

PRE-ANGKOR EARTHENWARE CERAMICS FROM CAMBODIA'S MEKONG DELTA

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Introduction

Major political and social transformations mark the period from ca. 500 B.C. - A.D. 500 across mainland Southeast Asia, when the region's earliest states emerged in coastal principalities from the Red River of Vietnam to the Irawaddy river of Burma (e.g. Higham 1989a; Stark and Allen 1998). One key region during this period was the Mekong delta (Figure 1), in what is now Cambodia and Vietnam. Chinese documentary records describe the early 'kingdom' of Funan from the 1st - 6th centuries A.D. that most scholars now believe was found in the Mekong delta (Higham 1989a: 245-60; Ishizawa 1995; Pelliot 1903; Stark 1998). Most models offered to explain these changes come from historians' analyses, and emphasize the role of external factors such as trade and Indian contact, although some scholars instead argue for indigenous development (e.g. Coedès 1968; Hall 1982, 1985; Wheatley 1983; cf. Vickery 1986, 1998; Wolters 1982). This debate regarding the origins of the early Southeast Asian state continues between scholars who attribute a largely local origin to early state formation and those who maintain the primordial importance of external factors, be they trade networks from India and China or Indian missionaries.

Although these changes occurred before the advent of indigenous writing in the region, most models rest on external documentary data rather than on archaeological data from the region (Stark 1998). Political instability in the region has inhibited archaeological research in Cambodia's Mekong delta. Louis Malleret's brief archaeological investigations at the site of Oc Eo during World War II provided our only archaeological understanding of the Mekong delta until the 1970s (Malleret 1959, 1960, 1962). Since then, archaeologists resumed work in southern Vietnam, and their research illuminates aspects of regional chronology and architectural variability across the delta (e.g. Đào Linh Côn 1998; Ha Van Tan 1986; Lê Xuân Diêm et al. 1995; Manguin 1998; Trình Thị Hoà 1996; Vo Si Khai 1998).

Most early historic (or "Oc Eo culture") sites that have been investigated in Vietnam's Mekong delta postdate A.D. 300, yet social and political formations in the pre-Angkorian period are clearly rooted in the first millennium B.C. (see also Higham 1989a: 190-238). Research on archaeological sites whose occupational sequences span the period 500 B.C. - A.D. 500 is thus critical to understanding the social and political shifts that accompanied the transition to history in this region. Archaeologists have now undertaken some work at "pre-Oc Eo" sites in Vietnam (e.g. Bui Phat Diem et al. 1997, Pham Duc Manh 1996, 1997). Scant information exists, however, on the archaeology of Cambodia's Mekong delta, where the abundance of inscriptional and sculptural information suggests these developments took place. Archaeological research at the site of Angkor Borei (Takeo province) provides some of our only clear evi-



Figure 1. Locational map of Angkor Borei (adapted from Hall 1995: Map 3, with author's permission)

dence for political and economic shifts from the first millennium B.C. to the first millennium A.D. (Stark and Bong, in press; Stark et al. 1999).

This study examines ceramic variability from the site of Angkor Borei in southern Cambodia. Research through the Lower Mekong Archaeological Project (LOMAP) focuses on Angkor Borei's changing role as an emergent delta-wide economic system through time. Radiocarbon dates from the 1996 field season suggest that Angkor Borei was first occupied by ca. 400 B.C., which antedates Chinese documentary sources of "Funan" by nearly six centuries. Damage to the site has obliterated most of the occupational debris that postdates A.D. 600, although inscriptional and sculptural evidence may suggest that occupation at Angkor Borei continued unabated for 100-150 years after that time (e.g. Dalsheimer and Manguin 1998; Dowling 1999). Preliminary thermoluminescence data from Angkor Borei may also suggest that occupation continued or resumed in or soon after the 10th century A.D. (Feathers 1997).

Three sections structure this article. The first section reviews our current knowledge of Angkor Borei in broadscale changes that occurred across mainland Southeast Asia during the first millennium B.C. The second section focuses on studies of archaeological ceramics in mainland Southeast Asia, and summarizes the current state of knowledge on Angkor Borei ceramics. LOMAP ceramic research currently focuses on typological studies, to describe ceramic groups from Angkor Borei that can be correlated with chronometric dates. A second area of LOMAP ceramic research involves compositional studies, and the final section reports results of a pilot compositional analysis and its implications for understanding the archaeology of the Mekong delta.

Angkor Borei and Southeast Asia in the First Millennium B.C.

Several trends that archaeologists associate with emergent complexity are evident in the major river valleys and along some coasts of mainland Southeast Asia between ca. 500 B.C. to A.D. 1 (e.g. Bronson 1979, Glover 1990a, 1990b, 1996, 1998; Glover and Yamagata 1995; Higham 1989a: 209-21, 233-38, 1989b, 1998; Moore 1988; Stargardt 1990; Stark and Bong, in press; Vallibhotama 1986, 1992; Welch 1989). This unbroken record of occupation from the first millennium B.C. to the mid-first millennium A.D. suggests a gradual trend toward political centralization and the emergence of major centers. Settlement systems with large walled and moated centers exhibit internal differentiation, many water features, and a series of satellite settlements within the vicinity. Agricultural intensification, commonly associated with emergent complexity, may also have characterized this period. Whether these systems were based on a strategy of intensive rice agriculture or recession-rice agriculture, however, is still a matter of some debate (e.g. Fox and Ledgerwood 1999; Kealhofer 1996; Ng 1979; Penny et al. 1996; van Liere 1980). So, too, are the political nature and scale of these complex systems (for reviews, see Bellina 1998; Glover 1998; Higham 1989a: 239-69; Hutterer 1982; Vickery 1998: 51-60).

Archaeological investigations at the site of Angkor Borei (Takeo province) were initiated in 1995 by the University of Hawaii/East-West Center/Royal University of Fine Arts as part of a larger training program for Cambodian students (Griffin et al. 1996). The Lower Mekong Archaeological Project (LOMAP) is one research project within this broader program, and focuses its work in and around the ancient site of Angkor Borei, in Takeo province in southern Cambodia. Angkor Borei is an important historical site for several reasons, including its proximity to Phnom Da (after which a pre-Angkorian art style was named)

and the association of Angkor Borei with the earliest dated Khmer inscription in Cambodia, dating to A.D. 611 (Coedès 1931). Until recently, the only archaeological notice of Angkor Borei consisted of a brief report in the *Bulletin de l'École Française d'Extrême-Orient* (EFEO 1935) that described the substantial brick wall that surrounds the site.

To begin to understand settlement and political organization in Cambodia's Mekong delta during the early historic period, LOMAP has focused its efforts at Angkor Borei on investigating the size and morphology of the site and on its occupational history. Results of this research are summarized elsewhere (Stark and Bong, *in press*; Stark et al. 1999). The modern-day community of Angkor Borei contains some 6,000 inhabitants in a 300-hectare area, and most residents live directly on the central and northern portions of the site. Archaeological vestiges are visible throughout the area, from the sections of intact moat along the southern and eastern portions of the site to the piles of brick rubble that represent collapsed brick monuments. Systematic excavations during 1996 produced a radiocarbon-based chronology that began in the third century B.C. and likely continued into the 5th century A.D. (Stark et al. 1999: Table 1).

Earthenware ceramics form the single most abundant artifact category recovered through LOMAP excavations in 1996 and 1999. Our excavations produced a far wider variety of artifacts than ceramics (ranging from beads to architecture), and some of these artifact categories are currently under study. Of vital importance to this article, however, is the ceramic assemblage at Angkor Borei. At least three distinct ceramic assemblages have been recovered from the site that are correlated with three general time periods, and describing these ceramic assemblages is essential to building a regional chronology. To discuss the Angkor Borei ceramics in greater detail, it is necessary to first contextualize this work with respect to previous studies of Khmer ceramics, and with respect to previous archaeological ceramic research in the general region.

Previous Southeast Asian Ceramic Studies

Most research on Southeast Asian ceramics concentrates on later (*i.e.* post A.D. 1200) high-fired ceramics, rather than on materials from the first millennium A.D. and before, and examines stylistic variation, temporal change, production, and use. Some useful research has concentrated on stylistic characteristics of collections to develop regional chronologies, and our knowledge of the later glaze wares from Cambodia, Thailand, and Vietnam continues to grow (*e.g.* Frasché 1976; Mourer 1986: 162-71; Stock 1981). Logistical and pragmatic reasons have constrained previous research on ceramic production technology to studies of kiln sites and their contents, rather than on characteristics of the ceramics produced in these locations (see summaries in Guy 1989 and Rooney 1990: 4-5).

Studies of Khmer ceramics lag behind the rest of Southeast Asia for political and historical reasons, and most work has concentrated on the 9th-14th century glazed stoneware series. Art historians have illuminated our knowledge regarding Khmer glazed stoneware ceramics (see especially Guy 1996-97; Rooney 1984, 1990, 1997; Stock 1981; Tsuda 1998-1999). Unfortunately, their data base has often involved poorly provenienced museum collections (*e.g.* Frasché 1976; Guy 1989; Rooney 1990; Stock 1981) and some key chronological questions can only be answered with stratigraphically excavated materials. Nor do we know the origins of technological traditions seen in Angkorian period ceramics, which previous scholars have attributed to Chinese, Indian, and Javanese influences (*e.g.* Frasché 1976: 24-28; Guy 1989: 23-25; Rooney 1990: 6-8). Yet the pace of research on Khmer ceramics continues to increase, and recent work in

the Siem Reap region promises to answer important questions regarding the organization of ceramic production during the 9th-14th centuries.¹

Premodern earthenwares are the least understood aspect of the Cambodian ceramic technological tradition. One might consider this fact ironic: low-fired earthenware ceramics were ubiquitous throughout Cambodia's archaeological sequence, and the glazed stoneware manufacturing tradition that we associate with the Angkorian period (9th-14th centuries A.D.) disappeared altogether from the Cambodian ceramic tradition at some point in the past. Few studies have concentrated on pre-Angkorian earthenware ceramics (B.-Ph. Groslier 1981: 11, 15; Stark, *in press*). Still fewer prehistoric earthenware ceramic assemblages have been studied in any detail except for R. Mourer's (1986) comprehensive analysis of earthenwares from Laang Spean (for illustrations and brief discussion, see Boisselier 1966: 363; Levy 1943; Mansuy 1902, 1923). Consequently, we cannot yet date the advent of wheel-made ceramic technology in Cambodia (although Groslier [1981: 14] suggests the end of the 6th century). Nor do we know whether potters used kilns before the 9th century A.D., despite recent research on ceramic kilns in the Siem Reap region (Aoyagi *et al.* 1998).

Ethnoarchaeological research on contemporary pottery-making traditions may provide insights on indigenous technological traditions in Cambodia. Ethnically Khmer potters in Cambodia today manufacture low-fired earthenware ceramics in central and southern Cambodia, and much of this production is market-oriented (Biagini and Mourer 1971; Delvert 1994; Kojo and Marui 2000; Mourer 1986; Souyris-Rolland 1950).² Analysis of manufacturing techniques suggests that this technological tradition exhibits both dynamism and continuity from the prehistoric period until the present (see especially Mourer 1986). Studying changes in the ceramic sequence from the late prehistoric to the early historic period, which is possible using materials from Angkor Borei, provides new perspectives on the Cambodian earthenware tradition. Such research also sheds light on ancient patterns of ceramic production and, perhaps, on intraregional systems of ceramic circulation. How archaeologists might study ceramics to reconstruct ancient economic patterns is discussed in the concluding section of this article.

Ceramics from Angkor Borei

The ceramic collections recovered through stratigraphic excavations at Angkor Borei are extraordinarily diverse, both within layers and through time (Stark, *in press*; Stark *et al.*, 1999). Archaeological excavations have recovered at least three distinct ceramic assemblages from the site that are correlated with three general time periods: 1) Angkor Borei Phase 1 (ca. 400 B.C. - 100 B.C.); 2) Angkor Borei Phase 2 (ca. 100 B.C. - ca. A.D. 200/300); and 3) Angkor Borei Phase 3 (ca. A.D. 200/300 - 600).

The 1996 LOMAP field season at Angkor Borei involved excavations at two 1 m x 2 m test units, labeled as AB-3 and AB-4 (see also Stark *et al.* 1999: 15-20). Use of 1/4" screens to sieve the deposits from

¹ See in particular articles by Ea Darith and Marc Franiatte, along with field reports in the present volume.

² See also Louise Cort and Leedom Leffert's article in the present volume.

these two excavation units produced more than 32,000 sherds; we recovered no complete vessels, and few partially reconstructible vessels, during the season. These excavations recovered a wide range of domestic earthenware ceramics that includes restricted globular vessels, jars, bowls, and small cylindrical containers. We also recovered earthenware stove fragments (see also Malleret 1960: 145-51; pl. XXVII-XXXI), objects described elsewhere in mainland Southeast Asia as pottery anvils (e.g., Higham 1989: Figure 2.25; Malleret 1960: 128, pl. XIX; Vincent 1988: Figure 7.47), and clay pellets during excavations. Crew members encountered pockets of yellow, orange, and blue-gray clay in the excavations, but it is unclear whether these clay deposits (which were collected as samples) were used for ceramic manufacture, or whether they represent alluvial deposits in gleyed soils that characterize the area's pedology.

Surface collections by project members generated a wider variety of ceramic objects than those found through systematic excavations, in part because villagers constantly disturb the surface of Angkor Borei through construction activities. Surface collections include industrial ceramics with crucible fragments and fabric stamps (or *tampons* [Malleret 1960: pl. 48, 49]). Still greater variability in the ceramic assemblage is evident when unprovenienced ceramics (some of which are now curated at the Angkor Borei museum) are included for review. Unprovenienced ceramics from Angkor Borei are often complete vessels, and complement our knowledge of the Angkor Borei ceramics. For these reasons, unprovenienced complete vessels (rather than sherds from systematic excavations) are used to illustrate this article.

In many respects, ceramics from Angkor Borei parallel technological traditions found elsewhere in the Mekong delta (Malleret 1959, 1960, 1962) and to the west, in central Thailand (e.g. Bronson 1979: 323, Glover 1990a: 173-75). Angkor Borei has yielded spindle whorls (see also Ban Don Ta Phet [Glover 1990a: 171-75], net sinkers, loom weights, furnaces, and lamps (Malleret 1960: 93). Many of these objects are industrial ceramics, and functioned as tools for undertaking various economic activities. Villagers have recovered a far larger variety of earthenware objects from the site, many of which parallel materials from Oc Eo (e.g. different pottery forms, bricks, architectural ceramics), but the lack of provenience for these objects precludes their placement into a chronological context.

Architectural ceramics are another category of earthenwares that characterize the early historic period in the delta. We recovered brick fragments through systematic excavations, but villagers have also found roof tiles in complete or partial condition. During this period, architectural ceramics included either bricks, pieces to cover buildings (particularly roof tiles), or architectural ornaments. The Mekong delta had two different types of roof tiles during the latter half of the early historic period (Boisselier 1966: 363-64): (1) rectangular large, heavy tiles designed to fit into a longitudinal depression; and (2) smaller, thinner tiles, with an upper grooved or ribbed surface. Modeled clay ornaments were also found as cornices, balustrades and appliqués (or masks?) with anthropomorphic or zoomorphic features (Figure 2) and human heads; earthenware cornices and wall tiles have also been noted on Mekong delta sites (but not necessarily from excavated contexts). Boisselier (1966: 363) notes that architectural ceramics were recovered during excavations in the south group of Sambor Prei Kuk buildings, below the floor. All of this suggests a pre-Angkorian early use of earthenware ceramics as architectural elements, most likely after the 5th century A.D.

Typological Studies on Angkor Borei Ceramics

Ceramic collections from the 1996 and 1999 field seasons form the basis of research, and work to date has concentrated on ceramics recovered from excavations at two test units. Typological studies are essential for building regional chronologies, and provide a foundation for ancillary ceramic studies. At least three separate assemblages are detectable in Angkor Borei's stratigraphy that may show technological changes in local manufacturing traditions through time. Examples from the middle and later assemblages are illustrated in this article (the earliest assemblage lacks complete vessels).

In reviewing the literature on pre-Angkorian earthenware ceramics, Mourer (1986: 152) suggests that the pre-Angkorian ceramic tradition contained a handmade component (used to produce utilitarian and domestic vessels) and a wheelmade component (used to produce vessels for religious and ritual functions). While it is likely that some components of Angkor Borei's later assemblages were wheel-made, one common denominator for the ceramic assemblage from Angkor Borei is the low temperature used to fire most of the hand-built ceramics. Previous research by Meacham and Solheim (1980) on archaeological ceramics from northeastern Thailand suggest a shift in firing temperatures through time: 3rd-2nd millennium B.C. earthenwares had firing temperature in the 800-950° C range, while mid-1st millennium earthenwares ranged in firing temperature from 900-1150° C.

No definitive description or typology has yet been published for the Early Historic period ceramics of the Mekong delta. However, Malleret (1960) illustrated at least 67 "types" of ceramics from the Oc Eo investigations, but only described the fabric and surface treatment of five of these (pp. 97-100). One reason for his reluctance clearly lay in the quantity of materials in his collections. Ceramic collections from Angkor Borei are similarly heterogeneous. At least 12 common ceramic varieties have been identified during initial laboratory sorting of the collections, in addition to many smaller groups. The following section, however, restricts its description to three abundant and/or temporally diagnostic ceramic groups to illustrate the range of variability in ceramics from Angkor Borei. The fabric, shape and finish of Cord-Marked



Figure 2. Example of earthenware anthropomorphic or zoomorphic object; unprovenienced object in the Angkor Borei Museum.



Figure 3. Example of cord-marked earthenware jar; unprovenienced object in the Angkor Borei Museum.

Earthenwares suggest culinary functions; this ceramic group is present throughout the occupational sequence at Angkor Borei, and is found at contemporary sites across the Mekong delta (e.g., Malleret 1960: 141-42). Fine Orangewares are found only in Phase 2 (i.e. ca. 100 B.C. - ca. A.D. 200/300), and may have a far more restricted distribution. Fine Buffwares, which correlate with Phase 3 (ca. A.D. 200/300- 600), have the widest distribution of these ceramic groups and implications of this distribution are discussed in a later section of this article.

Cord-Marked Earthenwares

A complete example of a cord-marked earthenware jar is illustrated in Figure 3. These ceramics have a coarse fabric with abundant quartz fragments, and the paste conforms to Malleret's Type II (1960: 98). Archaeologists associate Cord-Marked Earthenwares with utilitarian functions for several reasons. First, their coarse fabric (which contains large proportions of temper) and their textured surfaces (they generally bear cord impressions from the forming process) make them more thermal-resistant than fine-tempered vessels (e.g. Rice 1987:232, 241-42). Second, their generally restricted shapes (often some variant of a jar) make them ideal for cooking activities involving boiling/simmering and for liquid storage (e.g. Henrickson and McDonald 1983: 631, 633). Finally, studies of traditional potters in various parts of mainland Southeast Asia report that utilitarian earthenware vessels often have textured exterior surfaces (e.g. Bayard 1986; Shimizu 1959; Solheim 1964; see also Freeman 1957 for examples of textured paddles). In their ethnoarchaeological study of Khmer potters, Biagini and Mourer (1971: 207-8) suggest that texturing the exterior surface of utilitarian ceramics has both aesthetic and utilitarian purposes.

We used the Munsell Color system (Munsell Color Company 1992) to standardize color descriptions for the Angkor Borei ceramics. This system standardizes color descriptions by representing various combinations of hue, intensity and saturation. Exterior surface color ranges from a light to dark gray (7.5R 6/0 - 5/0), and the exterior surface has either horizontal or vertical cord-markings. The paste is much darker gray (7.5 R 4/0 -2.5/0), but does not exhibit evidence of carbon cores that would reflect low firing conditions. At least two variants exist: one has a platey, coarse paste with visible pores and a friable texture, while the other variant contains a more dense paste with fewer pores. The amount and type of nonplastic material are similar in each variant. The vessel body is round, and the neck nearly always constricted; most vessels are jars with various types of rims.

Cord-marked earthenware vessels may have been used for culinary purposes, and may have been made locally during one portion of Angkor Borei's occupation. Although this ware occurs throughout most of the stratigraphic sequence, its highest frequencies occur between layers 20-35. Two sigma radiocarbon results for this portion of the sequence suggest a period between approximately 500 B.C. and A.D. 200. Because the 1996 excavations only sampled two areas of Angkor Borei, it is possible that changing use of these locations through time (rather than the fluctuating importance of cord-marked earthenware vessels) explains fluctuating frequencies of this ceramic group in the assemblage.

Fine Orangewares

To date, Fine Orangewares have a restricted temporal and spatial distribution to Phase 2 (ca. 100 B.C. - ca. A.D. 200/300) of Angkor Borei's occupational sequence. As illustrated in Figure 4, Fine Orangeware sherds have very thin walls (~3-4 mm), an orange to buff color (5YR 7/6-10YR 6/2) in a mottled surface, very fine paste with occasional red and grey flecks, and cord marking around the base of the

vessel. Fine Orangewares include a small number of vessel forms (Figure 5). Small cylindrical vessels are common, with orifice diameters of 6 cm or smaller; vessel height in these cylinders rarely exceeds 10-12 cm. Fine Orangewares also have different forms including small, flare-rimmed jars, but it is the cylindrical vessels that dominate the Fine Orangeware assemblage. The sheer abundance of this ware across Angkor Borei suggests that these ceramics were manufactured locally, although this is one hypothesis to be tested in the future with clay sampling.

The precise function for Fine Orangeware cylindrical vessels is not clear, and no ready analogues are found elsewhere in the Mekong delta, in central Vietnam, or in central Thailand. Inspection of aerial photographs of the Angkor Borei region suggests that canals now connect Angkor Borei to several other settlements in the vicinity. (See Figure 6.) Reconnaissance visits to, and surface collections from four of these linked settlements in 1997 and 1999 suggest that they also contained archaeological sites that were contemporary with Phase 3 of the occupational sequence at Angkor Borei. Most of these sites contain Fine Buffwares; only one site (Preah Phkoam) contained any evidence of Fine Orangewares, and in small quantities. The Fine Orangewares thus have a restricted temporal distribution (and are associated almost entirely with Phase 2) and a restricted temporal distribution. To some archaeologists, the restricted nature of Fine Orangewares at a regional center suggests ritual uses; additional survey and surface collections of neighboring sites is necessary to explore this pattern in greater detail.

Fine Buffwares

Sherds in this ware have variable vessel wall thickness, from thin-walled vessels (<4 mm) to much thicker walls (>7 mm). What distinguishes Fine Buffware is its fine paste fabric and several vessel forms. Sherds in this ware have a characteristic buff or salmon exterior color (7.5 YR 8/2 - 8/4), but can also be white in hue; vessels in this category commonly have light or deep gray carbon cores. At Angkor Borei,

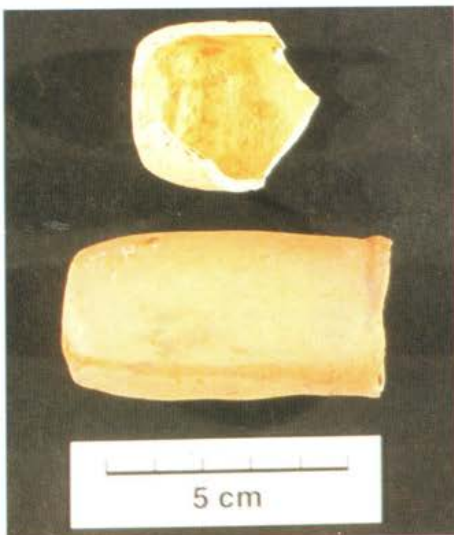


Figure 4. Example of complete Fine Orangeware cylinder and fragment; from 1996 excavations.



Figure 5. Examples of complete Fine Orangeware cylinders; unprovenient objects in the Angkor Borei Museum.

Excavations in 1999 focused on a cemetery, and uncovered several ceramic types that had not appeared in the 1996 excavations, even in fragmentary form. These differences suggest that utilitarian ceramic assemblages (intended for domestic and culinary activities) varied in content from mortuary assemblages (intended primarily for interment with the dead). The 1999 ceramic collection awaits thorough documentation, but unprovenienced vessels from the Angkor Borei museum provide two examples of different forms seen only in the mortuary vessels. Figures 9 and 10 illustrate ring-based, flare-rimmed jars that have also been recovered from looted burials at neighboring sites. Since similar vessels were removed during the 1999 excavations with their contents intact, it is not yet clear whether such vessels held cremation ashes. Figure 11 illustrates two red-slipped, ring-based globular jars; these jars were a regular part of the cemetery assemblage, and did not appear in the 1996 collections. Both ceramic groups will be studied intensively in the future.

Ceramics in ancient economic networks in the Mekong Delta

Elsewhere in mainland Southeast Asia, archaeological studies of ceramics have increased our understanding of technological and economic changes in the past. We might use studies of original firing temperatures (Meacham and Solheim 1980), for example, to illustrate how technological changes accompany changes in political organization through time. Likewise, studies of manufacturing technology using mineralogical compositional analysis (Vincent 1991; White et al. 1991) provide a strategy for tracking expansion and retraction in the size of distributional networks in the late prehistoric period. Finally, we can use compositional studies of certain ceramic types to track patterns of local production and regional circulation (Miksic and Yap 1990, 1992), and to link exotic ceramics to their distant production locales (e.g., Ardika et al. 1993).



Figure 9. Examples of ring-based flare-necked jars; unprovenienced objects in the Angkor Borei Museum.



Figure 10. Examples of ring-based flare-necked jars; unprovenienced objects in the Angkor Borei Museum.



Figure 11. Examples of red-slipped, ring-based globular vessels, similar to those found in the 1999 excavations; unprovenienced objects in the Angkor Borei Museum.

Excavations at Oc Eo revealed a huge variety of nonlocal materials that reflect contact with both India and China throughout Vietnam's Mekong delta (Malleret 1959, 1960, 1962). The diversity of trade goods found in this region led Malleret and subsequent scholars to suggest that the Mekong delta served as a stopping point for Indian and Chinese traders. In this model, Oc Eo was the coastal entrepôt and Angkor Borei was an inland capital during the mid-first millennium A.D. Architectural and artifactual similarities between Oc Eo and Angkor Borei support this contention. In some cases, comparison of the Angkor Borei and Oc Eo ceramic assemblages has identified precise parallels in vessel form. In others, technological similarities are found in the ceramic traditions of the two sites or between Angkor Borei and sites to the west, such as Arikamedu in southern India (compare Figure 12 with Begley 1993: Figure 15).

Understanding the economic organization of the Mekong delta requires a dual focus: (1) on the interregional trade networks that linked the delta to points north (China) and west (South Asia); and (2) on systems of intraregional exchange that moved commodities into the delta from other parts of the Lower Mekong basin and on the circulation of goods between communities in the delta. Compositional approaches provide a valuable, if underutilized approach to studying economic organization in early Southeast Asia. We have begun to investigate these questions using compositional analysis of ceramics from the 1996 LOMAP excavations at Angkor Borei.

Our pilot study used a chemical characterization technique called inductively-coupled plasma mass spectrometry (hereafter ICP-MS) to analyze the composition of 20 sherds selected from different levels of the 1996 excavations (Stark and Bentley 1999). The results of the compositional analysis suggest important patterns of variability in local manufacture of earthenware ceramics from Angkor Borei. The earliest Cord-Marked Earthenwares in the study display a heterogeneous composition, which is suggestive of nonlocal production and perhaps not surprising for the first settlers in this community. During Phase 2 (i.e., ca. 100 B.C. - ca. A.D. 200/300), we see sufficient homogeneity in the composition of Fine Orangewares to suggest that they were manufactured at or near the settlement of Angkor Borei. Cord-Marked Earthenwares from this period display a similar compositional signature with the Fine Orangewares,

Studying changes in ancient economic organization from ca. 500 B.C. - A.D. 500 is critical to tracking emergent complexity in the Mekong delta. One strategy for understanding political and economic changes during the early historic period lies in studying patterns of ancient systems of commodity production and ancient distributional networks. More than 50 years ago, Paris (1931, 1941) identified canals across the Mekong delta that linked major population centers from the early historic period. (See Figure 6.) Kenneth Hall (1982, 1985) in particular argues that the Lower Mekong polity that arose and that the Chinese called "Funan" was an inland agrarian state that based its power on trade.



Figure 12. Example of lid or cover with direct parallel to ceramics at Arikamedu, Pondicherry, India; from 1996 excavations.

which suggests local manufacture of ceramics for domestic uses by this time. Fine Buffwares included in this study displayed very different chemical signatures, which may suggest that these ceramics were not manufactured locally but instead were imported to the region (supporting Mourer's [1986: 147] hypothesis).

Discussion and Conclusions

Radiocarbon dates from Angkor Borei suggest that the settlement was first occupied in the mid-first millennium B.C. Although we cannot yet demarcate the spatial limits of this initial settlement, a shift in ceramic assemblage ca. 100/200 B.C. (with the introduction of Fine Orangewares) may echo organizational and scalar shifts in the settlement and region as well. The suggestion that Fine Buffwares were manufactured nonlocally also has interesting implications, since most researchers believe that the period following ca. A.D. 300 witnessed the most intensive period of contact between Southeast and South Asia (e.g. Bellina 1998; Glover 1989, 1996, 1998). The appearance of Fine Buffware ceramics in the delta and along the coastal regions of mainland Southeast Asia might signal the incorporation of these regions into systems of extraregional interaction during the 4th century A.D. Whether—and to what extent—this broader trade network involved Southeast Asians as traders remains a matter of some debate (e.g. Glover 1998; Vickery 1998).

In mainland Southeast Asia, few archaeological projects on early historic sites have undertaken systematic ceramic studies, in large part because of the technological and stylistic diversity that such assemblages often exhibit. Each field season yields tens of thousands of new sherds to study, and different sets of research questions. Research reported in this article illustrates the progress to date in using Angkor Borei ceramics to develop a regional chronology. This article has restricted its focus to several robust ceramic types that are already evident in the assemblage, while recognizing that many ceramic groups await full description and documentation. Developing a full understanding of Angkor Borei's ceramic assemblages requires attribute-based and technological studies, which are currently underway. We need more research at both local and interregional scales, and with far larger samples, to construct the region's ceramic chronology, and to untangle the complex web of economic interactions that linked communities together across the Mekong delta by the mid-first millennium A.D.

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