

# CIRCULAR SETTLEMENTS WITHIN EASTERN CAMBODIA

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## ABSTRACT

*In a cooperative program between the Royal University of Fine Arts and the Ministry of Culture in Phnom Penh, and the University of Hawaii, recent research since 1995 in eastern Cambodia suggests that earthwork sites of the so-called "Mimotian" culture pertain to distinctive Neolithic Southeast Asian settlements. As will be shown here, the homogenous nature of settlement pattern, architectural features composing the sites, and material culture yielded from the sites may point to a unique "Neolithic" adaptation within the lower terrace region of Cambodia (and extending into western Vietnam). As will also be shown, the circular earthwork settlements of Cambodia are very different from the moated sites previously documented in northeast Thailand. What remains to be firmly established regarding the Cambodian earthworks is a precise chronology regarding site occupational sequences and, second, an understanding of the multifarious and complex material record of the sites.*

## INTRODUCTION

The late French prehistorian, Bernard P. Groslier, once reputedly referred to a circularly mounded and internally moated site east of the Mekong River and west of the Vietnamese Highlands as being able to answer all the questions of the Southeast Asian Neolithic (Wilhelm Solheim II, personal communication). He also stated (Groslier 1966:195) that the fort at Mimot "has turned out to be one of the most important prehistoric sites in South-East Asia." While reasons why the site is so important are still being debated, Groslier did set the stage for serious inquiry into the origins and nature of prehistoric settlement in the terrain upriver from the Mekong Delta, on and immediately north of Vietnam's border with Cambodia (Fig-

ure 1). Recent research (1995-1999) by the author and Cambodian colleagues, under the direction of P. Bion Griffin, has led to the initial formulation that these circular sites of the so-called "Mimotian culture" constitute a definable, homogeneous grouping. In addition, the research initially propagates the notion of a distinctive prehistoric (pre-metallurgical) regional culture occurring within the *bas plateau* dominion of eastern Cambodia and extending into western Vietnam (Dega 1997; Dega *et al.* 1997). Homogeneity in site location, site morphology, and on-site material culture suggests that the settlements were free of obvious cultural diffusion, borrowing or latent contact with other, neighboring regional and sub-regional cultures. This suggestion would account for the distinctiveness of this settlement system and its defining elements.

## CIRCULAR EARTHWORKS: PREVIOUS ARCHAEOLOGICAL INQUIRY

Thus far, few archaeological investigations have focused directly on the circular settlements of eastern Cambodia. No pedestrian survey of even a small portion of the region, much less limited systematic subsurface sampling and site mapping, had been carried out prior to the initiation of several projects in 1995-6 (Dega *et al.* 1997; Nop *et al.* 1996; Kojo and Pheng 1997). The eastern Cambodian/western Vietnamese circular earthworks informing the present study were first mentioned in print in a 1930s edition of a *Bulletin de l'Ecole française d'Extrême-Orient*, involving several lines describing an earthwork near Loc-Ninh, Song Be Province, western Vietnam. However, it was not until Malleret (1959) undertook study of the sites over three decades later that the circular settlements were more explicitly recognized. Utilizing aerial photographs, Malleret identified 17 circular settlements and one rectangular structure that all occurred near the Cambodian-Vietnamese border (see Figure 1). Five of

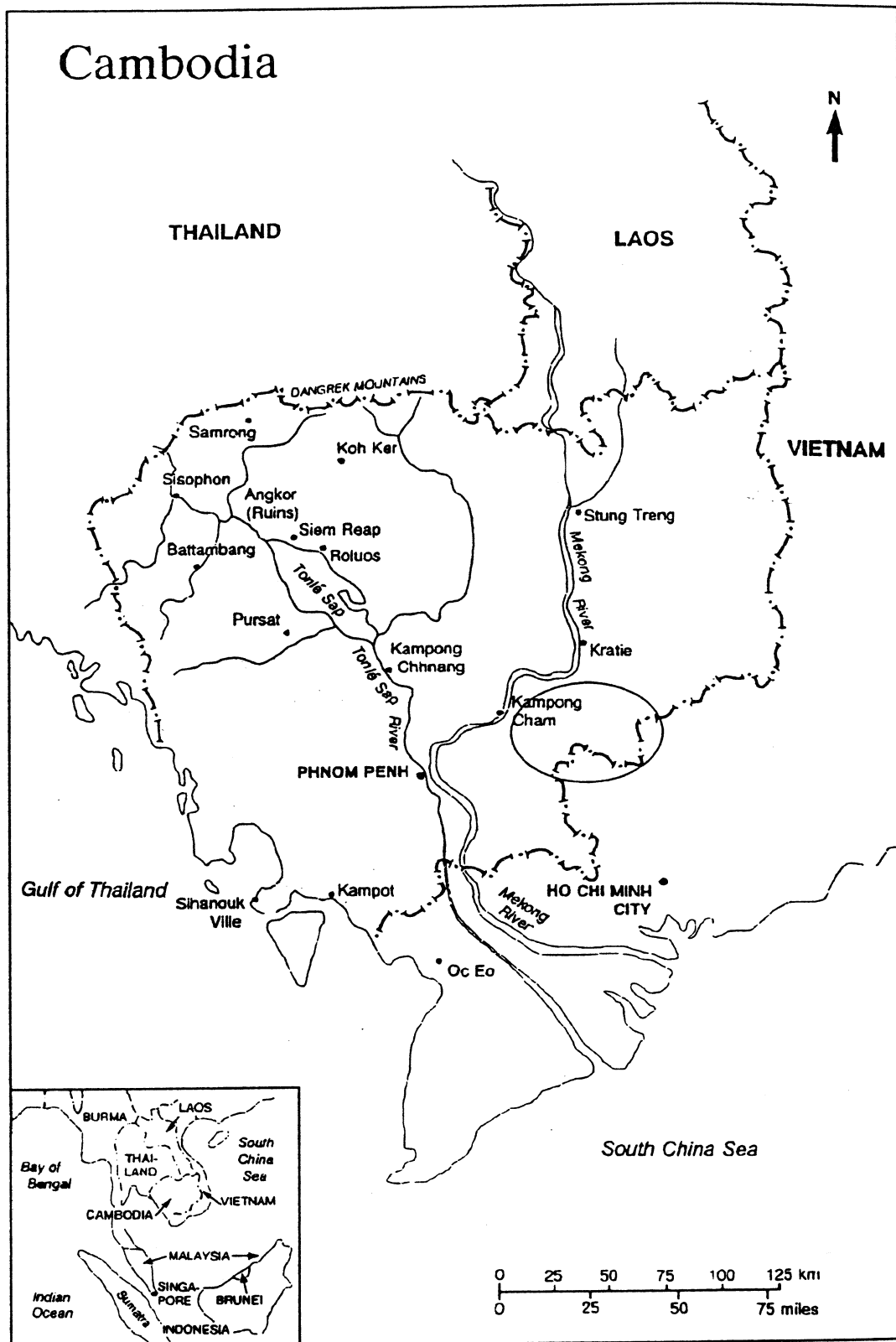


Figure 1. General location of circular earthworks within Cambodia (enclosed oval).

these sites, settlements he assumed to be prehistoric in origin, occurred within eastern Cambodia.

Over several days during each of 1962, 1966, and 1970, B.P. Groslier excavated at least seven trenches through the central platform of a circular settlement in eastern Cambodia. Informants describe them as 2 m x 4 m trenches, excavated to approximately 1.70 metres below the surface by 15-20 local workers (Mrs Payoy and Mr Mat de Laymen, personal communication). The Groslier site, called "*Banteay Meas*" or "Golden Fortress" by local villagers, was again revealed in February 1999 by a research team from the Royal University of Fine Arts (RUFA). Under the direction of Dr Gerd Albrecht, the RUFA/Tübingen team excavated one 1 m by 1 m unit at the site, with results pending their current analysis in Cambodia. Groslier (1966:195, and quoted as a personal communication by Saurin [1969:33]) declared the circular earthwork and accompanying lithic and ceramic assemblages as products of the "Mimotian culture", the leading term referring to the largest town near the site. Importantly, it is suggested by Groslier's terminology that the earthworks were constructed and occupied by a distinctive cultural group. Having briefly analyzed the materials from Groslier's excavations in the National Museum in Phnom Penh in 1996, Dega and Kou Vet (in preparation) agree it *does* appear that the internally diverse ceramic and lithic assemblage recovered by Groslier may indeed point to a localized, prehistoric tradition. Groslier (1966:195) further suggested the "fortified settlement" to be "Neolithic" in origin, occupied c. 3000-1000 BC.

The third phase of limited investigations involved J.P. Carbonnel who, in 1970, conducted a reconnaissance of several mounded sites at Chamcar Andong, Prei Kak, Peam Cheang, and Chup, just east of the Mekong River and west of Krek and Memot. Carbonnel (1979; see also Mourer 1994) referred to the sites as "circularly-distributed trash mounds" and as "tumuli", and posited that they were constructed by the accumulation of midden waste discarded from pile-dwellings, the latter supporting houses on a central platform area. He suggested these sites to have been permanently occupied villages. Carbonnel excavated portions of one of the sites and dated the inception of the site, from a radiocarbon sample of charcoal recovered from within a potsherd, to 2130-1150 BP, a date somewhat different from that surmised by Groslier. Carbonnel further suggested that the sites were occupied continuously through to the tenth century AD, a time contemporaneous with the founding of the Angkorian kingdom.

In 1995 and 1996, a small crew from the University of Hawaii and several students from the Royal University of

Fine Arts (led by Dega and Khun Samen) completed basic mapping of six earthworks. They also obtained sediment samples from five of the settlements, and through local informants' knowledge of the sites, were able to note an additional four settlements within the region (Dega *et al.* 1997; Dega 1997). Surface survey of the six settlements and their environs revealed the presence of many earthenware sherds (very eroded) and a wide range of highly patinated lithics, including basalt and sandstone cores, whetstones, adzes, chisels and flakes, occurring within the settlements. Extremely paltry concentrations of artifacts were identified outside the settlements. In 1997, the crew, led by Dr P. Bion Griffin of the University of Hawaii, returned for survey at one settlement in Krek, and obtained a short pollen core from a small catchment near the site. Results from the core are pending.

Also in 1996, a team of students from RUFA, led by Dr Yasushi Kojo, mapped and conducted hand augering at one circular site in Krek (Malleret's Site #15). Utilizing the presence/absence of cultural material through the vertical columns, they suggested that the sites were occupied twice, followed by intervals of site abandonment which lasted 500 and 1000 years respectively (Nop *et al.* 1997:17). Kojo and Pheng (1997), through the use of aerial photographs, were able to confirm an additional earthwork in eastern Cambodia (Samraong). Kojo and Pheng (1998) then produced an article that discussed the morphology of the prehistoric circular earthworks as compared to modern, ethnographic examples of similarly shaped settlements within northeastern Cambodia. Importantly, Kojo and Pheng (1998:236-239) noted that in the latter settlements, individual houses occurred along the fringes of a circular platform. This pattern has been substantiated during our recent research as seen through the horizontal and vertical distribution of cultural materials across the prehistoric earthwork sites.

In early 1998, a team of archaeologists from Tübingen University (led by Gerd Albrecht, Dr Barbara Albrecht, and Dr Miriam Haidle), accompanied by archaeology students at level three in Cambodia's training system, conducted a short field school at two earthworks in Krek. A majority of the students concentrated on excavations at Malleret's Site #15 while Dega and Professor Chuch Phourn (RUFA) excavated at another earthwork seven kilometres to the east (Chi Peang). While data sets from the field season are still undergoing analysis, it was again apparent that the circular settlements have very similar landscape localities, similar architectural components, similar artifact assemblages, and congruent stratigraphic profiles. Aided by local villagers, the crews noted three additional circular sites in eastern Cambodia.

In early 1999, a RUFA/Tübingen team, led by Albrecht, and a RUFA/University of Hawaii team, led by Dega, returned independently for additional work at the earthwork sites. Again, results from the excavations are pending. Both teams were able to *note* additional earthworks in the region, increasing the present total of earthworks in Cambodia to seventeen. I defer to Groslier by writing "note additional earthworks", in consideration of the words of Groslier (1966:252-253) discussing Angkor, "We must be clear that when we say that Mouhot discovered Angkor we mean only that he revealed it to Europe. For centuries Cambodians had been living near the temple and were familiar with it, so that subconsciously, perhaps, but none the less effectively it formed part of their intellectual background." Such is the case with the circular earthworks, where all seventeen sites thus far "discovered" in Cambodia have been known by local villagers, the latter acting as guides for the archaeologists. (Note: all earthworks discussed here have been labelled according to site names given by local Cambodian villagers.) Importantly, combined with the fourteen known earthworks occurring just across the border in Vietnam (Nguyen Trung Do, personal communication), the total number of known earthworks within Cambodia/Vietnam has increased to 31 circular settlements occurring within this lower terrace region of the two countries. As another pertinent point, the RUFA/Hawaii crew was able to excavate 31 trenches at six earthwork sites in early 1999. An abbreviated discussion of settlement and cultural patterns revealed during the past few years of RUFA/Hawaii research at the Cambodian earthworks is presented below.

#### CIRCULAR EARTHWORK LOCATION AND GEOGRAPHY

As stated, a minimum of seventeen prehistoric circular earthworks are centred within a discrete geographical region of eastern Cambodia (see Figure 1), another fourteen sites occurring in the same corridor margin just across the border in Vietnam. These sites occur within an environmental zone that is classified here as the northeastern margin of the Tonle Sap corridor, itself a transitional landscape zone between the more upland mountain areas and the lowland deltaic plains (see Phan Cu Tien 1991:10). While this corridor extends from the borders of the Tonle Sap through to the lower Mekong Delta, the circular earthworks occur only across a 55 kilometre swathe of basaltic plateau which has minimal north-south deviation. The area in which the earthworks are located is bounded by hills that grow into mountains along the north and east across the outer walls. The outer, earthen wall surrounding the sites typically rises some 4 m above the inner depres-

flanks, and by a vast floodplain at the foot of the sites stretching south and west through the Mekong Delta and Tonle Sap plains. The confluence of hill and valley streams allows for wide water distribution along low-lying areas at the base of the hills. In the Memot and Krek regions, the plateau and intermontane depressions typically consist of Quaternary deposits usually approaching 10 m in thickness; below, ancient alluvial soils overlie thick basaltic outcrops (C-horizon) (Phan Cu Tien 1991). The region consists of a mosaic of sediment regimes including volcanic soils which are partly alluvial and partly lateritic in origin. Basaltic plateaus overlie a Mesozoic sandstone basement. More to the point, soil conditions in the region range from clayish and silty alluvium to poorly drained alluvial and basalt-derived reddish clays. Sediments within the settlements, occurring to at least 2 m below surface, are characterized exclusively by red clay soils. On-site cultural material, generally occurring between 0.40 and 1.25 m below surface, occurs exclusively within the red clay layer. Ferritic, pisolithic-formed laterite nodules are common within the sites' depressed areas (see below). Unfortunately for archaeological work in the region, the average pH levels of the red soil vary between 3.3 and 3.9, equating to extremely acid soils.

The circular settlements themselves lie at an average of c.110 m above sea level in locations juxtaposed against forests and hills, and, much like the moated sites in north-eastern Thailand, are located near water channels (see Moore 1988; Higham 1989; McNeill 1997). Importantly, the Cambodian circular sites are almost exclusively found on or near the summit of hills, and sit above valley margins which typically lie to the east and west sides of the slopes. Today, agricultural land in the region consists of areas composed of alluvial terrace fertilized annually by silt deposits that are suitable for intensive cultivation. Shifting cultivation is practised at lower elevations in areas where flooding does not occur (Nuttonson 1963:108). Starting at the edge of the lower alluvial plains, flood-stage rice cultivation is synchronized with the monsoonal fluctuations that transport water into this typically semi-arid environment. At present, almost 90% of the recorded earthworks lie within rubber plantations, the rubber trees having been planted from the 1930s onwards.

#### EARTHWORK MORPHOLOGY

The settlements themselves consist of a concentric earthen embankment surrounding an inner "moat" or depression, and contain a slightly bowl-shaped platform inside the concentric rings. The sites average c.220 m in diameter, some 2.0-2.5 m above the platform surface, and 1.5-2.0 m above the terrain outside (Figures 2 and 3). The

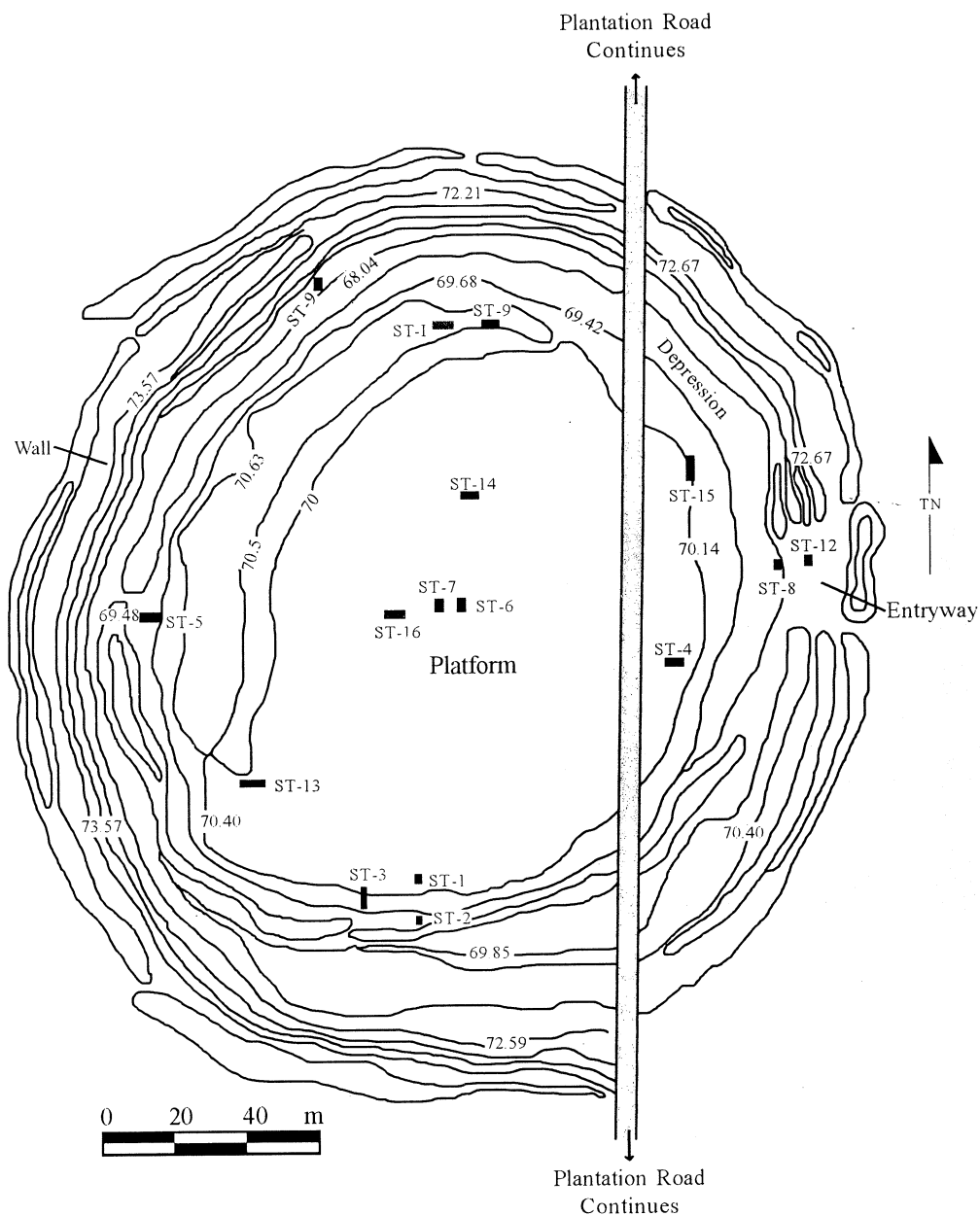


Figure 2. Topographic plan of Chi Peang site, Krek District. Excavations units completed in early 1999.

depression or “moat” (the latter term implying a water facilitating function that may not be warranted) runs parallel to the concentric wall and platform, and follows a synclinal contour. The width of the depression averages 22 m, and the base lies some 2.5 m below the platform surface. Central platforms at the sites average 150 m in diameter and are topographically somewhat bowl-shaped,

the edges of the platform being slightly elevated compared to the centre of the platform. The edges of the platform vary in height, this being a function of variable cultural concentrations occurring on and below the surface. Each of the Cambodian earthworks contains an “entryway”, which is typically located in the northwest or southeast portion of the sites. The entryways are c.24 m wide

and, for the most part, are flush with the outer terrain and the central platform. This creates an even plane that begins outside the settlement, and proceeds through the wall and depression, to the platform. The entryways themselves do not represent drainages and thus do not provide direct entry for water into the site's circular depressions.

It is on the platform area, particularly along the outer edges of the platform, that large concentrations of cultural material have been recovered during subsurface sampling (see Figure 2 for the placement of excavation units at one site). In cross-section, the horizontal distribution pattern of artifacts across the many earthworks is clear. Few artifacts occur within the depression, the highest density of artifacts occurring along the fringes of the platform, artifact numbers decrease proceeding to the center of the site, and artifact density slightly increases within the centre of



Figure 3. Circular earthwork segment: outer wall to right, inner depression in centre, and platform edge to left.

the earthworks. This distinctive pattern, noted at each of the six excavated sites, indicates activity areas where the greatest accumulation of materials occurred. Further, the subsurface artifact distribution pattern correlates precisely with surface distribution patterns. Interestingly, the several test units, placed at various locations through the entryways, yielded few cultural materials in the majority of cases. The several pits excavated outside the sites (beyond the outer wall) were completely barren of cultural deposits.

The earthwork sites themselves share common architectural features, each apparently constructed in a similar fashion. The settlements contain a central platform area, the outer fringes being raised above the centre, again suggestive that the fringes represent concentrated activity areas. The inner depression and surrounding earthen wall

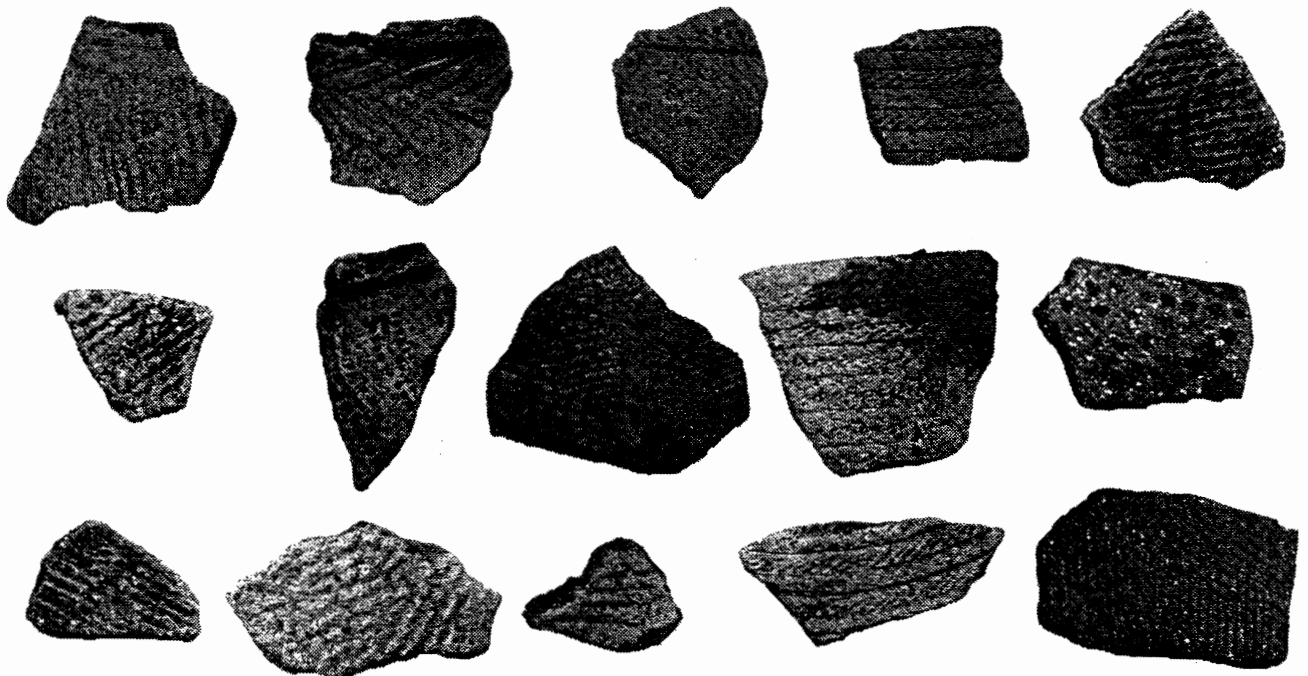
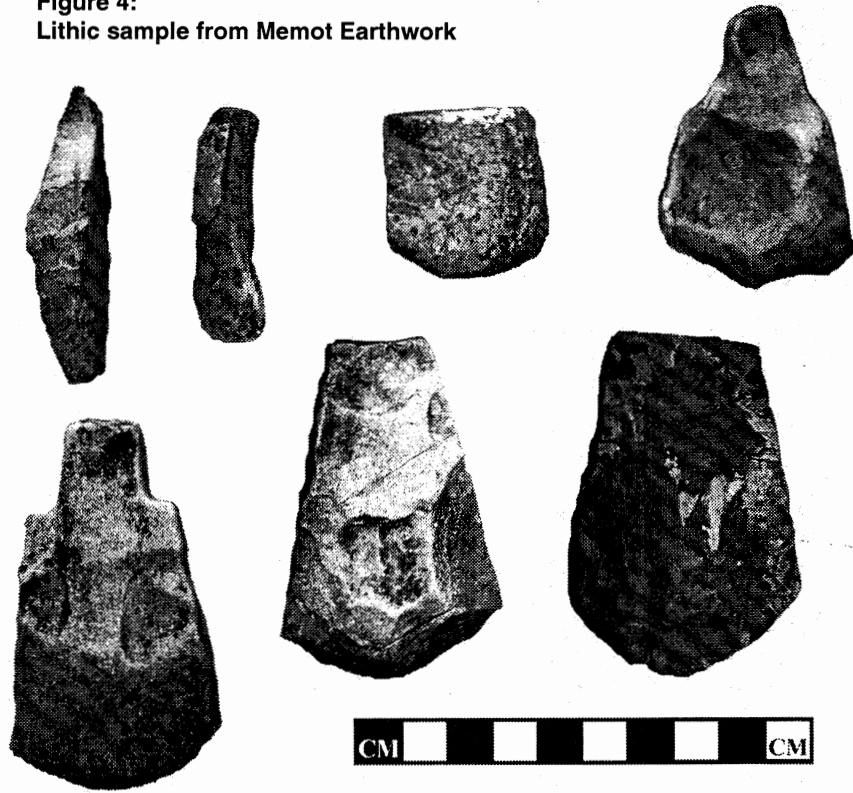
were, logically, constructed simultaneously. The soil excavated to make the depression was utilized to construct the adjacent outer wall. These two features presumably served complementary functions. Both the wall and inner depression of the settlements are thought to have been utilized for several purposes, including a possible use as barriers. They may have served to keep unwanted humans and animals out of the settlement, whilst holding bonded labourers and livestock, or even marketeers, within the settlement. A "defensive" function such as this is suggested by the height of the outer wall and the depth of the inner depression. Moore (1988) and McNeill (1997) have already inferred a similar, secondary use for the moated settlements in Thailand.

#### SITE MATERIAL CULTURE

Artifact classes acquired from surface and subsurface contexts of the earthworks include a highly variable lithic toolkit and a rich and diverse ceramic assemblage, the latter exhibiting much variation in surface treatment, surface decoration, and vessel form (Figures 4 and 5). The highly acidic soils have precluded the recovery of most faunal, botanical, and human remains as well as direct evidence for metallurgy, although any stone and ceramic accessory equipment, such as moulds, would have been preserved. The lithic assemblage, recovered from the same subsurface context as the ceramic assemblage (0.40-1.25 m below surface; *continuous*, non-interrupted deposits), consists of basalt and sandstone cores and whetstones, adzes (quadrangular and shouldered), chisels, scrapers, and an immense amount of flakes and debitage. Use wear, exhibited by fracture and flaking, is prevalent among pieces in the assemblages. Patination of the tools has resulted from intensive weathering. All stages of stone manufacture are evident within each site's assemblage. Additionally, it appears that the manufacture of lithic tools and their use to process materials occurred near the proposed area for site dwellings (or individual marketing areas), which is along the fringes of the central platform (as witnessed by artifact density distributions across the sites).

The ceramic assemblage, recovered from excavating six sites, revealed low-fired earthenware ceramics with highly variable surface decoration and vessel form. Alongside the red slipped and plain earthenware sherds, the decorated sherds manifest a variety of surface markings, including cord-marked, stamped, punctuated, dentate, and incised motifs. Much of this surface decoration appears carefully and expertly crafted. In some instances, sherds comprising both rim and body contain more than two different surface marking techniques (e.g., beveled

**Figure 4:**  
**Lithic sample from Memot Earthwork**



**Figure 5:**  
**Decorated ceramics sample from Krek #13 Earthwork**





and incised rim and cord-marked body). Tempering agents within the ceramic matrices included quartz and sand inclusions as well as rice and rice chaff. The utilization of rice and rice chaff as tempering agents promotes the inference that the occupants of the earthworks indeed belonged to rice harvesting communities. A wide array of vessel forms is represented within the sites, from very small, thin-walled bowls to large, thick-walled, shallow vessels. Far more detailed analysis of these assemblages will be undertaken in the near future. Importantly, because neither pieces nor flecks of charcoal were preserved within the acidic site sediments, the sites will be dated by utilizing samples of charcoal within the sherd matrices. Samples of rice and rice chaff used as tempering agents are also amenable to dating. Thermoluminescence dating could profitably be utilized for ceramics fired at a high enough temperature.

Of particular interest for inter-site comparisons concerning the earthworks' cultural homogeneity, clearly exotic materials and artifacts are absent from all sites. The rich material record of the six excavated sites has thus far contained no artifacts or raw materials that appear to have been manufactured or imported from outside the region. Combined with the apparent homogeneity in site location and site morphology, similarities between the settlements may be best understood as a result of a very localized, autochthonous development, a shared culture through interactions (inter-settlement trade/exchange, etc.) within this distinctive group of settlements.

#### THE EARTHWORKS OF CAMBODIA AND THAILAND

(see also the preceding paper on "moat" geomorphology in Thailand by Boyd, McGrath and Higham: eds)

An interesting comparison for the present study is the existence of moated settlements or earthworks across northern Thailand. Over 92 small, moated sites have been documented within the Mun and Chi River valleys of northeastern Thailand (Moore 1988) and 93 moated sites have been recorded in the Phimai region (Welch and McNeill 1991), among others (see also Higham and Kijngam 1984; Higham 1989; Higham 1996). When the number of circular earthworks of eastern Cambodia/western Vietnam is combined with the site counts listed above, the database of prehistoric/early historic sites with a circular morphology in Southeast Asia is substantial.

Moated sites in Thailand may be considered "as a technological group rather than as a constituent of an overall settlement pattern which includes both the larger moated, and smaller, unmoated sites" (Higham 1989:217).

When this is done, the data indicate several patterns in location, morphology, and temporal affiliation that are very different from the circular earthworks of eastern Cambodia.

For example, moated sites in Thailand are thought to have originated as copies of natural phenomena. Moore (1988) suggests that moated sites in northeastern Thailand are located in stream bends or meanders and are ringed by flooded margins during the wet season, thus providing a circle of water around the settlement. In Cambodia, the case appears different as the circular sites occur on natural hilltops 1-2 kilometres from streambeds. Essentially the only water resource that could have circulated through the sites in this semi-arid environment would have been rainwater, the water table itself being many metres below the surface.

Additionally, it appears that natural topography had little effect on the actual morphology of the Cambodian earthworks, even if it played an important role regarding the precise location of the settlements. In Thailand, by contrast, the circular sites "derive their contours from the local terrain and thus, exhibit infinite variety" (Moore 1988:8). Cambodian earthworks appear not to specifically derive their settlement morphology from the local terrain and emerge as being rather homogenous. Little variety is exhibited in site location (except elevation), site size, and construction of the walls, depression, or platform. The Mun and Chi sites of northern Thailand are typically tethered to lower, middle, and upper terraces, with some variation in preferred location occurring through time (Moore 1988). The Cambodian sites studied here occur exclusively within "lower-middle" terrace areas composed of red, basalt-derived clay sediments, at an average altitude of 110 m above sea level.

The moated settlements in Thailand, when compared to the Cambodian earthworks, are much larger in site size, averaging 30 hectares in area (Welch and McNeill, personal communication; see also Moore 1988). The largest Cambodian earthwork we have documented is 4.87 hectares in area. Circular sites in the Mun and Chi valleys, interpreted as designed to collect water and control territories, have been classified as larger, "central place" loci. In comparison, the Cambodian sites cannot be readily typecast by size, geomorphologic location, site morphology, or, as yet, on-site material record. Moreover, many moated sites in Thailand are variable in size, and size rank, and are thought to have developed in similar stages over time, as a progression of less complex to more complex by the addition of moats around the sites. The eastern Cambodian earthworks have limited variability in size, and no particular site emerges as a dominant site or "cen-



tre" of the grouping. The average difference in diameter between any two Cambodian earthworks is, approximately, only 30 m.

According to Moore (1988), the earthwork sites occurring within the Mun and Chi valleys initially appeared c.1000-500 BC, with intensive occupation of the sites occurring between c.500 BC-AD 500 (see also Welch and McNeill 1991). While dating the Cambodian sites has yet to be fully accomplished, it initially appears that the Cambodian earthworks may have been constructed and occupied at an earlier period than the moated sites to the west, and perhaps, as Groslier originally stated, between c.3000-1000 BC. Further, Mourer (1994:179) proposes that the duration of the Mimotian culture can be dated to c.3420 BC-AD 800. While radiocarbon dates from the sites are lacking, certain trends evidenced in the material record may provide a relative chronology for the sites. First, there is no evidence of metal or metal-producing equipment at the sites (e.g., stone moulds, casts, etc.). Second, no exotic trade items appear within the material record, a trend one could potentially expect from sites which post-date 1000 BC. Third, rice grains and chaff appear as temper within the ceramics, which implies that rice cultivation was an integral part of the subsistence regime. The Cambodian circular sites would therefore post-date the beginnings of rice cultivation at c. 3500 BC (cf. Higham 1989). However, we have no evidence as to when rice may have dwindled to levels sufficient only for feeding the inhabitants, without any production of a surplus. At present, the chronology of the Cambodian earthworks remains on uncertain ground. We do not yet know the origination or terminal occupation phases of the sites. Obtaining a basic culture-history framework for the sites remains a most pressing issue for our team.

Finally, the moated sites of the Mun and Chi valleys, specifically, have been interpreted as representing departure points from an earlier system of village autonomy to one of centralization, based upon the idea that investment in constructing the moated sites required authority and hierarchical relationships (Moore 1988; Higham 1989:219). There is no proven application of this point to the Cambodian earthworks. Rather, the construction of circular settlements in the region, believed to be contemporaneous with each other, may not indicate socio-cultural evolution at all but may simply represent a materialization of community or cultural identification.

In summary, the well-classified moated sites of northern Thailand (Mun and Chi valleys) "were simply but clearly ranked, metal-using, wet-rice cultivating settlements" (Moore 1988:153). Ranking is exemplified through the idea that the labour required to construct the

sites required coordinated leadership or a hierarchical command. Additionally, moating was thought to have been formulated by imitating natural water flow/retention patterns around natural mounds. Moore's summary highlights the following contrasts with the eastern Cambodian earthworks.

- 1) The sites in Cambodia may have been occupied at an earlier time than were those to the west, based upon considerations of settlement size, settlement morphology, and the presence/absence of material resource classes.
- 2) The Cambodian and Thailand sites compared here appear functionally and stylistically different.
- 3) The moated sites in Thailand appear to have been occupied by ranked or socially stratified communities. Thus far, there is no evidence for social stratification within the eastern Cambodian sites.

#### CONCLUSIONS AND FUTURE PROSPECTUS

Preliminary analyses of circular earthwork settlements in eastern Cambodia suggest a localized adaptation among peer communities within a distinctive geographical region of Mainland Southeast Asia. As such, construction and occupation of these sites may represent an early autochthonous development, perhaps as early as 3000-2000 BC. Similarity in settlement location, morphology and architecture, and cultural materials recovered from a sample of sites, may perhaps be best understood as a result of repeated interactions among the grouped settlements and little latent contact with other regional groups.

While the location and settlement morphology of these sites are now better known, several basic problems remain to be addressed, including those pertaining to the culture history of the sites and, second, to understanding the diverse material record produced at the sites. Establishing site chronology is perhaps the most important facet for present research. Our success in excavating portions of six sites now allows us to focus on in-depth analysis of the sites' lithic and ceramic assemblages, these data sets providing additional clues as to intra-site and inter-site relationships over time and space. Dating the origin, occupation, and abandonment of the sites, and importantly, determining whether these settlements extended across a discrete temporal and spatial span as a group of communities united through their mutual interactions, are objectives that require much additional research.

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DEGA, CIRCULAR SETTLEMENTS WITHIN EASTERN CAMBODIA

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REFERENCES

- Carbonnel, J.P. 1979. Recent data on the Cambodian Neolithic: the problem of cultural continuity in southern Indochina. In R.B. Smith and W. Watson (eds), *Early Southeast Asia*, pp. 223-226. New York: Oxford University Press.
- Dega, M.F. 1997. The archaeology of circular earthworks in Kampong Cham Province, Cambodia. Paper presented at the Southeast Asian Symposium, East-West Center Conference, Honolulu, Hawai'i.
- Dega, M., K. Vet, C. Chamroeun, and K. Samen. 1997. Circular earthworks in Kampong Cham: 1996 archaeological research. *Bulletin de L'Ecole française D'Extrême-Orient*, pp. 13-16. Phnom Penh, Cambodia.
- Dega, M. and K. Vet. In preparation. The Mimotian assemblage: Groslier's ceramic and lithic assemblages from a circular earthwork in eastern Cambodia.
- Groslier, B.P. 1966. *Indochina*. London: Miller.
- Higham, C.F.W. 1989. *The Archaeology of Mainland Southeast Asia: From 10,000 BC to the Fall of Angkor*. Cambridge: Cambridge University Press.
- 1996. *The Bronze Age of Southeast Asia*. Cambridge: Cambridge World Archaeology.
- Higham, C.F.W. and A. Kijngam. 1984. *Prehistoric Investigations in Northeast Thailand*. Oxford: British Archaeological Reports (International Series) 231 (1-3).
- Kojo, Y. and S. Pheng. 1997. A newly discovered circular earthwork in southeastern Cambodia. *Journal of Anthropological Science* 105 (3):181-187.
- 1998. A Preliminary investigation of a circular earthwork at Krek, southeastern Cambodia. *Journal of Anthropological Science* 106 (3):229-244.
- Malleret, L. 1959. Ouvrages circulaires du Cambodge. *Bulletin de L'Ecole française D'Extrême-Orient* LIX, fasc. 2:409-449.
- McNeill, J.R. 1997. Quaritch-Wales' moated site excavations reappraised. *Indo-Pacific Prehistory Association Bulletin* 16:167-176.
- Moore, E. 1988. *Moated Sites in Early North East Thailand*. Oxford: British Archaeological Reports (International Series) 400.
- Mourer, R. 1994. *Recherches Nouvelles Sur Le Cambodge*. Paris: Ecole française D'Extrême-Orient.
- Nop, R., S. Oun, K. Loeun, P. Hoeung, and S. Nup. 1996. *An Archaeological Study of a Circular Earthwork at Krek, Southeastern Cambodia*. Joint thesis submitted to the Ministry of Culture and Fine Arts and the Royal University of Fine Arts Faculty of Archaeology, Phnom Penh, Cambodia.
- Nuttonson, M.Y. 1963. *The Physical Environment and Agriculture of Vietnam, Laos, and Cambodia*. Washington D.C.: American Institute of Crop Ecology.
- Phan Cu Tien. 1991. *Geology of Cambodia, Laos, and Vietnam*. Hanoi: Geological Survey of Vietnam.
- Saurin, E. 1969. Les recherches préhistoriques au Cambodge, Laos, et Viet Nam (1877-1966). *Asian Perspectives* 12:27-41.
- Welch, D. and J.R. McNeill. 1991. Settlement, agriculture, and population changes in the Phimai Region, Thailand. *Bulletin of the Indo-Pacific Prehistory Association* 11:210-228.