

The Archaeological Evidence for Bark-cloth in Southeast Asia

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It is not generally known that the earliest evidence for bark-cloth anywhere in the world comes from archaeological sites along the southeast coast of China where tools used for bark-cloth production have been found in Neolithic contexts dating back more than 6,000 years. This region is significant to Southeast Asian prehistory because non-Han groups not Sinicized until the Qin and Han Dynasties (that is, between 221 BC and AD 200) originally occupied it. Moreover, there is sufficient archaeological evidence to indicate that bark-cloth technology was well established in this region several millennia before the technology diffused into the Pacific.

Tools of Production

In 1985, archaeologists from the Shenzhen Museum (1990, 1991) in China's Guangdong Province made an astounding discovery: during excavations at the Neolithic site of Xiantouling, fourteen stone bark-cloth beaters were found. The site lies on the coastal strip near the Pearl River delta and belongs to Phase I in the Pearl River delta, dated between 4500 and 3700 BC (Chau Hing-wah in Shenzhen Museum 1993: 54). Xiantouling was excavated over three seasons in 1985, 1989, and 1997. The stone bark-cloth beaters were found in the basal layers, associated with large numbers of other lithic tools, including adzes, axes, and grinding-stones. This important discovery has necessitated a complete reappraisal of the prehistory of bark-cloth. Not only are the bark-cloth beaters from Xiantouling the earliest known forms in the archaeological record but they also represent the largest assemblage of bark-cloth beaters yet found at a single archaeologi-

cal site (Tang and Wong 1994; Yang 1999). More importantly, in relation to the question of the origins of bark-cloth technology, the bark-cloth beaters from Xiantouling are not isolated finds. Similar beaters have been recovered from an additional ten archaeological sites in this region, including the Dahuangsha site from the same period, with a calibrated radiocarbon date of 4680–3870 BC (Chau Hing-wah in Shenzhen Museum 1993: Table 1).

The stone bark-cloth beaters from Xiantouling are all relatively flat, measuring 1–2 cm in thickness. Only one beater was unbroken; it measured 21 cm in length. One of the beaters is round; the others are round-angled rectangles with one polished side and intense vertical flutes on the other (Yang 1999: 106). One small rectangular beater is further distinguished by four small holes in each of its corners, presumably so that it could be attached to a wooden handle with twine. Examples of this construction method occur in the ethnographic record of insular Southeast Asia with the closest technological parallels on Taiwan and Sulawesi.

All of the bark-cloth beaters from the Pearl River region are characterized by worked surfaces. The beaters in the Xiantouling assemblage have longitudinal grooves measuring 1–2 cm in depth carved into their upper surfaces. Some feature rows of parallel grooves; others feature grooves intersecting at right angles; and a few beaters feature lines that intersect on the diagonal. It is not immediately clear from the evidence if the different patterns worked on the surfaces are of technological significance or if they represent cultural preferences. There is a possibility that the different patterns reflect different species of bark-producing plants or different

stages of the manufacturing process. We know from ethnographic parallels in the Pacific that beaters with deeply grooved surfaces are employed in the initial stages of bark-cloth production while those with finer, shallower grooves are used in the final stages of production to apply decorative impressions known as watermarks, which are clearly visible when beaten bark is held up to the light. The stone beaters from Xiantouling could have produced watermarks of the same type as seen on an example of eighteenth century tapa from Hawaii (see Leonard and Terrell 1980: Fig. 3.6).

The longitudinal grooves on the beaters are diagnostic as they enabled the museum archaeologists to identify the beaters as bark-cloth beaters. While some scholars (Ling 1962) had previously identified smooth beaters with unworked surfaces from Chinese archaeological sites as bark-cloth beaters on the basis of ethnographic parallels in Taiwan, most archaeologists would be reluctant to identify ungrooved beaters as bark-cloth beaters without further direct supporting evidence. (This is discussed further below and in Chapter 5.) Fortunately for the prehistory of bark-cloth, the stone bark-cloth beaters in the Xiantouling assemblage are unambiguous and thereby unequivocal.

These cloth production tools also occur at archaeological sites throughout Southeast Asia. More specifically, stone and pottery beaters have been reported at archaeological sites in South China, Vietnam, Cambodia, Laos, Malaysia, and Thailand, as well as in Taiwan and several different sites in insular Southeast Asia. This class of artifact is also distributed at archaeological sites in South America (see Tolstoy 1963) and Madagascar, although these prehistoric beaters are beyond the scope of this chapter. It is significant from an origins perspective that the earliest known forms come from the Pearl River region of southeast China. It is also significant that the widest range of bark-cloth beaters come from Vietnam where five different types have been recovered from sites attributed to the Hoabinian, Son Vi, Ha Giang, Bien Ho, Phung Nguyen, and Dong Nai cultures (Ha Van Tan 1980: 80–81). Taiwan has also produced a wide range of stone bark-cloth beaters, with at least four different types in the archaeological record.

Figure 2.1 gives a typology of Southeast Asian prehistoric bark-cloth beaters developed from the classification system proposed by Ling (1962); however, it differs from Ling's classification in one important respect: the propensity to split rather than

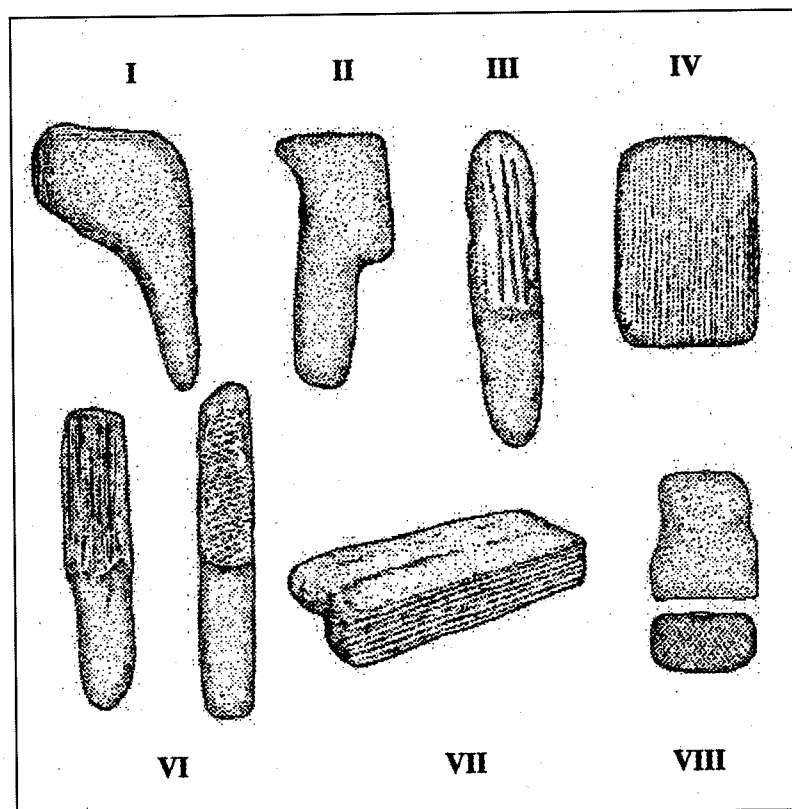


Fig. 2.1 Typology of Prehistoric Bark-cloth Beaters in the Southeast Asian Archaeological Record

clump together different types. The present typology also includes beaters from recently excavated sites.

Although Type I beaters are the simplest forms in the typology, they are the most difficult to identify at archaeological sites. Basically, these beaters are unworked, distinguished by smooth surfaces devoid of grooves, a feature that renders them ambiguous. Interpretation is difficult because beaters of this type could be used in either food or bark-cloth production. Notwithstanding this ambiguity, a few isolated examples from south China and Southeast Asia have been linked to bark-cloth.

More than forty years ago, a number of ungrooved stone beaters from southern China were linked to bark-cloth production, but this correlation was not generally accepted at the time. Ling proposed that several pounders with smooth unworked surfaces from Liangzhu sites in southeast China were actually bark-cloth beaters (1962: Plate IV). The Liangzhu culture is one of the late Neolithic cultures that extended over Jiangsu and Zhejiang provinces and Shanghai. Better known for their exquisite black pottery and jade artifacts, Liangzhu sites are dated between 4900 and 3900 BC (Shanghai Museum 1992). Ling's identification of the ungrooved beaters as bark-cloth beaters was based on linguistic data and detailed descriptions of bark-cloth in ancient Chinese historical sources dating back to the first century BC. K. C. Chang, however, challenged Ling's interpretation of these artifacts as bark-cloth beaters. Chang maintained that bark-cloth beaters had not been identified at mainland sites although he was certain that they must have been part of the cultural equipment of the whole region, including Taiwan (1989: 96). It is worth noting, however, that subsequent Chinese excavations (Huang Xuanpei 1990) of Liangzhu sites have produced supporting archaeological evidence in the form of extant remains of bark-cloth. In my view, the recent archaeological evidence suggests that the prehistoric groups at Liangzhu sites did not use specialized stone tools for bark-cloth production but multi-functional ones.

Levy also found one of these ambiguous beaters during his archaeological investigations of O Nari, one of the Mlu Prei sites in northern Cambodia (1943: 32–35, Plate XX). While the beater is provenanced, it was a surface find and thus undated. Actually, the artifacts at Mlu Prei were a "confused mixture" of Neolithic and Metal Age assemblages (Bellwood 1978: 190). Notwithstanding problems

with the chronology, Levy confidently linked the Mlu Prei beater to bark-cloth production on the basis of ethnographic parallels used to beat bark-cloth from the mountainous regions of Luang Prabang. Pavie (1904) interpreted one of the same tools found at an archaeological site in Laos in the same way.

Type II beaters are distinguished by horned protuberances. Beaters of this type are not widely distributed throughout Southeast Asia but appear to be confined to Taiwan and Insular Southeast Asia. Such regional differences are significant. Beyer (1949), who found large numbers of stone bark-cloth beaters at archaeological sites in the Philippines in Rizal, Bulakan, Cavite, south Cebu, Misamistukidnon, and Cotabato, first coined the term "horned type" to describe many of the beaters he had found. An undated horned beater was also among the original surface finds from Minanga Sip-pako in south Sulawesi (Stein Callenfels 1951: Plate XIII). Most horned types are devoid of grooves, but a horned type with deep longitudinal grooves on its upper face was recovered during the excavations of Ampah, on Borneo (van de Hoop 1935: 468–70; van Heekeren 1972: 125).

In Taiwan, bark-cloth beaters occur in the oldest Neolithic assemblages on the island belonging to the Tapenkeng culture, dated to approximately 3500 BC to 2500 BC. Apart from stone bark-cloth beaters, the toolkit of the first Neolithic groups in Taiwan included stone adzes with quadrangular cross-sections, polished slate points, and stone-net sinkers. Bellwood (1997: 212) believes that the Tapenkeng culture arrived on Taiwan fully formed from southern China, from either Guangdong or Fujian Province. Ling (1962) classified the bark-cloth beater from Tapenkeng (Fig. 2.2) as a horned type with its protuberance broken off. This classification is debatable. If the protuberance broke off after the beater was manufactured then it certainly was a Type III beater. But the broken section does not appear to have been found during the excavations, which raises the possibility that the protuberance was struck off the pebble core during the manufacturing process. If so, the beater is actually a Type III beater.

Type III beaters are elongated oval pebbles with a series of grooves carved on the upper part of one surface only. In terms of the development of bark-cloth tools, Type III beaters can be seen as early modifications of basic pounders. The earliest example of this type comes from a Phase

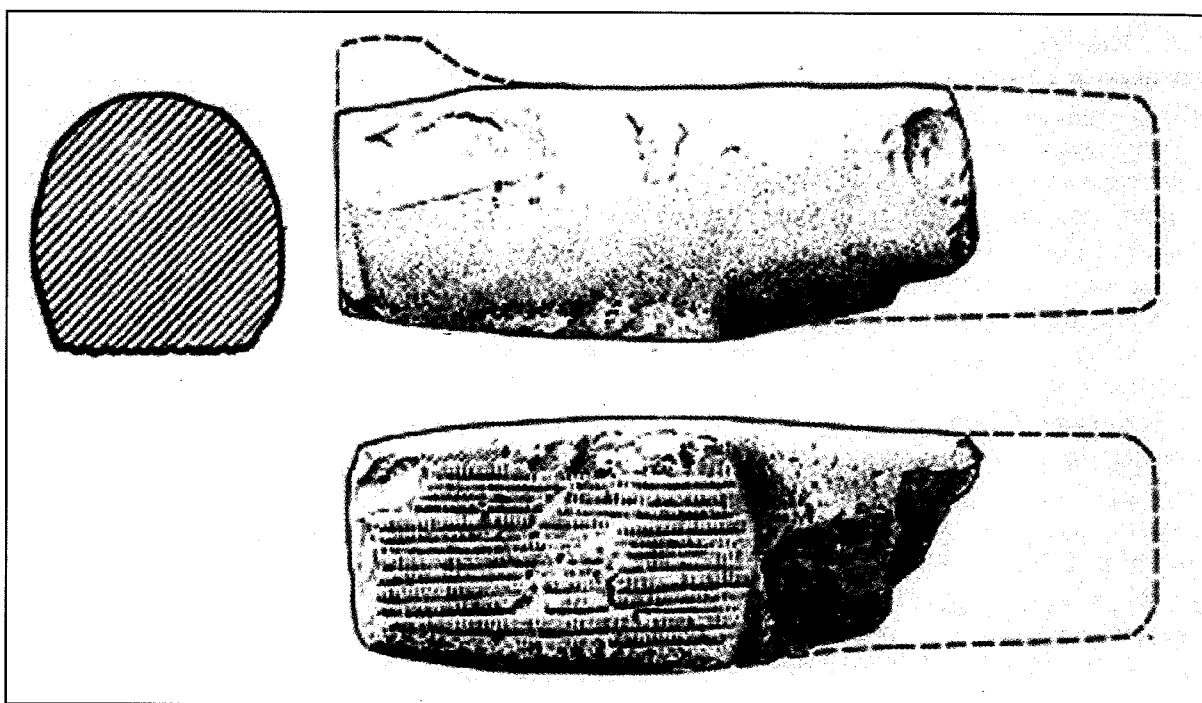


Fig. 2.2 Bark-cloth beater with broken (?) horned section from Tapenkeng, length 11 cm, width 4.6 cm (after Shun-sheng Ling 1961: Fig. 8)

III site in the Pearl River delta, dated 2900–2200 BC (Anonymous 1991: Fig. 2). These beaters also occur at Yuanshan sites in Taiwan and as far south as Bukit Tengkorak in Sabah (Chia 1997: Fig. 4.6 [I]).

Slight variations of Type III beaters have also been found in Surat Province, in peninsular Thailand. Two examples were found in an ancient tin mine, in association with an assemblage of stone adzes. Unfortunately, the age of these beaters has not been determined. The tools were made from finely ground grey stone and measured 24.7 cm and 22.5 cm in length, respectively. The grooves on the beaters are much shallower, rounder, and smoother than other forms. When Evans first examined them he observed use-wear (pecks) on their surfaces which made him uncertain of their function. According to Evans, they are either “pounders or grinding stone used to sharpen stone implements” (1930: 124).

The earliest prehistoric beaters in the archaeological record from the Pearl River area are classified here as Type IV beaters. Unlike other beaters in the typology, which are rounded, the beaters from Xiantouling and surrounding sites are flattened stones with worked rows of parallel grooves extending over the entire surface of one face. This morphological difference is of functional significance. As stated above, this type of beater

is not held in the hand but attached to a handle for beating (see Fig. 1.9). From a technological perspective, it is remarkable that these 6,000-year-old beaters from early Neolithic sites are more specialized than other types from later Neolithic sites.

Type IV beaters have also been recovered from late Neolithic sites in the vicinity of Hong Kong, such as Fu Tei Wan (Meacham 1994: 40) and Man Kok Tsui (Chiu and Ward 1979: 98). Similar artifacts have also been excavated from sites in northern Vietnam (Ha Van Tan 1980). In Sulawesi, two examples were found at Kamassi (Stein Callenfels 1951; Heekeren 1972). Horned beaters were found at the sites of Kamassi and Minanga Sipakko. They are generally referred to as coming from Kalumpang, the township which is located near them in central Sulawesi. There is no general agreement about the dating of the Kalumpang sites but the date of 3000 BC for Kamassi recently put forward by Bulbeck (2002: 97) seems most acceptable.

Sites from the same period in the Pearl River have also produced Type V beaters, which are rectangular in shape and distinguished by a series of longitudinal grooves that intersect at right angles. The largest assemblages of beaters with intersecting grooves of this type come from Neolithic sites attributed to the Peinan culture of Taiwan. The Peinan site covers an area in excess of 40 hectares.

The excavations (Lien 1991) produced remains of more than fifty house foundations and more than 1,500 burials dated between 1500 and 800 BC. The stone slab graves that characterize Peinan sites contained beautifully carved jade ornaments and many pottery artifacts. Peinan beaters are elaborately carved in geometric motifs formed by intersecting longitudinal and transverse grooves. The same designs are carved into Polynesian wooden bark-cloth beaters and appear to have cultural significance.

There are also examples of Type V beaters from Neolithic sites in southeastern China, which differ from other forms in material composition. Instead of being made from stone, these beaters are actually made from pottery. In southeast China, this class of artifact is widely distributed at late Neolithic sites belonging to the Tanshishan culture. The Tanshishan is one of the well-defined regional cultures of southeastern China that sprang up around 3500 BC (Chang 1986: 107, 108). The same pottery beaters (Fig. 2.3) have also been found in Cambodia at Mlu Prei (Levy 1949) and in Thailand at the Ban Kao site (Sørensen and Hatting 1967; Sørensen 1972), a Neolithic site in Kanchanaburi Province, central Thailand. These pottery artifacts have also been reported in Malaysia at Gua Musang (Tweedie 1970: 18).

Type VI differs from all other prehistoric beaters in one important respect. While the surface of the beater is distinguished by the grooves that characterize other bark-cloth beaters, the stone is further hafted so that the handle is incorporated within the implement itself. There can be little doubt that these stone forms provide the prototype for contemporary wooden beaters widely used for cloth production in Polynesia. In Vietnam, where the earliest known Type VI beaters have been excavated, this class of artifact is known as a *ban dap*. Examples of this type of beater were excavated at Lo Gach in Ha Giang Province (Nguyen Khac Su and Truong Viet Thang 1995: 17). At Lo Gach, three beaters with the same workings were found in association with quadrangular and stepped adzes and pottery. Holbe (1975) found examples of this specific type "made of a sort of dark grey rock with leaf vein markings" in Kom Tum Province in the Central Highlands (see also Ling 1962: 203–04). Fontaine (1975) also found an example in the Lower Mekong at the Bien Do site (Long Binh Commune) in the Dong Nai Valley. Fontaine described the beater as having seven longitudinal

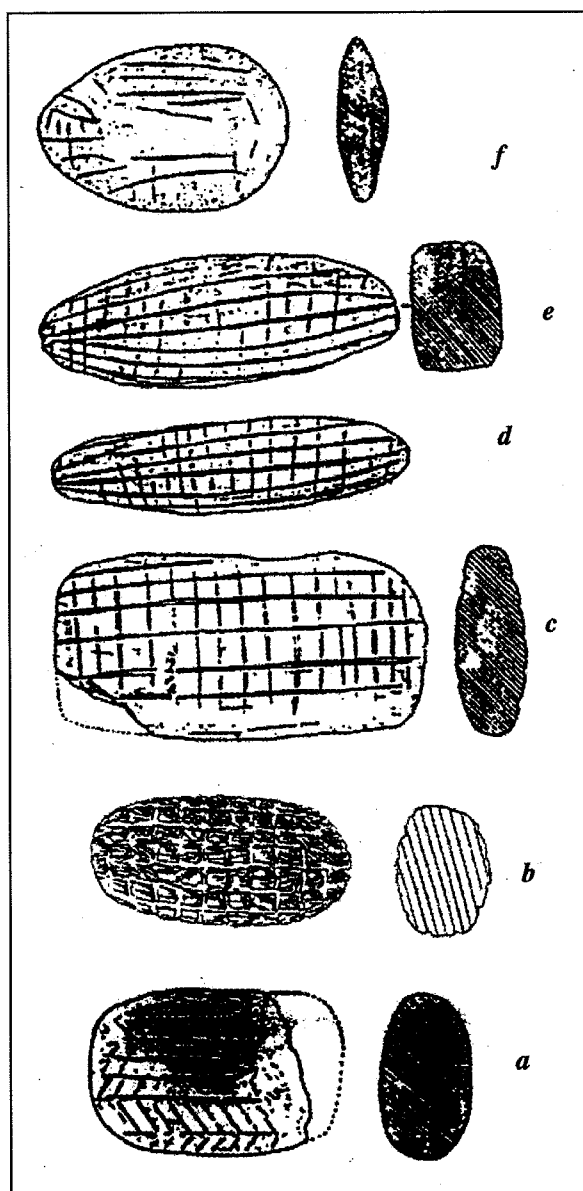


Fig. 2.3 Pottery beaters from Tanshishan (a, c, d, e, f) and Ban Kao (b)

grooves measuring 2 cm in width. Colani (1934) linked these beaters to pottery beaters used by the highland peoples of Quang-Duc Cu (Lam Dong Province), an interpretation still shared by some Vietnamese archaeologists (Personal communication: Nguyen Viet). Perhaps this type of beater is also multi-functional? Type IV beaters have also been found at archaeological sites in the Philippines with largest concentrations in the Batangas. This distinctive type has also been found at sites in Rizal and Cebu. Thiel (1986–87) also found a fine specimen at Arku Cave in northern Luzon, which she interpreted as a bark-cloth beater. The burial assemblages from Arku are dated between 1500 BC and the beginning of the Common Era.

Type VII beaters differ from other types that are generally worked on one face in that they are worked on three faces. In Vietnam, beaters of this type come from Neolithic sites belonging to the Phung Nguyen culture that dates back to about 4200 BC. These have been described as "small blocks of parallel elliptic schist with parallel lines on two opposed lateral faces while a big line goes through other faces" (Ha Van Tan 1979: 80). The worked indentations on the lateral surfaces are of technological significance. As with Type III beaters, this type is attached to a wooden or rattan handle, and the hafted lateral surfaces ensure that the handles can be firmly fixed. Examples have also been found in the Philippines and Taiwan.

Type VIII beaters are different both morphologically and functionally from other beaters in the typology and clearly belong to a different cultural tradition. Basically, these beaters are stone choppers with grooved surfaces on their rounded bases. In the bark-cloth literature, these are known as "the Malay type," because they were first reported from the Malay Peninsula (Sieveking 1956: 83) and Borneo (Sarawak and Sabah, and Kalimantan) (Harrisson 1949). On Borneo, beaters of this type known as thunderbolts (*batu prahit*) have become part of the material culture of some traditional groups who keep them as charms (Harrisson 1949: 596–601 Fig.2). However, the nomenclature is slightly problematic since more beaters of this type have now been found in Thailand. Nevertheless, there is clearly a relationship between them all, and most of the Type VIII from Thailand (discussed below) have been found in the southern provinces of peninsular Thailand.

Museums in Malaysia and Singapore house a number of these distinctive beaters, which have been surface finds. Most have been recovered from the floors of caves, such as Gua Musang (Tweedie 1940). The Perak Museum also housed a perfect example of this type from Changkat (Sieveking 1956). There is one important exception. Excavations (Sieveking 1954, Adi 1985) at the Neolithic site of Gua Cha produced securely provenanced beaters that tell us much more about the development of these interesting tools. The site of Gua Cha is a massive limestone shelter on the banks of the Nenggiri River, a tributary of the Kelantan River, which flows into the sea at Kota Bahru.

The site was first excavated in 1954 (Sieveking 1954) and again in 1979 (Adi 1985). Two layers were identified. The basal layers belong to the

Hoabinian culture while the upper layer belongs to the Neolithic. The site is dated between approximately 10,000 to 1000 BC. The bark-cloth beaters of concern here were not among the crude stone tools in the Hoabinian layer but were found in the Neolithic layer, which has a single radiocarbon date of about 1500–1500 BC (Adi 1985). The Type VII beater was found in that section of the cave, which had almost exclusively been used for burials. Other grave goods interred with these Neolithic groups were stone bracelets, shell necklaces, quadrangular adzes, and wheel-made pottery (tripods). While the bark-cloth beaters from Gua Cha resemble the Hoabinian pebble tool tradition, their occurrence in the Neolithic layers suggests that incoming Neolithic groups with knowledge of bark-cloth technology may have modified the pebble tools.

In Thailand, eight of the stone bark-cloth beaters recorded by scholars (Aranyanak 1991: 23–25) are Type VII. These were found in seven different provinces: Surat Thani, Chumpon, Kanchanaburi, Udon Thani, Nakkon Si Thammarat, Prachuap Khiri, and Phangnga. With the exception of Kanchanaburi and Udon Thani Provinces, all of these are located in the south, facing the Gulf of Thailand. With the exception of Phangnga Province, which produced two stone beaters, each of these Thai provinces produced single finds.

Six of the eight bark-cloth beaters identified were surface finds. The only securely provenanced beaters were two found inside Buang Bab Cave, Ban Thamniap, Amphur Khiritat Nikhom District, Surat Thani Province. These beaters were found with stone axes and pottery tripods and are dated as 3,500 to 4,500 years old (Aranyanak 1991: 24, 25).

While the prehistoric bark-cloth beaters discussed in this chapter provide unequivocal evidence for the widespread production of bark-cloth in Southeast Asia during the Neolithic period, they do not, however, indicate the function of bark-cloth in prehistoric societies. To ascertain the function and meaning of bark-cloth in those societies we must explore the cultural contexts of extant remains.

Extant Remains of Prehistoric Bark-cloth

Although the climate of Southeast Asia is not conducive to the preservation of organic materials, extant remains of bark-cloth have been found at several archaeological sites in mainland and insular Southeast Asia.

Excavations (Bannanurag 1989; Higham and Bannanurag 1990, 1991, 1994) of the Neolithic site of Khok Phanom Di in central Thailand have produced the largest assemblage of prehistoric bark-cloth found at a single site in Southeast Asia. The site is located in marshland in the lower valley of the Bang Pakong River, near Bangkok. Khok Phanom Di (Good Mound) is so named because of its large size, measuring 12 m above the surrounding terrain. During the period Khok Phanom Di was occupied (about 2000 to 1500 BC), the site would have been located near the coast. The extraordinarily rich maritime habitat of the region and the presence of many prestige goods and exotic artifacts in the burials indicate that Khok Phanom Di was occupied by a group of affluent foragers living in a lush coastal environment with extensive exchange networks.

Khok Phanom Di is also significant to the history of bark-cloth not only because it produced the largest assemblage of bark-cloth fragments but also because these fragments are the earliest thus far found in Southeast Asia. Because the bark-cloth from Khok Phanom Di is securely provenanced and dated, it provides important insights into the role of bark-cloth in prehistoric societies in what is now central Thailand some 4,000 years ago.

Bark-cloth was found in burials spanning the entire sequence at Khok Phanom Di where they appear to have functioned as shrouds (Higham and Bannanurag 1991: 152; Bannanurag 1989: 39). Of the 154 burials recovered during the excavations, 28 contained fragments of bark-cloth. This represents about 30% of the burials and includes all sexes and ages. Beaten bark-cloth was recovered from graves numbered 11, 19, 33, 38, 40, 54, 57, 64, 90, 102, 107, 110, 112, 114, 117, 125–26, 130–34, 136, 139, 140, 142, 144, and 151 (Thompson 1992: 175). In some burials the bark-cloth ran over ceramic grave goods. This led Higham and Bannanurag to conclude that it probably functioned as shrouds (1990: 188). Shrouds are also indicated by the close proximity of upper arm bones to upper torsos in some burials. The shroud that wrapped an infant in burial 151 was described the cloth as “white, unwoven fabric resembling bark-cloth” (Higham 1989: 76). The macerated fibres are readily discernible in the photo-micrographs of the fibres.

As Thompson points out, the fibres from Khok Phanom Di were analyzed by a number of specialists but some of the results were inconclusive and conflicting (1996: 109). Botanists from the Royal

Botanical Gardens, Kew, could not identify samples of fibres because of limited reference materials from the region. The Kew botanists simply described the fibres as “groups of fibres with short chains of thinner-walled cells adhering to them in places” (T. Lawrence, cited in Thompson 1992: 180).

Thompson analyzed six samples from the site. She divided them into two distinct categories. One group (burials 125, 151, 136, and feature 23) contained fibres with a fibre diameter of 5 mm. A second group (burials 117, 125, 136, 151, and pit 10:7 feature 29) comprised numerous, long, fine fibres of even diameter. An EDAX of the fibres obtained with the Scanning Electron Microscope produced prominent peaks of silicon that Thompson believed might have included phytoliths. According to Thompson, the samples were probably the same as those subsequently identified by Chiraporn Aranyanak (1991) of the Fine Arts Department in Bangkok as asbestos fibres. The silicon peaks that characterize asbestos are clearly discernible in Chiraporn Aranyanak's photo-micrographs and comparable photo-micrographs of asbestos from the Textile Institute in Manchester, England.

The diameter of the bark fibres in one category was larger, and Thompson noted that they had more diverse chemical profiles. They were “not finely filiform and had notch-like projections along their length” (Thompson 1992: 175). Photomicrographs of samples (burials 117 and pit 10:15 feature 23) were compared to photo-micrographs of comparable ethnographic samples of *Artocarpus* bark-cloth from the Marquesas and *Broussonetia* bark-cloth from Fiji and Tikopia. *Artocarpus* sp. was a strong possibility because Maloney (1987) had already positively identified *Artocarpus* sp. in the pollen record and *Echinochloa*, *Compositae*, *Cyperaceae*, and *Commelinaceae* from phytoliths in the soil under burial 149. Thompson was, however, unable to find any correlations between any of the bark-cloth samples. Consequently, she was unable to identify any of the fibres in the assemblage positively or to confirm or deny that the burials at Khok Phanom Di were wrapped in *tapa*.

Undoubtedly, the most unusual fibres from Khok Phanom Di were the asbestos fibres. As well as the samples from Khok Phanom Di, Aranyanak (1991) has also positively identified asbestos fibres in samples from Ban Chiang, Ban Prasat, and several Portuguese settlements. The significance of these exotic fibres at Khok Phanom Di is discussed

in considerable detail in my "Asbestos Cloth and Elites in Southeast Asia" (2000).

The oldest securely provenanced fragments of beaten bark in insular Southeast Asia come from Sarawak where excavations reveal that bark-cloth played a central role in mortuary rituals that took place in some caves during the Neolithic period. The fragments were found during the 1989 excavations of Gua Sireh (Ipoi 1993; Ipoi and Bellwood 1991). Gua Sireh is a small cave located high above ground level on the Gunung Nambi limestone massif in Serian District, Samaraban Division, in western Sarawak. The cave was used for burial for several millennia during the Neolithic period.

Gua Sireh is important in Southeast Asian prehistory because it produced the earliest securely provenanced grains of domesticated rice in the region. The grain from inside a potsherd has an AMS radiocarbon date of 3850 ± 230 BP (about 4500 BP). This correlation is significant as the remains of bark-cloth that are of concern here were found in the same context as the rice. More specifically, traces of bark-cloth and the rice grain came from trench EFG8. The bark-cloth had been used as a shroud and was fairly dry when unearthed. Microscopic analysis by the writer was undertaken and the fibres in the photo-micrographs compared to *Broussonetia* sp. and *Artocarpus* sp. However, the fibres did not match, and it is possible that the bark was made from other fibres such as *Ficus* sp. or *Antiaris* sp. It may not be coincidental that the bark fibres in the photo-micrograph of the fragments from Khok Phanom Di closely resemble the bark fibres in the photo-micrographs from Gua Sireh.

Prehistoric fragments of bark-cloth were also found during excavations in the same year (1989) at the Lobang Angin site in Sarawak (Ipoi 1993; Ipoi and Bellwood 1991). Lobang Angin is located in one of many limestone caves above the Melinau River in the Gunung Mulu National Park, about 160 km from Niah Cave. Edmund Kurui located the fragments during excavations of a small opening above the main Lubang Angin cave mouth. The fragments were found at the bottom of a trench containing a sub-surface inhumation burial (Burial 7), covered by on-surface grave goods. Because of a lack of stratigraphy, the artifacts were analyzed as a single assemblage, dated between 1000 BC and AD 500. The clear traces of bark-cloth beneath and alongside the bones in Burial 7 indicate that bark-cloth was used for burials at Lobang Angin, either

as a mortuary shroud or to line the burial trench in the cave (Personal communication: Ipoi).

Conclusion

The archaeological data described in this chapter provides unequivocal evidence that bark-cloth technology was known to Neolithic groups in many different parts of Southeast Asia, millennia before the technology diffused into the Pacific. The evidence indicates that the early Southeast Asians who occupied the region around the Pearl River in southeast China were well advanced in bark-cloth technology more than 6,000 years ago. This research also shows that their bark-cloth tools were highly specialized and surprisingly more advanced than bark-cloth tools produced by many other Late-Neolithic groups.

Typologies are tools used by archaeologists to articulate relationships between different classes of artifacts, and, *ipso facto*, their producers. At the broadest level, the typology of prehistoric beaters shown here shows considerable interaction between bark-cloth producers during the third millennium BC. Specifically, the beaters indicate interaction between Neolithic groups in south China, Vietnam, Taiwan, the Philippines, and Borneo. The correspondence between Type III beaters from Ban Kao (Thailand) and beaters from Tanshishan sites (south China) is also significant for reconstructions of early population movements in Southeast Asia. The typology of prehistoric bark-cloth beaters also shows regional differences, which raise the possibility that the technology developed independently in the area of today occupied by the nation-states of Malaysia and Thailand.

The extant remains of bark-cloth recovered from Khok Phanom Di, Gua Sireh, and Lobang Angin clearly show that bark-cloth was of considerable ritual significance in the prehistoric period. The usage of bark-cloth to wrap bodies in Southeast Asia clearly suggests that bark-cloth was one of the defining characteristics of some Neolithic cultures. The usage of the same albeit unidentified fibres in mortuary rituals in central Thailand and Sarawak also confirms relationships between specific prehistoric populations in the archaeological record.

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