

## RECENT RESEARCH ON THE POST-PLEISTOCENE IN THE LOWER KHWAE NOI BASIN, KANCHANABURI, WESTERN THAILAND

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### INTRODUCTION

For over three decades, Thai archaeology has provided new empirical data for the early millennia of the Post-Pleistocene (Anderson 1987; Pookajorn 1984, 1988; Sørensen 1974; Heekeren and Knuth 1967). This period has been viewed as one which experienced major social and economic changes, particularly in the contexts of domestication and agriculture (Bayard 1972; Gorman 1977; Higham 1977; Higham *et al.* 1987, Higham and Kijngam 1979, 1982; White 1986). However, the reconstruction of regional Thai prehistory of this period depends on the sequences from a few major sites such as Spirit Cave in northern Thailand (Gorman 1970, 1971), and the Kanchanaburi caves of Sai Yok (Heekeren and Knuth 1967), Ongbah (Sørensen 1973), Talu and Heap (Pookajorn 1984, 1988). In particular, the archaeological research at Spirit cave has provided important data on subsistence-settlement patterns prior to early domestication, relevant not only for Thailand but for the whole of Southeast Asia.

In recent years there has been increased awareness that we need more than isolated site samples (Hutterer and McDonald 1982). Therefore, this paper is an attempt to examine the interaction between humans and early Holocene environments in a region of western Thailand. Specifically, I will focus on the adaptive strategies of hunter-gatherers in response to a highly seasonal tropical environment. The data presented in this paper are based on a preliminary analysis of the assemblages from Lang Kamnan cave and other archaeological sites in the lower Khwae Noi basin of Kanchanaburi province.

### THE ENVIRONMENTAL SETTING

The research area presented in this paper is located in the lower Khwae Noi basin, in an area chosen to maximize topographic and environmental variability. The size of the lower Khwae Noi research area - 225 km<sup>2</sup> - was chosen to correspond approximately to the expected size of the territory of a foraging group in a seasonal tropical savanna environment. Topographically, the area has relatively clear boundaries. The seasonal

cycle can be divided into three periods: a hot dry season from March to May, a hot rainy season from May to October, and a cool dry season from November to February (Senanarong 1984; Senanarong and Njamiasai 1986). Plant communities of the area vary with the rainfall pattern. Many plants and animals are available and abundant during particular seasons. Most plants grow rapidly during the rainy period, producing seeds and below-ground reproductive and storage organs toward the end of the season (Golley 1983; Hutterer 1983; Lekagul and McNeely 1977). The annual rainfall is generally between 1200 and 1400 mm (Meteorological Department 1982).

The forests of the area can be divided into mixed-deciduous and dry dipterocarp types (Land Development Department 1988:83; Lekagul and McNeely 1977:XXV-XXIX; Suvarnasuddhi *et al.* 1976:45-63). Mixed deciduous forest is found in areas receiving 1250 to 2000 mm of annual rainfall with pronounced wet and dry seasons; it occurs on the plains as well as in the mountains and hills. The mixed deciduous forests are also very rich in wild animals, including macaques, gibbons, squirrels, bears, the larger grazers, bamboo rat and large footed bat. Dry dipterocarp forest replaces the mixed deciduous forest as annual rainfall drops below 1250 mm and the dry season lengthens to six months. These forests are more open than the mixed deciduous forests, with more grass and bamboo. This type is an ideal forest habitat for the large grazing animals.

#### BACKGROUND RESEARCH

The lower Khwae Noi basin area is particularly appropriate for this research because there is already established archaeological evidence for the presence of Post-Pleistocene hunter-gatherers (Bronson and Natapintu 1988; Heider 1957, 1958; Intakosai and Liere 1979; Natapintu 1988; Pookajorn *et al.* 1977, 1979; Pookajorn 1984, 1988; Sangvichien *et al.* 1969; Sørensen and Hatting 1967; Heekeren and Knuth 1967). The first major project undertaken along the Khwae Noi river was conducted in 1961-1962 by the Thai Fine Arts Department and the Danish Government (Heekeren and Knuth 1967; Chin 1986). This project involved reconnaissance surveys and excavations, primarily of caves and rock shelters. These sites, especially Sai Yok cave, were attributed to the "Mesolithic" or "Hoabinhian" period. The archaeological evidence included lithic assemblages, faunal remains and pottery. Analyses of the lithic artifacts and faunal remains have established that the fauna was of Post-Pleistocene affinity and that the lithic industry was similar to that of the Hoabinhian (Heekeren and Knuth 1967). Until now the few excavated sites have been taken to be representative of early Holocene settlement patterns in the larger region (Pookajorn 1984, 1988).

Further excavations and surveys were conducted in 1977 by the Department of Archaeology, Silpakorn University at Khao Talu cave, Ment cave and Petch Kuha cave, followed in 1979 at Heap cave (Pookajorn *et al.* 1977, 1979). These sites are also interpreted as Hoabinhian habitation sites. Long term survey and other research efforts have also been undertaken by the Museum of Prehistory, Department of Anatomy, Mahidol University (Sangvichien 1974) and by the Thai Fine Arts Department (1988a). The archeological evidence collected during these projects consisted primarily of lithic

artifacts dated by comparison with artifacts from excavated sites. However, these surveys were not undertaken in a systematic and representative manner. Very little environmental research has been carried out.

#### LOWER KHWAE NOI ARCHAEOLOGY

During 1989 and 1990 I conducted fieldwork in the research area described above. Survey involved random sampling for sites, and the collection of information about sites from local residents and from surveys by other archaeologists (Buttranuchit *et al.* 1980; Fine Arts Department 1988a, 1988b; Pookajorn *et al.* 1977, 1979; Sørensen and Hatting 1967). Test excavations were carried out in 2 representative sites.

The research area can be divided topographically into 4 zones; karstic limestone, limestone uplands, alluvial lowlands and piedmont. Nine caves and four open air sites were located. The sites can be identified into three classes: habitation, burial and resource sites. The tentative cultural chronology of the area is based on the sequences from Talu and Heap caves (Pookajorn 1988) and Ban Kao (Sørensen and Hatting 1967), which are all situated in the same area.

#### Habitation sites.

Nine of the thirteen sites are classified as habitation sites. One cave site called Lang Kamnan and an open site called Rai Arnon were excavated. The surface survey also produced a few pebble tools, polished stone adzes and faunal remains. The sherds were cord-marked, plain or burnished, similar to those of Ban Kao.

Three sites were classified as burial sites. These have produced a number of polished stone adzes, bone and stone beads, bone tools, stone sharpeners, stone discs, animal bones and potsherds. Preliminary analysis of the data suggests that these sites are related to Ban Kao.

Two sites, one near Ban Kao railway station (called Tung Nong Takong by Sørensen and Hatting 1967:8) and another situated along a small tributary of the Khwae Noi river, have produced a large amount of pebblestone debris, probably the remains of stone tool production activities.

#### Lang Kamnan Cave

This cave, which faces northeast, is about 110 m above sea level and is situated in a limestone upland in Tung Nagarat village, Muang district, Kanchanaburi province. It is about 1 km from the cave to the closest underground water source and about 4 km to the Khwae Noi river. The surrounding vegetation is mixed-deciduous and dry dipterocarp forest. The cave is 50 m long, varies in width from 7 to 40 m and is 11 m in height. There are many rocks on the surface, especially in the front and central areas. During the rainy season water drips into the middle of the cave. Unfortunately, part of the cave has been disturbed by guano diggers and pothunters.

In the front area of the cave there were earthenware sherds, pebble tools, animal bones and a few shellfish on the surface. Three 2 x 2 m squares were excavated in the

central and west wall areas and two 1 x 1.5 m squares in the front area. The deposits were divided into spits of 10 cm as an aid to vertical control, and five stratigraphic layers were recorded through a depth of two metres down to the sterile layer. The deposits were screened.

Layers 1 and 2 in both squares contained earthenware sherds, animal bones, stone flakes, shellfish and small hearths. In layers 3 and 4 assemblages of small flakes and core tools, charred bones and shellfish were recovered.

The earthenware sherds consist of four cord-marked sherds, two plain sherds, and three black burnished sherds which are similar to Ban Kao pottery and that from a nearby site in the limestone upland named Sane cave. Faunal remains occur from layer 1 through 4. The small and medium cervids, rats, and bats have been preliminarily identified by Karen Mudar, Museum of Anthropology, University of Michigan and by Preecha Luecha, Ecological Research Department, Thailand Institute of Scientific and Technological Research. Most of the bones were broken into small fragments and some were completely charred. It is difficult to identify the faunal remains to species but more detailed analysis is now in progress.

The terrestrial gastropods and freshwater faunal remains have been identified by Dr Rodjana Kaewjam, a malacologist from the Biology Department at Mahidol University. They include *Cyclophorus siamensis* (a land snail), freshwater bivalves (including *Uniandra* and *Chamberlainia*) and turtles. *Cyclophorus siamensis* occurred from layer 1 through layer 4 while some other freshwater bivalves occurred only in layers 1 and 2.

The lithics are amorphous and mostly of quartzite, made by direct percussion. Function have not yet been determined. Only one radiocarbon date on shellfish is available, from the bottom of layer 2 at 80 cm from the surface. It is 7540±180 BP (OAEP-1179). Other radiocarbon samples are still being processed.

#### DISCUSSION

A preliminary examination of the artifacts from Lang Kamnan cave indicates that it was used as a temporary campsite by a small group of prehistoric hunter-gatherers. They exploited three ecological habitats: upland forest, lowland forest, and the riverine zone. The higher limestone elevations of limestone mountains probably served as boundaries, while the river valley served for communications.

The cervid remains represent exploitation of the lowland and upland forests (Lekagul and McNeely 1977: 672-696). The large numbers of land snails, especially *Cyclophorus siamensis*, also represent exploitation of the humid parts of the limestone uplands and lowland forests near swamps. The turtle and bivalve remains represent riverine exploitation. In addition, the prehistoric hunter-gatherers who occupied Lang Kamnan cave combined both hunting and collecting strategies in their subsistence.

The cultural materials of Lang Kamnan belong to the category generally termed Hoabinhian. Nevertheless, there is no evidence of edge grinding and there are no Sumatraliths in the site. Furthermore, most of the lithics are waste flakes, with only a few utilized flakes and broken utilized cores.

Based on the published data (e.g. Heekeren and Knuth 1967; Tan 1978) most Hoabinhian sites have been identified by the traditional typological approach, and descriptions have focused primarily on the core assemblages. Very little attention has been paid to flakes, although some studies (Gorman 1970; Hutterer 1974; White and Gorman 1979) suggest that they were used mainly on wood or bamboo. The study of edge damage on core tools (Bannanurag 1988; Hayden 1979) suggests that a steep edge angle is essential for woodworking.

The assemblage from Lang Kamnan differs from those from Khao Talu, Ment and Heap caves (Pookajorn 1988) in having a smaller range of stone tools and fauna. This may reflect differences in resources and ecological niches, although the sites are in the same seasonal tropical environment. If we can understand the subsistence and settlement patterns of the prehistoric hunter-gatherers living in this area, then we might understand the socio-economic development of the lowland sedentary village at Ban Kao, which was occupied by 1770 BC.

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