Natural History Investigations at Ban Chiang
The Study of Natural Resources and Their Use Today Aids Reconstruction of Early Village Farming in Prehistory
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Although social scientists have long considered Southeast Asia a cultural backwater of China and India, biologists have noted since the 19th century that botanical evidence pointed to this region as an independent and probably very early source of plant domestication. One recent compendium (Li 1970) lists over twenty species of plants that were probably domesticated on mainland Southeast Asia, and several of these, most notably rice, yams, and taro, now are staples for regions well beyond the Southeast Asian heartland. What societies undertook the original horticultural experiments? Why and how did they commence and develop agriculture? Not until the 1960s did archaeologists seriously pursue these questions, when Dr. Wilhelm Solheim at the University of Hawaii and his students Chet Gorman and Donn Bayard excavated in northern and northeast Thailand. The resulting work at Spirit Cave and Non Nok Tha brought Southeast Asia to the attention of the archaeological world as a region of technological precocity not only in plant and animal domestication, but in metallurgical understanding as well. From under the Indo-Chinese shadow, a regional configuration of cultural and ecological traits and adaptive strategies has begun to emerge, with indigenous roots dating back to the Late Pleistocene.

Ban Chiang, the site of the University Museum/Thai Fine Arts Department excavation in northeast Thailand, is a window on four thousand years of this Southeast Asian cultural tradition. While at some future date we may have a better picture of the prehistoric interrelationships with neighboring areas such as northern Vietnam and southern China, the intensive, multidisciplinary research crucial to the elucidation of early agricultural development has been initiated thus far only in northeast Thailand. Since Ban Chiang lies within the theoretical zone of the early domestication of rice, yams and other indigenous Southeast Asian domestics, the multidisciplinary research effort into the palaeo-economy and palaeo-ecology of Ban Chiang and related sites should shed light on the biological, social, and technological factors in the emergence and development of plant cultivation throughout the Indo-Pacific region.

The story behind the emergence of Southeast Asian farming societies lay in the interaction between the prehistoric societies and their natural world. We cannot go back, however and interview the ancient inhabitants on their cropping systems and other exploitation strategies. Nor are most of the relevant but highly perishable data on diet and environment likely to
SEASONALITY

The rhythm that pervades the ecology, both human and non-human, of this region is the seasonality of rainfall. Northeast Thailand lies in a tropical zone that receives all of its annual rainfall within about six months—May through October. During the dry season, November through April, lakes and marshes contract, streams dry up, the water table drops. It is likely that this seasonal pattern of rainfall dates back to the lowland settlement of this region in the 4th millennium B.C. because the same faunal species found in the excavations (see pp. 17-24, Higham and Kjøngen) have been found in the vicinity of Ban Chang within living memory of the inhabitants. The plants and animals that inhabit this region have evolved suitable behavioral and biological adaptations to the fluctuation in water resources, and human societies must adjust their subsistence strategies to the ebb and flow of the natural resources. One of the primary goals of my field work was to document the fluctuations in natural resources throughout one seasonal cycle, and to record the traditional strategies used by the current villagers of the region to exploit these fluctuating resources.

When I arrived in Ban Chang in October, the dry season had just begun and the rice crop was about to be harvested. I had planned to stay at least eighteen months, the first six months to orient myself, develop language facility and appropriate research strategies, the next twelve months to document a seasonal cycle. The schedule worked very close to plan.

That first year the rains had ceased a few weeks 'early' and my principal informant, Lung Li, was very much in a bind. While he and his family harvested their rice crop, I set about the slow process of building a vocabulary appropriate to the research. The intensive language course in Thai I had taken at Berkeley gave better preparation for asking directions to the Oriental Hotel than for discussing rice varieties with farmers. Moreover, I quickly found that although the villagers learn central Thai in school, read Thai newspapers, etc. I should learn the local dialect, a variant of Lao, if I wanted to understand discussions on farming, etc. This process required much dictionary work and discussions with a very patient Lung Li on the name for this, the name for that.

The remainder of that first dry season I spent scouting around (more formally known as surveying), developing interview and other data collection forms, reading appropriate literature (discussions of Thai flora were a lot more meaningful while sitting in Ban Chang than while sitting in Van Pelt Library at Penn), and discussing 'things' with Lung Li. I came to have a profound respect for Lung Li's character and knowledge of his natural world. He had an enquiring mind—hard to find in any society—and a sensitivity to his environment that surpassed that of anyone else with whom I talked. Moreover, this self-taught naturalist bore truly extraordinary patience with my endless requests for repetition and elucidation, which reflected a selfless desire to share his knowledge and understanding. He became a close confidante, and I will always be in his debt.

By the start of the rainy season in May, I had acquired sufficient understanding of the language and ecology of the area that I could begin to ask semi-intelligent questions. Although my understanding was still somewhat hazy, Lung Li helped to clarify. I began the systematic collection of data for the full seasonal round.

Certain activities I carried out throughout the year. Once a week I rode my bicycle around the village to measure the depth of all the wells in order to document the change in water levels throughout the seasons. Once a week I inventoried the Ban Chang morning market to learn the names of produce cultivated and gathered as each became available. I ate the local foods prepared in local ways. And during that year considerable time was spent with Lung Li collecting botanical specimens, drying them and recording relevant information on the preferred environment locale, local name, dietary and other uses, method of exploitation, seasonal availability, etc.

In addition to these activities I would frequently venture out with Lung Li into the surrounding area to investigate subsistence activities and environmental zones. When possible I tried my hand at the ongoing activity in order to get a better sense of the problems faced by subsistence farmers. Thus, during the early rainy season I helped to plow and transplant fields. Local women will plow only if circumstances dictate, and I found upper body strength most stressed when turning the corners of the paddy. One has to boast the heavy plow and iron plowshare out of the sticky mud and swing it up and over to the next side, preferably in one smooth motion, all the while encouraging the water buffalo to turn the corner and proceed at an appropriate pace down the next row. After a few of my jerky and druggy turns, the water buffalo marched off the paddy in apparent disgust at my inept technique.

GARDENING

During lulls in the seeding and transplanting of the paddies, people turn their attention to dry land farming. I hoped that an examination of the gardening system might show insights into one of the major issues pertaining to the change in water resource policies. What was the nature of the early cropping system—wet paddy? or dry land swiddening?

While no final answer per se can be offered, I did find the study of gardening was much more complex than wet rice cultivation. I started by taking inventories and plant counts of various local gardens and discussing the cultivation techniques with the owner. Slowly I came to realize that most gardens around Ban Chang reflected not traditional gardening practices, but the impact of cash cropping and the market economy since the last generation.

This most gardens had low diversity of species since everyday produce and condiments could be bought at the morning market. Some plants might be grown in quantities too large for family consumption so that the surplus might be sold for cash income. Many garden plants—such as cassava and corn (maize)—were not indigenous to the area.

So Lung Li and I went off to look at gardens in more remote villages and eventually I began to sort out the traditional gardening system, the basic set of plant varieties and cultivation strategies. It became clear that a wide variety of strategies was generally known, from which cer-
planting and harvesting, and contribution to the subsistence needs. It seems entirely plausible that the early cultivators could have used both techniques.

DIGGING FOR YAMS

In addition to rice, botanists have said that several species of yams were domesticated from wild species in mainland Southeast Asia. While hard-coated rice seeds have a probability of leaving archeological traces as carbonized grains or impressions in pottery, detecting the role of roots in prehistory is a notoriously elusive problem because fleshy tubers have no hard structures and thus rapidly disintegrate in the earth. Because of lack of direct evidence for use of yams and the predominance of rice cultivation in the region today, archeologists have tended to discount the possible importance of yams in the prehistoric subsistence at Ban Chiang. The question remains, however, as to when then domesticated the yams?

In my research I wanted to find out if yams grew today and were used in the Ban Chiang region, which species, where in the environment, and what time of year they were exploited. I found that many wild and cultivated species of yam known generically as man grew in the area and that the local people gathered them to sell in the market. They ate them either steamed, or as a sweet mixed with shredded coconut and sugar. During the yam digging season, commencing in late August, large quantities were dug up and I went on several forays to collect specimens. I also had several planted in my yard so that I could watch the development of the plants.

Each of the six or so non-cultivated edible species had distinctive habits and environmental preferences. One yam, Dioscorea hispida, or as it was known locally, had to be detoxified before it could be eaten. Thin slices of peeled yam were soaked in changes of salty water for at least three days. Then the slices were steamed before mixing with coconut and sugar. I found they made excellent home fries as well, although many neighbors did not appreciate this recipe. Other yams did not require detoxification, but each had its own defense against natural predators such as wild pigs. Some yams had sharp thorns just under the surface of the soil, or several tubers spreading outward from the main vine, or one very long and deep tuber.

The growth habit of cultivated yam varieties usually had these defenses mini-
**DRIY SEASON**

The harvest is the most labor-intensive time of the year, but once the rice is cut, threshed and stored away in the small rice buts found in every house yard, the more relaxed part of the year commences. Some subsistence activities take place in the dry season: some trapping, small-scale fishing or hunting, some gathering of certain resources available only then, and even some small gardening activity near to shrinking water resources. The dry season is the time for festivities, craft activities and traveling to other villages and other regions. Many women set up their looms and spinning wheels, weaving and dyeing cotton and silk cloth. In certain villages iron smiths set up their bellows and make and repair knives and plows; some villages make earthenware pots. The next season’s supply of rope for plows is made. New land is claimed and slowly cleared, for work outdoors in the scorching sun is tiring. In modern-day northeast Thailand much effort goes into preparations for celebrations relating to Buddhist holidays that can last several days. Traditionally, groups of families would travel by ox cart to distant rivers that still had water. These great fishing expeditions would net fish to be fermented in bulk for the year’s supply of piae ro, a primary source of protein.

During this last dry season I focused on the ethnographic system of environmental classification. One of my major research goals was to try to place natural resources into their environmental context. The problem was that the classification of the region into vegetation types had been too general to be of any use in answering my very localized questions. I wished to know, for example, the relationships among wild rice, wild yams, and wild legumes. Before going to Thailand I had vague visions of undertaking inventories of sample vegetation patches. After some soul searching, this seemed totally inappropriate to an environment highly disturbed by millennia of human modification. I was becoming aware of terminology that the farmers used to
refer to different types of land. As my understanding of the natural flora and other environmental variables increased I realized that this local environmental system was highly "scientific," based on vegetation, soil type, drainage. Since I was taking botanical samples, I could correlate the ethnic types with scientific classifications. In fact I found the local system more refined in several instances, more in tune with local needs of making a living, than the scientific forest types which were suited to the needs of lumbering. This local environmental map was a suitable framework with which natural resources could be correlated. The different zones were also recognized as having differing potential as rice paddies or gardens. A full exposition of this ecological system and its relevance to reconstructing the prehistoric environment will be presented in later publications, but this discovery was the most rewarding of my field work. I certainly would not have gained a full appreciation of it if I had stayed less than eighteen months.

THE VALUE OF ETHNO-ECOLOGY

In summary, I found the present a rich source of ecological data with great potential for deciphering long-term relations between humans and this environment. Environmental constraints in the seasonal fluctuation of water, available resources, plus the plant and animal behaviors, clearly shape the options available for any human society living in this region. On the other hand, the study of current practices reveals a variety of strategies that can be used to exploit this environment. In future more detailed expositions of the data collected during this field work, I intend to integrate the contemporary ethnographic and ecological data with archaeological information to develop a model of the change in human/environmental relations in the Ban Chiang region. Such a model can contribute not only to issues such as the origins and development of shifting and paddy cultivation in Southeast Asia, but also to a fundamental puzzle of cultural evolution raised by the Ban Chiang excavations: if an early and innovative rice-cultivating and metal-producing society developed in this area, why did no urban or state society subsequently emerge? The flourishing of technological sophistication in a non-urban, non-militaristic, village level society is one of the enigmas of Ban Chiang.

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Credit
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Acknowledgments
I wish to express my gratitude to The University Museum for supporting the field research reported in this article. Assistance for other aspects of this research has been received from the Oberlin College Alumnae Fellowship Committee, the Department of Anthropology of the University of Pennsylvania, the Center for Southeast Asian Studies at Berkeley, the Association of American University Women, the Institute for the Study of Human Issues, and the Royal Forestry Department, especially the staff at the Herbarium. Special thanks are in order to Lung Li and the other villagers who helped me with my research. My deep appreciation is extended to those and the many other individuals and institutions on both sides of the globe who made this work possible and who are listed in the general acknowledgments (page 4). To my mentor, the late Chet Gorman, I am especially grateful.