rare	present
<u>Shapes:</u>								
1) Simple bowls	common	common	absent?	present	absent?	present	present	present
2) Carinated vessels	common	common	absent?	present	present	present	present	present
3) Globular vessels	present	common	absent	present	present	common	present	present
4) Footed vessels (pedestalled)	common	common	absent?	present	absent?	present	present	present
5) Pot-stands	present	present	absent?	absent?	absent?	absent	absent	absent
6) Perforated vessels	present	present	absent?	absent?	absent?	absent	absent	absent
7) Cylindrical vessels	present	present	absent	rare	absent?	v.rare	v.rare	v.rare
8) Tripod vessels	present	present	absent	absent	absent	absent	absent	absent
9) Spouted vessels	v.rare	v.rare	absent	absent	absent	present	absent	present
10) Jars	v.rare	rare	absent	present	absent	common	common	common

Map 1.1: Distribution Of Pottery Sites In Southeast Asia



Whole cultures are named after pottery e.g. the culture of the people who made and used cord-marked pottery and the Sa-Huynh pottery were called the "Cord-Marked Pottery Culture" and "Sa Huynh Culture" respectively (Chang 1964, Solheim 1964, 1967). Connections among these cultures have also been made through pottery shape and decoration over time and space, e.g. the Sa Huynh pottery in south and central Vietnam are connected to the Kalanay pottery in central Philippines, the Niah pottery in Sarawak, and other areas in Southeast Asia as the Sa Huynh-Kalanay Pottery Tradition (Solheim 1967).

The use of compositional and technological approaches in pottery studies in mainland Southeast Asia is relatively recent and limited. These approaches have been used mainly on pottery from Thailand e.g. studies done by Vincent (1984, 1987, 1988, 1990), McGovern *et al.* (1985), and Pookajorn (1984). In the following sections, we will discuss current pottery studies and the development of pottery cultures in the mainland countries of Thailand, Burma, Vietnam, Cambodia, and Peninsular Malaysia.

Thailand: In Thailand, sites with pottery are mainly located in the northern region. These sites include Spirit Cave, Non Nok Tha, Ban Chiang, Ban Chiang Hian, and Ban Na Di (Map 1.1). Other sites include Ban Kao, Sai Yok, Ongba Cave, and Tham Khao Sam Liam in west central Thailand and also sites such as Buang Bep, Lang Rongrien, Khao Kanap Nam, and Na Ching in southern Thailand (Map 1.1). The description below follows an approximate chronological order of these pottery sites.

Spirit Cave: Spirit Cave in north-west Thailand reported one of the earliest dated pottery in mainland Southeast Asia (Table 1.1). Pottery here was dated back to about 7000 B.C. (Gorman 1970) and was found associated with "Hoabinhian-like" stone tools in the second layer of the site. These pottery sherds were estimated to have come from approximately twenty vessels and are mainly of cord-marked designs. Other designs include applied and incised decoration. Some sherds with plain and burnished surfaces were also found. Organic resinous coatings are visible on some of the sherds from this site. Techniques of manufacture included impact modelling and paddle finishing with bounded cords.

Non Nok Tha: A later site, known as Non Nok Tha, dating back to 4000 B.C. (Bayard 1970, Solheim 1970) was also discovered in north-eastern Thailand. Non Nok Tha produced a variety of pottery types which were grouped into six classes on the basis of shape and base form (Bayard 1983).

Ban Chiang: The site of Ban Chiang was dated to around 3000 B.C. (Gorman and Charoenwongsa 1976, White 1986). The wide variety of pottery discovered in this site include beaker-shaped vessels with red-slipped and applied surfaces, incised and cord-marked pottery, red-on-buff pottery, and incised and painted pottery.

Like Non Nok Tha, Ban Chiang was similarly divided into three periods: the early, middle, and late periods by White (1982), based on pottery shape and decoration. A distinction in manufacturing techniques between the early and late periods was also made by using petrographic, neutron activation, and

xeroradiography analyses (White *et al.* 1990). Physiochemical analyses of the Ban Chiang pottery using petrographic techniques, scanning electron microscope, and proton-induced x-ray emission spectroscopy indicated a highly conservative pottery industry over several thousand years (McGovern *et al.* 1985).

Ban Na Di: The site of Ban Na Di in northeast Thailand had pottery assemblages similar to those of Ban Chiang. The Ban Na Di site was dated between 1500 B.C. to the present (Higham 1984).

Pottery shapes include cord-marked vessels with round bases, which often have bands of applied clay round the upper parts. Surface decorations include cord-marked, incised, and painted designs. A decorative motif known at Ban Chiang as "curvilinear applique" is also observed. Petrographic studies on the Ban Na Di pottery suggested that the pottery were both of local origin and "imports" (Vincent 1984).

Ban Kao: Ban Kao is located in Kanchanaburi province, west of Bangkok. The first radiocarbon date for the site was about 1800 B.C. (Sorensen 1965). However, there is some uncertainty over the dating of the site (Parker 1968, Sorenson 1973, Sieveking 1974).

The Ban Kao pottery included a variety of ring footed, pedestalled, tripod, round, and flat-bottomed vessels. Sorenson (1972) classified the Ban Kao pottery, based on pottery typology (and adze types) into three periods; (1) Early Neolithic, (2) Late Neolithic, and (3) Late Period. The Early Neolithic

Period is characterized by vessels with ring foot, pedestals, and tripods while the Late Neolithic Period consists of mostly round or flat-based vessels. The late period, on the other hand, has no pottery but has two burials associated with iron objects.

Analyses of the Ban Kao pottery using wet chemical techniques suggested contact among various groups of the highland and lowland sites in Ban Kao (Pookajorn 1984). The Ban Kao Culture has also been connected to cultures in western and southern Thailand, e.g. Sai Yok and Ongba Cave in the Kanchanaburi Province and also to those in northern Peninsular Malaysia, e.g. Gua Cha, Koding, and Bukit Tengku Lembu (Sorenson 1962, 1972, 1988). Sorenson used common pottery types to suggest these cultural connections.

Pottery types, e.g. the tripod, pedestalled and carinated vessels found in Lang Rongrien, Khao Kanap Nam, Na Ching, and Tham Khao Sam Liam in Kanchanaburi, western Thailand and Buang Bep in the Surat Province of southern Thailand, were similarly linked to the Ban Kao Culture (Evans 1931, Anderson 1984, 1988). Sorenson (Sorenson and Hatting 1967, Sorenson 1988) further ascribed a Chinese Lungshanoid origin for the Ban Kao Culture based on the pottery types and their associated artifacts. However, this has not been accepted. Parker (1968) has disagreed and believes that the Ban Kao burials belonged essentially to the early iron age and not the Neolithic. Solheim (1964), moreover, considered the neolithic pottery in Ban Kao to be part of the Sa Huynh-Kalanay Pottery Tradition.

Burma: U Aung Thaw (1971) has reported a series of dates for the site of Padah-Lin Cave in east Burma (Map 1.1). Here, cord-marked sherds were found associated with stone tools, bones, and shells. These cord-marked pottery most probably came from layer 2 and 3 which had been radiocarbon dated by charcoal samples to between 4500 B.C. and 6000 B.C.

Vietnam: In Vietnam, archaeological sites with pottery include Da-But and Phung Nguyen in northern Vietnam, Quynh Van, Binh Chau, Long Thanh, Sa-Huynh, Bau-Tro, and Minh- Cam in central Vietnam, and Phu Hoa and Hang Gon in Southern Vietnam (Map 1.1).

Da-But: Da-But has a radiocarbon date of around 4145 B.C. (Ha Van Tan 1984-1985). Pottery found in this site consists of round-bottomed pots and bowls with straight or slightly everted rims. Decorations include only basket-impressed designs. The pottery was hand-molded, low fired, and sand-tempered.

Phung Nguyen: The site of Phung Nguyen is believed to date between 3000 B.C. and 2500 B.C. (Ha Van Tan 1984-1985). The Phung Nguyen pottery shows common cord-marked, comb-incised, and carved-paddle impressed decorations that were wheel-made (Boriskovsky 1968-1971). The pottery also has characteristic features of high ring foot and decorations of comb or roulette-impressed dots amid incised lines.

Quynh Van: The site of Quynh Van in the Nghe Tinh province, central Vietnam dates to about 2850 B.C. for pottery (Ha Van Tan 1984-1985). The Quynh

Van pottery consists of pointed-bottomed vessels with combed designs, made by using the coiling technique.

Binh Chau: The site of Binh Chau in Nghia Binh province is believed to predate that of the Sa-Huynh periods based on pottery types and associated artifacts (Ha Van Tan 1984- 1985). Common pottery shapes found in Binh Chau include carinated or everted round-bottomed pots and ring-footed globular pots. The pottery has cord-marked, incised, impressed, and incised and painted decorations.

Long Thanh: The site of Long Thanh in the Nghia Binh province has two radiocarbon dates of 1420 B.C. and 925 B.C. (Ha Van Tan 1984-1985). The Long Thanh pottery consists of burial jars, vase-shaped pots, low-bellied pots, high-necked pots, and ring-footed pots with incised and impressed decoration of curvilinear scrolls and wave-like designs.

Sa-Huynh: The site of Sa-Huynh is radiocarbon dated to as early as 600 B.C. by the other Sa-Huynh Culture sites of Hang Gon and Phu Hua in southern Vietnam (Bellwood 1979:278). The Sa-Huynh culture is believed to have developed out of the Binh Chau and Long Thanh cultures (Ha Van Tan 1984-1985). The Sa-Huynh pottery assemblage is characterised by its burial jars. The burial jars were large, round-based, and usually plain or decorated with cord-marked and sometimes incised designs. Other pottery types include smaller round-based and footed pots decorated with incised and "Arca" shell-edge impressed designs.

Elsewhere in central Vietnam, pottery with cord- marked, incised, and painted decoration have been found in Bau-Tro and Minh-Cam (Bellwood 1979:179). Ha Van Tan (1984-1985) categorised the prehistoric pottery in Vietnam based on pottery shape and decoration into two groups: (1) the early prehistoric pottery and (2) the late prehistoric pottery.

The early prehistoric pottery, dating between 4000 B.C. and 5000 B.C. is represented by two pottery complexes, namely, the Quynh Van pottery complex and the Da-But pottery complex. The Quynh Van pottery complex consists of pointed-bottomed vessels with combed-impressed designs while the Da But pottery complex has round bottomed vessels with designs from basketry wrapped paddles.

The late prehistoric pottery complexes, dating between 3000 B.C. and 1000 B.C., include those of the Phung Nguyen, Dong Dau, and Go Mun cultures. Pottery of this period has decoration of cord-marked, red-slipped, and incised designs and was manufactured using the potter's wheel and paddle and anvil techniques. The late prehistoric pottery shows parallels to other pottery complexes in Southeast Asia (Bayard 1977, Peacock 1959, Solheim 1964a).

Cambodia: In Cambodia, the two archaeological sites with significant pottery finds are Laang Spean and Somrong Sen (Map 1.1). These two sites have been dated to between 4300 B.C. and 1200 B.C.

Laang Spean: In this site, pottery appeared as early as 6240 ± 70 B.P. or 4290 B.C. (Mourer 1977:53). Based on pottery types and associated artifacts, the chronology of the site was divided into five cultural levels (Mourer 1977:32). Abundant cord-marked or paddle-impressed pottery first appeared at cultural level II in association with Hoabinhian tools. From cultural levels III to V, covering a time range of between 2050 B.C. and 830 A.D., the pottery became more evolved with greater elaboration.

Pottery decorations consist of mainly incised and impressed designs. The four main types of impression used were cord-marking, pointille impression, semi-circular impression, and wide and shallow marks of furrows outlined with a blunted point. Painting is only evident in one vessel. Pottery shapes include ring-footed cups, flat-bottomed containers, and spherical pots. The pottery were all hand moulded and no evidence of the use of the wheel was found.

Somrong Sen: The site of Somrong Sen dates to about 1300 B.C. (Carbonnel and Delibrias 1968). Pottery found in this site consists of mainly sherds and a few complete vessels which include footed cups and bowls, some richly decorated with geometric designs (Mourer 1977:43). Other pottery shapes include footless vessels with convex bottoms. Only one vessel has a flat bottom. Pottery decoration is exclusively geometric with a combination of cord-marked impressions, crossed incisions, wavy lines, aligned punctuations, and the 'dents de loup' pattern. The pottery was made without a wheel, but with an anvil and a paddle.

Peninsular Malaysia: Pottery found in Peninsular Malaysia dates from about 5000 B.C.¹ Among the dated sites with pottery are Gua Teluk Kelawar and Gua Harimau in Perak, Gua Kecil in Pahang, Gua Cha in Kelantan, and Jenderam Hilir in Selangor (Map 1.1). More than 80% of the sites with pottery are undated e.g. Gua Musang in Kelantan, Bukit Tengku Lembu in Perlis, Gua Berhala in Kedah, the limestone caves in Perak, and Nyong in Tembeling, Pahang (Map 1.1). Two of the most significant sites in Peninsular Malaysia, where large pottery assemblages were discovered, are Gua Cha in Kelantan and Bukit Tengku Lembu in Perlis.

Gua Cha: Pottery in the site of Gua Cha dates to 3020 ± 270 B.P. or 1070 B.C. (Adi 1985:35). The various types of pottery recovered in Gua Cha include footed vessels, carinated bowls, biconical vessels, globular vessels, simple bowls, rounded containers, bucket-shaped vessels, beakers, pot-stands, perforated cups, and jars (Peacock 1959:125-135). The pottery here is commonly decorated with cord-marked designs. Some plain and red-slipped pottery were also found. One of the vessels has spiral and pointille comb-impressed decorations.

Bukit Tengku Lembu: The Bukit Tengku Lembu pottery assemblage comprises trumpet-shaped vases, cylindrical vase, wide-mouthed pots, goblets, bi-conical pots, round-bottomed pots, waisted pot-stands, round-bottomed pots with everted rims, and rounded bowls (Peacock 1959:142). A majority of the pottery are cord-marked, but some are plain or burnished. Two "Black Ware" sherds

¹ Chapter 2 discusses pottery in Peninsular Malaysia in greater detail.

and a few sherds decorated with chevron and lattice designs were also found (Williams-Hunt 1952, Peacock 1959).

Typological comparisons linked the Gua Cha and Bukit Tengku Lembu pottery to those of the Ban Kao Culture in Thailand (Sorenson 1972). The tripod pottery found in the sites of Gua Berhala in Kedah and Jenderam Hilir in Selangor has been linked to the Ban Kao Culture of Thailand (Leong 1986).

Island Southeast Asia

In island Southeast Asia, prehistoric pottery has also been used in cultural interpretations. Bellwood (1979:220), for example, developed a four period chronological sequence based on pottery typology for sites in Taiwan, the Philippines, Sarawak, and Indonesia. Cultures and complexes have been named after pottery e.g. the Lapita pottery, the Kalanay pottery, and the Tabon pottery has been called the "Lapita Culture", the "Kalanay Pottery Complex", and the "Tabon Pottery Complex" respectively (Bellwood 1979:244, Fox 1970:103). The Kalanay and Tabon Pottery Complexes in the Philippines, the Niah Pottery Complex in Sarawak, and related pottery from other areas in Southeast Asia has been linked to the Sa Huynh Pottery Complex in Vietnam as the Sa Huynh-Kalanay Pottery Tradition (Solheim 1967, 1967a).

Pottery traditions and complexes have also been used by archaeologists and prehistorians in documenting population movements into island Southeast Asia. The widespread jar burial complexes and traditions in the island regions, e.g. the Sa Huynh-Kalanay Pottery Tradition, are considered

to be the results of Austronesian migrations either from the northern and eastern regions in island Southeast Asia or from Southern China and Indo-China (Beyer 1948, Solheim 1959, 1967, 1975, Fox 1970:166, Bellwood 1979:212).

In the islands of Java, Sumatra, Borneo, and Palawan, pottery appeared only around 3000 B.C. to 5000 B.C. for example, the plain and red-slipped pottery, found in the sites of Laurente Cave (5880 B.C.), Musang Cave (3740 B.C.), Dimolit in north-eastern Luzon (3000 B.C.), and the Sanga-Sanga Islands in Sulu archipelago (5545 B.C. - 4700 B.C.). (Heekeren 1957, Evangelista 1964, Solheim 1964, Peterson 1974, Bellwood 1985, Peralta 1985). Cord-marked pottery was probably introduced into island Southeast Asia as a result of this belated cultural flow from the mainland. Such new traits from the mainland are believed to have reached the islands at around 3000 B.C. through seafaring. Archaeological evidence also suggests a similar time frame of between 3000 B.C. and 1000 B.C. for effective seafaring to occur in Southeast Asia (Dunn 1970, Shutler 1962).

The following is a discussion on the development of pottery cultures in the Philippines, East Malaysia (Sabah and Sarawak), and Indonesia.

Philippines: In the Philippines, the earliest pottery were found in the archaeological sites of Laurente Cave, Musang Cave, Dimolit, Arku Cave, and Lal-Lo in northern Luzon, and Sanga-Sanga islands in Sulu Archipelago (Map 1.1). Other sites with pottery include Edjek in Negros Island, Bagumbayan, Kalanay, and Batungan in Masbate Island, and Leta-Leta, Duyong Cave, Pilanduk,

Tabon Cave, Manunggul, Ngipe't Dulgut, Uyaw, Pagayona, Tadyaw, Guri, and Rito- Fabian in Palawan (Map 1.1). The following is a description of pottery types found in these sites, according to chronological order.

Laurente Cave (Luzon): This site, located in Penablanca, Cagayan reported the earliest pottery in the Philippines, with a tentative radiocarbon date of 7830 \pm 170 B.P. or 5880 B.C. (Peralta 1985:33). The pottery sherds are plain and were found associated mainly with lithic artifacts such as flake tools, cores, debitage, pebble-cobble tools, and hammerstones.

Sanga-Sanga islands (Sulu): The Sanga-Sanga islands produced two radiocarbon dates of 5545 B.C. and 4700 B.C. (Spoehrer 1973). A large quantity of pottery sherds was found, some with red-slipped surfaces, together with stone tools, silicified wood, bone tools, and a shell adze.

Musang Cave (Luzon): Musang Cave is located in the Penablanca limestone formation in the Cagayan Valley, northeast Luzon. The second cultural level of the site yielded pottery dated to 3740 B.C. (Thiel 1988-1989:77). Approximately sixty-seven vessels were found in this site. The pottery comprises globular pots and bowls, some with ring feet. The pottery has red-slipped and polished surfaces, and were made using the paddle and anvil technique.

Dimolit (Luzon): Dimolit is an open site located near Palanan Bay in Isabela province, northern Luzon. The site produced three rather widely-spaced radiocarbon dates with an average of about 5120 \pm 220 B.P. (Peterson 1974, Bellwood 1985:223). The pottery levels probably date to between 3000 B.C.

and 2500 B.C. Pottery shapes include globular pots, carinated vessels, and shallow dishes. Some of the shallow dishes have ring feet. The pottery is plain, red-slipped, or decorated with punctuation designs. The use of the coiling and the paddle and anvil techniques were noted in some of the pottery.

Arku Cave (Luzon): Arku Cave in northern Luzon has a series of dates of about 1000 B.C. (Peralta 1985:40). This site was also dated to between 2200 B.C. and 50 B.C. (Thiel 1986-1987:229). A large amount of pottery, including burial jars, were recovered at this burial site. The pottery has shapes which include very small pots, small pots, globular vessels, pots, large pots, shallow bowls, bowls, large bowls, deep bowls, large deep bowls, and cylindrical jars. The pottery surfaces were commonly red-slipped. Some pottery with incised and circle designs were also found. These pottery types are very similar to those of the Tabon pottery complex in Palawan. Other distinctive pottery types include oval bowls and the cylindrical jars with straight sides and flat base.

Lal-Lo (Luzon): The site of Lal-Lo, located in the lower reaches of the Cagayan river in northeast Luzon has pottery dated to about 1800 B.C (Thiel 1986-1987). Recently, excavations at this site dated the pottery to about 1000 B.C. (Aoyagi *et al.* 1991). A majority of the pottery here comprise bowls with slightly curved rims and rounded lips, some with ring feet. Other pottery shapes included vessels with everted rims, dishes with upturned rims, globular vessels, straight-sided vessels, and bowls with inturned rims. The pottery are mostly plain. Small punctuate dots designs are among the common pottery motifs. Other motifs include incised circles and lines, cross-hatched, and paddle-impressed designs. The pottery found here has been related to those

of the Yuan-shan culture in northern Taiwan, the Kamassi site in Central Celebes, and the Lapita pottery culture in Melanesia (Thiel 1986-1987:90-93).

Edjek (Negros): Pottery found at the site of Edjek dates to between 1760 B.C. and 1290 B.C. (Hutterer and Macdonald 1982:223). The earliest cultural level of this site consists of only pottery and some fired clay lumps. The pottery has decorations of incised lines and carved-paddle impressions. Some plain and red-slipped sherds were also found.

Bagumbayan (Masbate): The site of Bagumbayan had pottery dating to between 1670 B.C. and 1560 B.C. (Bay-Petersen 1982-1983:73). The pottery, associated with shell midden deposits, consists mainly of round-based globular vessels with flared rims. The "Buff Ware", found in the lower layers 4 and 5, was low-fired and appears to be crudely made with thick and soft fabric. Most of the pottery are plain, but some are red-slipped or decorated with incised parallel and criss-cross designs.

Leta-Leta (Palawan): The Leta-Leta Cave in El Nido, northern Palawan is believed to date from 1000 B.C. to 1500 B.C. (Fox 1970:178). The few jars found in this cave site have unique shapes which include narrow-necked vessels, and vase-like vessels with flaring rims and ring feet. Generally, pottery types in this site are similar to those of the Tabon Pottery complex.

Ngipe't Dulgut (Palawan): Pottery in Ngipe't Dulgut is believed to be the earliest in the Tabon Caves complex, contemporaneous to those in Leta-Leta (Fox 1970:105). A small pottery assemblage of about eight vessels were recovered,

including four burial jars. The pottery has plain, polished or impressed surfaces similar to those of the Tabon Pottery complex. One of the jars has a relatively straight neck and an ellipsoid shaped body. A distinctive red-slipped vessel with impressed line and punctuate designs on the edge of it's rims and ring foot was also found.

Manunggul Cave (Palawan): The Manunggul cave comprises four chambers, two of which (Chamber A and B) were used for jar burial. The pottery assemblage in Chamber A was dated to between 710 B.C. and 890 B.C. while those in Chamber B yielded a date of 190 B.C. (Fox 1970:112 and 117). In Chamber A, seventy-eight jars, jar covers, and some small vessels were found. The pottery surface is either plain, polished or decorated with impressed, incised, painted, incised and impressed, incised, impressed, and painted, and incised and painted designs. These pottery types represent eight of the nine pottery types of the Tabon Pottery complex. The famous "Manunggul Jar" with the ship of the dead motif on the jar cover was found here. In Chamber B, burial jars, trunconical jar covers, and smaller vessels were also recovered. However, the pottery types were limited to three types: plain, polished, and impressed, similar to those of the Tabon Pottery complex.

Pilanduk (Palawan): The Pilanduk cave site has pottery assemblage consisting of large burial jars and other smaller vessels. The burial jars have coarsely made globular-bodies with high flaring necks. The pottery were red-slipped, with one sherd having applique and punctuation designs. The smaller vessels include globular vessels with flaring necks and decoration of incised designs and paddle-carved impressions.

Batungan (Masbate): The site of Batungan dates to about 750 B.C. (Solheim 1959a:162-165). Globular vessels with carinated body were found in this site. Pottery decorations include painted, incised, and impressed designs. The incised and impressed pottery have circles, lines, and punctuations designs. Some of the pottery were also red-slipped.

Tabon Cave (Palawan): The site of Tabon Cave produced burial jars with an estimated date of between 500 B.C. and 200 B.C. (Fox 1970:44). At least two hundred complete or partially complete jars, jar covers, and other smaller vessels were recovered from this site. The jar burial assemblages of Tabon Cave and other jar burial sites in Palawan have been grouped by Fox (1970:75) as the Tabon Pottery Complex. The Tabon pottery were all hand-molded with vessel walls thinned by using the paddle and anvil technique. The pottery consists of jars, bowls, globular pots, footed vessels, box-shaped containers with covers and vessels with spouts. Fox (1970:78-93) classified the various shapes and decoration of the entire pottery collection into nine main types, namely: (1) Tabon plain, (2) Tabon polished, (3) Tabon impressed, (4) Tabon incised, (5) Tabon painted, (6) Tabon organic glazed, (7) Tabon incised and impressed, (8) Tabon incised, impressed, and painted, and (9) Tabon incised and painted.

Duyong and Uyaw (Palawan): These two sites were estimated, using relative dating, to between 500 B.C. and 200 B.C. (Fox 1970:119). In both sites, pottery sherds comprising jars and smaller vessels were recovered. The pottery has decoration similar to those of the Tabon Pottery Complex, except for the painted pottery.

Kalanay (Masbate): The cave site of Kalanay appears to date from about 400 B.C. (Solheim 1964a, 1968, Bellwood 1979). A large amount of pottery was recovered with shapes consisting of round-based jars, jar covers, and footed bowls or dishes with carinated body. The Kalanay pottery has plain, red-slipped, incised, and impressed surfaces. Incised designs of triangles, curvilinear scrolls, and rectangular meanders are common. Designs stamped with the "Arca" shell, similar to those of Sa Huynh in Vietnam was also found. Other decorations such as cord-marked and paddle impressed designs are rare.

Pagayona (Palawan): Pottery in Pagayona is estimated to date between 200 B.C. and 200 A.D. (Fox 1970:151). The pottery comprises mainly jars, jar covers, and other smaller carinated vessels found intact or in an almost complete form. A total of forty vessels were reconstructed from this site. A unique piece from this assemblage is the vessel with a tall neck and a spout. The Pagayona pottery has plain, polished, impressed, and incised and impressed surfaces, similar to those of the Tabon Pottery complex (Fox 1970:147).

Tadyaw (Palawan): Tadyaw has an estimated date of between 100 B.C. and 300 A.D. (Fox 1970:153). This site produced at least five hundred vessels comprising jars, jar covers, and smaller vessels. The jar covers consist of a variety of trunconical covers. Carinated bowls are common and a majority of the pottery is plain and polished, similar to those of Pagayona and Tabon. Only a few of the pottery sherds have incised or paddle impressed designs.