



TRADE, CULTURE AND SOCIETY IN THAILAND BEFORE 1200 AD

Helen James

Abstract

This paper discusses the development of the vibrant socio-cultural complexes inhabiting the geographic area between the Mekong and the Salween river systems in pre- and proto-historic times up to 1200 AD. Our knowledge of these cultures has increased in recent decades thanks to the multidisciplinary research undertaken by Charles Higham, Dhida Saraya, Srisakra Vallibhotama, Bennet Bronson, Donn Bayard and others whose work has complemented that of the linguists, art historians and scientists to bring to life the sophisticated societies which evolved on the Khorat plateau in northeast Thailand, in the Chao Phraya valley, and on the peninsula of southern Thailand long before the declaration of independence from the Khmer overlord at Sukhothai in the mid-thirteenth century. Far from being a vacuum with little social, cultural or political development, we now know that these socio-cultural complexes had extensive intra-regional, interregional, and international trading networks complementing their own indigenous developments, long before the appearance of the Greco-Roman trading ships in the harbours of the Coromandel and Malabar coasts of India in the first and second centuries AD. The pattern of indigenous relationships gave rise to the early Bronze and Iron Age civilizations in this region and made these socio-cultural complexes a cornerstone in the reinterpretation of Thai history.

Introduction

The geographical area now delineated by the nation state, Thailand, had a sophisticated cultural history characterized by complex interregional, intraregional and international relationships long before the officially constructed Sukhothai-Ayutthaya-Bangkok march of modern history minimized the socio-cultural developments of earlier times. An anthropological approach enables us to put a framework around these pre-Sukhothai socio-cultural complexes, in an attempt to locate



their destinies amidst the long established international trading, transportation and communication networks which have linked human societies east and west since pre-historic times. The focus on trade, culture and society enables us to set the continuum of human experience in the area in international perspective.

Early twentieth century histories of Thailand promoted the view that the Thais had migrated from either north or south China in the ninth or thirteenth centuries to escape either the upheavals in Nanchao or the Mongol invasions. Multidisciplinary research has discredited this theory. The T'ai did not 'come' from anywhere suddenly to take over the country in the thirteenth century. They were already established in mainland Southeast Asia centuries, perhaps even millennia, before their appearance in the historical records. They were just one of many ethnic groups who had inhabited socio-cultural complexes in the region since at least 10,000 BC. It is now accepted that the early peoples in pre-historic mainland Southeast Asia developed an autonomous society and culture, distinct from Indianization or Sinicization. This battle no longer has to be fought. The much vaunted Greco-Roman trading interest in India from the first to third century AD, was only the latest in a series of international trading relationships between the area we now call the Middle East and the Southeast Asian region since about the fourth millennium BC, driven perhaps by the surge to interaction with other human groups.

The riverine cultures of mainland Southeast Asia facilitated the trade and communication networks which provided the synergies for socio-cultural development in the area. The ancestors of the Austronesian and Austro-Asiatic peoples moved into the fertile river valleys, whilst in the uplands other 'hill tribe' peoples continued to develop their societies within eco-systems which reflected an earlier way of life. Whether these diverse peoples moved down the river valleys as is the current view, or up the river valleys to escape flooding of the Sunda shelf, they developed separate linguistic capacities and distinctive local cultures across a wide area from the Yangtze River basin to India, Indonesia and the Pacific. Mainland Southeast Asia is now perceived to have made a major contribution to the development of socio-cultural complexity in the pre-and proto-historic eras leading these robust and innovative societies to take the initiative in developing intraregional and interregional commodity exchange networks to as far away as prehistoric Japan, Korea and Madagascar. Environmental changes impacted significantly on the socio-cultural complexes evolved by the earliest humans, causing much movement throughout the region. Some 40,000 years ago the early Australoids were expanding into New Guinea and Australia; others were moving into the Austronesian homelands even before the period of major Austronesian expansion after 4000 BC. Our knowledge of their material and spiritual cultures is still evolving. When and how language capacity developed is still debated as are the mechanisms of social

interaction within and between foraging bands, essential to the evolution of speech capacity. Early human communities did not exist in splendid isolation. The social and religious interactions of these subsistence economies were carried out across extensive regional networks, through marriage ties between communities and expressed in ritual and the ritualized art of their rock paintings, crafts and jewellery.

The ethno-linguistic cultural history of these early human communities, delineates the common linguistic heritage of the Austro-T'ai/Thai-Kadai-Indonesian language families geographically dispersed across a wide region south of the Yangtze River to Hainan Island, Southeast Asia and Assam. The early domestication of rice, prehistoric ceramic technology, an indigenous bronze and iron metallurgy mark the cultures of northeast and central Thailand contemporaneous with the civilizations in the Euphrates, Nile and Indus river valleys during the third millennium BC. Unlike the peoples of these Middle Eastern civilizations, those of the Bronze Age in northeast and central Thailand left no inscriptions, no traces of their language or linguistic heritage, no stone or brick monuments, temples or palaces as did the later proto-historic period. Evidence from the linguistic heritage of the Mon and Khmer peoples who did leave inscriptions, remnants of stone or brick monuments, temple complexes, Buddhist amulets and artefacts, together with records of the Chinese dynastic histories enables us to visualise the structural developments from agricultural societies to urban complexes which were taking place in the region since the mid-first millennium BC.

Early human habitats and the development of socio-cultural complexity

Since the 1960s Thai/Danish archaeological expeditions revealed that human habitation at Ban Kao and Sai Yok in Kanchanaburi Province was continuous from at least 12,000 BC, intensive research into the pre-history of Thailand has recognized the important contribution of mainland Southeast Asia to our understanding of the development of socio-cultural complexity. Wooden burial coffins found here with urns containing charred remains accompanied by grave gifts of ceramics, bronze lime containers, beads and a decorated bronze bell belonged to a culture based on exploitation of the riverine and forest environment by people whose primary pursuits were fishing and shellfish gathering. An ill-preserved human skeleton of an adult from the *Homo sapiens* group, small in stature, found lying on its back, was a member of the Hoabinhian culture occurring in a wide geographic range from South China to Malaya, reaching to Southeast Australia, and Tasmania (Van Heekeren 1961, 105–106). The 1962 excavations led to the conclusion that the neolithic culture of the Ban Kao area at Lawa and Chande Caves, shared a common culture with the Lungshan culture of northern China, for every type of artefact known from Lungshan was also discovered at the Bang site

(Nielsen 1962, 14). Rock paintings in a shelter some 500 metres above sea level at nearby Tam Roop, or Picture Cave, are thought to have been a shrine or holy place for the people of this culture (Nielsen 1962, 14; Knuth 1962, 21) consistent with such ritualized art in other Hoabinhian and neolithic sites. At Ban Kao occupation continued from earliest cultural sequence through to the appearance of historic material. These discoveries, complemented by those at 20 sites in northeast Thailand excavated in 1963 by Professor William G. Solheim and his team, and subsequent expeditions by Thai and international experts, provided clear evidence of a widespread Hoabinhian stone age hunting and gathering culture often associated with rock shelters and caves extending from southern Thailand around present day Krabi at Lang Rongrien and Moh Kiew sites to the west, north and northwest from Kanchanaburi, to Lampang and Mae Hongson.

What were the origins of the people who lived at Ban Kao and Sai Yok? Modern research using mitochondrial DNA analysis applied to the remains of the earliest Southeast Asian found on the banks of the Solo River more than a century ago, proved that Java Man, *Homo erectus*, was a relative of the *Homo sapiens* who originated in Africa 150–120,000 years ago (Thomas 1993, 5; Richards et al, 1993, 18–26). Their common ancestors are thought to be only 200,000 years old. It has been theorized that between 120–90,000 years ago *Homo sapiens* moved out of Africa, supplanting *Homo erectus* and *Homo sapiens neandertalis* as they crossed over the Late Pliocene land bridges from that early cradle into Asia (Chamberlain 1991, 138, 143), thence spreading around the globe (Leakey 1999, 34). The alternative multiregional theory, which traces human origins to populations of *Homo erectus* in Africa, Europe and Asia, claims that the fossil record supports morphological continuity on a regional basis for the transition to *Homo sapiens* (Thomas 1993, 5). Remains from north China suggest that *Homo erectus* may have continued here long after the archaic *Homo sapiens* had evolved further in the west (Stringer and McKie 1996, 44). Thus it is thought that the history of the development of the hominid family has most likely not followed a linear trajectory, but may have involved some form of hybridization between those who came out of Africa and the local archaic populations (Tattersall 1999, 25). Comparing the European and East Asian morphological sequences Reynolds suggested that marked behavioural changes occurred in the period 50,000–30,000 years ago both in the Eurasian region and in the Middle to Late Stone Age transition in Africa for it is at this time that symbolism and identity seem to appear in the archaeological record on a broad basis, perhaps indicating new environments in which groups ‘mapped’ themselves through the use of material culture and constructed networks of information, material and mate exchange in a system of long-term interdependence leading to changes in socio-cultural relationships (Reynolds 1991, 163). According to the theory of expansion of *Homo erectus* out of Africa and across Asia it is thought that present

day northern Thailand around Lampang is likely to have been on their migration routes.

Of the dozen confirmed Pleistocene epoch sites identified in Southeast Asia those in southern Thailand at Lang Rongrien and two villages near Lampang, northern Thailand (Ban Mae Tha and Ban Don) contribute much to our understanding of how these early humans interacted with their environments. Excavations undertaken in 1978 and 1986 by G.G. Pope and Surin Pookajorn at Ban Mae Tha and Ban Don Mun revealed evidence of hominid occupation dating to 700,000 years ago. Further evidence of hominid occupation of Thailand in this early Pleistocene epoch was found in a limestone cave at Khao Pah Nam also in Lampang province. Here the flaked stone tools were found with animal bones—wild cattle, tiger, deer, hippopotamus, and hyaena—but still no hominid bones such as have previously been found in China, Indonesia and Vietnam. The remains of charred hippopotamus bone were found near what appears to be a hearth. None of those animals found today in thick rainforest was present. It has been suggested that this early hominid habitat may have occupied a fairly open deciduous woodland, reflecting the dramatic changes in climate which have taken place in Southeast Asia since the early Pleistocene epoch.

The next evidence for hominid occupation occurs in southern Thailand in a rock shelter at Lang Rongrien, Krabi province. It represents a timelapse of half a million years from the Lampang sites during which time *Homo sapiens* had evolved from the early hominids. Occurring in a similar limestone karst tower situated between two rivers, the remains of charcoal in nine hearths excavated in 1983 by Douglas Anderson have been dated between 38,000 and 27,000 years ago. Across three phases of occupation, some 45 stone artefacts were found, together with charred animal bone, two hearth areas lined with stone, and a grooved deer antler. Reynolds (1990, 112) believes that these finds demonstrate the existence of a flake-based industry preceding the Hoabinhian in Thailand and are similar to the artefacts of the Ngoum industry in Vietnam from about the same date. More recently Stephane Ducrocq has written of *Siamopithecus eocaenus*, a new species of late Eocene anthropoid primate, some remains of which recovered from excavations at two sites in the late Krabi basin of southern Thailand are similar to those of the Burmese Eocene anthropoids, *Pondaungia cotteri*, found at Pondaung in northern Burma (Myanmar). Since the fossil record of anthropoid primates in Southeast Asia is scarce, these finds in Thailand and Myanmar represent a significant contribution to the argument for a probable Asian radiation centre (Ducrocq 1999, 613, 635).

In the late Pleistocene, 50,000 to 12,000 before the present, the timespan to which the Lang Rongrien site belongs, *Homo sapiens* had to adapt to four climate changes. Periods of cooling associated with expansion of the continental ice sheets and decrease in rainfall produced a lower sea level. In Southeast Asia, one such

period 22,000 to 16,000 BC resulted in Malaysia, most of Indonesia and much of the Philippines being joined to the mainland. The changes in rainfall and the monsoons would have placed southwestern Thailand and the Malay peninsula in a rainshadow leading to the formation of a savanna-like grassland environment in the southern peninsular zone. It is likely there was no rainforest in Thailand at that time (Anderson 1989, 107). The flora and fauna available to the people of this habitat would have been typical of the savanna grassland: turtle, pig and deer, rhinoceros and wild cattle, the bones of which have been found at the Lang Rongrian site and other Pleistocene sites in Southeast Asia. Bands of hunter gatherers would have hunted the fleetfooted animals of the forest, the various species of monkey, deer and wild pig, and squirrels, for which they would have needed to develop spears, bows and arrows or blowguns (Anderson, 1989). Since no remains of these items have been found, it is thought they were fashioned from bamboo, or other organic materials which have not survived. These hunter-gatherers would have gathered roots, fruits and nuts to supplement their diet. It is now recognized that plant foods were a substantial part of the diet of early man in Southeast Asia (Steele 1994, 127).

Population levels were apparently low in the Pleistocene epoch, and remained so either through disease or predators, or the limited technology to obtain food resources to support the population. It is likely that the groups lived in widely separated areas to allow the possibility of ranging over considerable territory in search of big game items for food. For these forays, cooperation within the group, or even between groups, would have been necessary to secure the larger animals. Such cooperation and the sharing of the game caught among the group has been perceived to have a social function as well as a public good. Foraging forays were not only to feed the nuclear family members within the larger group, but also sharing the goods within the hunter-gatherer group attracted favorable attention and social benefits from other group members (Hawkes 1993, 341, 347). The thin layers of cultural materials on the floors of caves and rock shelters suggest brief occupations as the groups moved from place to place. Did the various groups engage in intertribal trade to obtain the raw materials for their prehistoric implements? Ranging over considerable territory, they would have had the opportunity to spot the raw materials needed for the flaked stone tools used for slicing flesh, animal skins and plants, or the less glassy stones such as quartzite and cobbles for chopping or pounding, perhaps exploiting networks of reciprocity (Kennedy 1977, 35) to acquire the needed items. Anthropologists now recognize the extensive communication networks implicit in the dispersal patterns suggested by the lithic and other material remains of early man.

In recent years there has been increasing attention to the social relationships of early hunter-gatherer and hunter-fishermen communities, their gift exchange systems, genetic units and possible patterns of dispersal from the natal

group (Steele 1981, Hawkes 1993). Together with these issues goes the question of how and when language capacity developed in *Homo sapiens* as debate continues on the evolution of central brain structures and peripheral, speech-producing musculature. Deliberately controlled vocalization would have preceded articulation of a recognizable spoken language (Steele 1981, 128). Well-developed communication networks and considerable social interaction both within foraging bands and with other bands would have been essential to the evolution of speech capacity. It is no longer possible to view these early hunter-gatherer communities as existing in splendid isolation within a self-sufficient subsistence economy throughout the long centuries of the Palaeolithic. The new paradigm of hunter-gatherer social organization emphasises flexibility and adaptability by small bilateral kinship groups whose loosely defined sense of territory, high residential mobility, lack of sophisticated technology, little or no accumulation of wealth and investing of prestige in leaders (not chiefs) according to personal attributes may account for the longevity of this culture (Renouf 1984, 18). Thus there is increasing attention to early man's development of, and integration into, extensive regional networks, the marriage ties between communities, his social and religious interactions, use of ritual and ritualized art as evidenced by the rock paintings, the development and maintenance of asymmetrical male-oriented gender relations, unequal gender controlled division of labour, and imposition of power modes on putatively egalitarian socio-cultural norms (Whitely 1994, 362, 367). As the archaeological record begins to show evidence of notions of descent, rituals associated with the main activities of life—birth, marriage, death, feasting, acquisition of a preferred item, success in the hunt, the seasonal cycle—became more complex, more frequent, and supported the emergence of notions of leadership and status.

The Hoabinhian village cultures and the appearance of agriculture

Along an arc of sites on the northern and western rim of the Thai-Burmese (Myanmar) border Hoabinhian village cultures exhibit various aspects of the gradual appearance of a sedentary society among the hunter-gatherer societies. Since Chester Gorman's investigations in June 1966 at Mae Hongson revealed four distinct periods of human habitation at the Spirit Cave dated 11,000–5500 BC many further Hoabinhian rock shelter cultures have been found in the Banyan Valley and at Tham Pa Chan (Steep Cliff Caves) beyond Mae Hongson which exhibited pottery sherds, cordmarked and plain, fragments of a polished adze, flaked pebble tools, fragments of rice chaff, stone tool culture, sumatraliths,¹ short axes

¹ 'A uniface discoid stone tool, usually made from a slice of a large pebble, found in Southeast Asia, and northern Sumatra, typical of Hoabinhian sites.' *Encyclopedic Dictionary of Archaeology*, ed. Kipfer, 541.

and hammers, remains of shellfish, fish and animals—the badger, rhinoceros and deer—all similar to those found at the Spirit Cave. Remains of canarium nut, gourd and bean in a time sequence younger than that at the Spirit Cave, 3500–2000 BC in the lower two levels, and 900 BC–900 AD in the first level showed that this hunter-gatherer culture continued into the first millennium AD. Exploration of the caves in the Nam Khong basin by Kiernan, Spies and Dunkley in 1988 revealed another 31 previously unreported Holocene epoch sites which yielded a rich variety of artefacts including prehistoric pottery, sherds, and large wooden coffins made from teak and pine, some with human remains, which were found at 26 of the sites. Some sites contained typically Hoabinhian assemblages of stone tools and intermittent occurrence of ceramics possibly obtained by exchange with other sedentary groups. All the sites occur in, or are adjacent to, dry limestone caves or rock shelters high on the sides of ridges. Prehistoric postsheds in 13 of the sites included both flared pots and shallow unflared dishes made from a coarse compound of oxidized organic matter. Impressed cord is evident in the sherds. Other pots were decorated by incising the clay with a sharp object (Kiernan, Spies and Dunkley 1988, 24–29). Small bronze bells with a rounded dome and spiral design on the face were also found, as well as eight heavily corroded iron bracelets and beads of stone or ceramic. Three phases of occupation are represented here, an Early Hoabinhian, a Later Hoabinhian and an overlapping different cultural group responsible for the coffins and associated artefacts called the Nam Khong Coffin Culture. This was a group which seemed to have some acquaintance with metallurgy, or had contact with other metal-using groups as evidenced by the bronze bells found in association with the split log coffins. We could ask were the people of this culture the ancestors of the present day Lawa who live in villages south of Mae Hong Son and who still bury their dead in split log coffins and make cord-impressed pottery (Kiernan, Spies and Dunkley 1988, 30–42). A stone tool manufacturing complex found at 19 sites in the Nan River basin by Pautreau, Santoni and Prischani possibly served the surrounding region. Other Hoabinhian culture sites occur in the valley of the River Ping, northern Thailand, in the Pha Chang rock shelter at Ob Luang, and on the Mae Chaem stream. On the cave walls of the Pha Chang rock shelter are two series of paintings of which those in red, now hardly visible, are thought to date from prehistoric times, perhaps exhibiting the hunter's perspective noted in the rock art of a pre-pottery seventh millennium BC neolithic excavation at Dhuweila in eastern Jordan (Betts 1987, 215). The rock art of prehistoric peoples is now considered a reflection of the social processes of the groups including the roles of the emerging shamans and their attempts to exert control over the resources of the group (Dowson 1994, 332–345).

The similar range of animal remains at each of the Hoabinhian sites suggests that the cooperative hunting techniques used by the Pleistocene cultures con-

tinued to be utilised to provide the main sources of food—wild pig, species of deer and monkey, wild cattle and rhinoceros—as staple sources of protein. Intensification in the early Holocene may indicate that the need for wide-ranging settlements had diminished owing to changed approaches to food acquisition. The inland Hoabinhian sites yield evidence of fresh water molluscs and land snails being included in the diet; coastal sites include bivalves, intertidal and marine gastropods. During this broad-spectrum revolution,² the wider range of faunal remains indicated a greater variety in the diet of the people. The polished stone axes and adze blades found at the Spirit Cave and Sai Yok may have been implements developed to help with clearing forests for some sort of intentional planting. Locality seems to have been of more importance to the Hoabinhians than it was to the early hunter-gatherer communities. Raw materials for their stone tools were taken from the local stream cobbles or rocky outcrops. The pattern of occupation seems to have become fixed on a particular river valley. Considering the range of Hoabinhian sites in Thailand, Reynolds suggests stages in this cultural development from Early Hoabinhian, to Hoabinhian with pottery and adzes both included in Neolithic sites. It is possible to look at these Hoabinhian cultures as one facet of a more complexly organized society where certain extractive tasks were carried out by small groups in ‘Hoabinhian localities,’ whilst occupation in the lowlands and larger valley floors may have involved forest clearance and swidden agriculture giving a ‘centre and periphery’ pattern in the archaeological context (Reynolds 1990, 113). The wider range of plant foods gathered also indicates that Hoabinhian people had become more conscious of the nutritional value of wild plants. Although it is still unconfirmed whether the early Hoabinhians practised rudimentary agriculture, they clearly knew the value of beans, gourd, pepper, butternut, candle nut. They may not have intentionally disturbed the soil to enhance the production of these plants, yet the various fruits and nuts may have already begun to evolve genetically under the force of climate change and natural selection as cultivated organisms.

Yet the pottery does suggest that the Hoabinhian groups were inclined to establish permanent settlements, for pottery, which breaks easily, is not very portable. Anderson (1989) has pointed out that use of pottery implies an attachment to a locale having suitable clays for its manufacture, and that the vessels could be used for storage of plant foods. Whilst most of the Hoabinhian sites are in rock shelters, where the potsherds have been found, no evidence of their having been made in the rock shelters has been found, leading to the assumption that open

² ‘A theory relating to a subsistence change occurring in western Asia which involved a range of foodstuffs, small mammals, invertebrates, aquatic resources, and plants in the Late Pleistocene as a prelude to the Neolithic revolution.’ Kipfer, 80.

air sites may have been used for firing the pottery, unless it came from trading with other groups. As a technocomplex,³ the Hoabinhian extended across a vast area from the equator in Sumatra to the Tropic of Cancer in southern China. Its agricultural status is attested to only in northern Vietnam and northern Thailand, at the Spirit Cave (Bellwood 1985, 164). Plant domestication was probably never ‘invented’; its principles were probably known to the hunter-gatherer communities long before evidence for plant cultivation appears in the archaeological record.

Surin Pookajorn’s subsequent investigations of the hunter-gatherer caves in Kanchanaburi, 4.5 km north of the Kwae Noi River where he found the remains of Hoabinhian stone tools, animal, shellfish and plant remains in layers dating from 8000–1000 BC, flaked pebble tools and black burnished potsherds cord-marked and incised similar to the nearby Neolithic site at Ban Kao led him to suggest there was some sort of interaction between the original hunter-gatherers and perhaps newly arriving groups of rice agriculturalists. He suggests the Hoabinhian people who occupied Khao Talu, Ment and Heap caves were culturally and ethnically distinct from the villagers of the Neolithic site of Ban Kao and that the pottery found in the Late Hoabinhian technocomplex was not their product, but a product of the Neolithic villagers and may be considered an item in this trade (Pookajorn 1990, 22). The occurrence of pottery, potsherds thus may be associated with permanent or semi-permanent communities of both hunter-gatherers and agriculturalists. His view concurs with that of Headland and Reid, that late Holocene hunter-gatherers were engaged in inter-ethnic trade with neighbouring communities and often undertook some form of sedentism (Headland and Reid 1989, 49). If Pookajorn is correct, the movement of the pottery from the source to the end-user group may imply amicable relationships, or even a shared set of social values (Zeitlin 1994, 208–209). What items we may ask, did the hunter-gatherer community exchange for the pottery?

A second Hoabinhian ecological environment occurs in coastal milieux associated with shell middens where deforestation and the rise and fall of sea levels have had extensive impact. At the sites of Nong Nor, Noen U-Loke and Ban Lum Khao in the flood plain of the Bang Pakong River, Chonburi province, the archaeologist is interpreting settlements built on marine environments, flood plain deposits, or old river channels. Considerably different expectations of what the life and culture of the people may have been like therefore emerge. Thick sedimentary deposits mark where the rivers met the sea. Many prehistoric sites dot the former coastline as human occupation followed the retreating shoreline. Occupied on two

³ ‘a group of cultures characterized by assemblages sharing a polythetic range. Each of the cultures in the group has different specific types of the same general family of artifacts. Each shares technological artefacts developed in response to common factors in the environment and economy.’ *A Dictionary of Archaeology*, eds. Shaw and Jameson, 566.

occasions, the Nong Nor site gives evidence of a later Bronze Age culture on top of the earlier Hoabinhian culture, for the shell midden had been cut into by the graves of the later culture. Since the site covered only about 1,200 metres square, Higham concluded that it would have supported only a few families who may have spent much time canoeing out to the line of breakers and the open sea, as the presence of both shark and dolphin bones attest to the success of their fishing and hunting expeditions. Yet these coastal hunter-gatherers apparently made pottery impressed with cordage, for the one burial found, that of a woman interred in a seated, crouched position, was covered with pottery. The site yielded many thick deposits of ashes where the pottery was fired, and scratched stones used in burnishing the surface of the unfired pots. Since the site had no fine-grained stone, it has been suggested that the polished adzes found were items traded with other communities living inland.

By contrast, the site of Khok Phanom Di on the flood plain of the Bang Pakong River some 14 km north of Nong Nor provides evidence of extended occupation over 17–20 generations (Higham, Bannanurag, Mason and Tayles 1992, 54). Over five hectares in size and rising 12 metres above the surrounding countryside, it had once been much nearer to the sea. It gave evidence of many human burials with pottery inclusions in the grave sites as well as evidence of rice being present. Based on the time line for occupation and the interrelationship between the geomorphology and the marine environment, it has been concluded that the marine embayment on which Nong Nor was built silted up after the sea had retreated and that some time later—perhaps some five centuries—a large estuary had formed further north, attracting people some 20 generations later to the site of Khok Phanom Di. It is estimated that Khok Phanom Di was occupied for about five centuries from 2000 BC. By comparing the bone tools and pottery shapes, designs and firing techniques, researchers came to the conclusion that the same culture persisted at Khok Phanom Di as had been present at Nong Nor. In both cases imported sandstone was used in sharpening adzes, and pottery was made by the paddle and anvil technique.

The people of this culture buried their dead first beside, then over each other in clusters. The corpse was placed on a wooden plank or bier and wrapped in sheets of white fabric made from bark or naturally occurring asbestos. The dead were buried with the head to the east and often accompanied by pottery, disc beads, cowrie shells, bangles of fish vertebrae or other grave goods such as rhinoceros and deer teeth. In the second mortuary phase, bodies were sprinkled with red ochre (Higham et al 1992, 39). The population of Khok Phanom Di suffered from anaemia/thalassemia and did not live long. Infant mortality was high in mortuary phases 1–3. Some 42 percent of 98 individuals died within a few weeks of birth whilst another 17 percent died within the first five years of life. After mortuary phase 4, the pattern changed from 26 percent under five years to 20 percent between the

ages of five and fourteen. Higham attributes the causes of this pattern in the early phases to malaria and haemoglobinopathy, whilst in the later phases exposure to malaria had reduced, enabling longer survival of those with the genetic blood disorder. This variation in the pattern of infant mortality may coincide with the major environmental change when the river changed its course directing the main river channel away from the site (Higham et al 1992, 48). The bone structures of the people were well-developed possibly from their canoeing and pottery activities. Although in the earlier burials the disposition of grave goods showed no distinction between male and female, by the later phase some distinction is apparent. Thus a man was buried with a turtle carapace, whilst a woman was accorded a clay anvil for making pottery, both doubtless highly valued items in the culture of this community. Perhaps these were their personal belongings during life, or do the grave goods indicate belief in an after-life? Burial sites from the later phases suggest that the people of this culture experienced a growth in wealth over the five hundred years of its occupation as evidenced by the interred grave goods. One woman was buried with 120,000 shell beads, pots, a clay anvil and two burnishing stones. The grave of an infant lying next to her also included thousands of beads and a miniature clay anvil. Both had exotic, heavy shell ornaments (Higham 1990, 6). A later site suggests possible distinction in social structures evolving, for a raised chamber was used as the burial monument for three apparently wealthier individuals, whilst those less well endowed, as identified by the quality of the grave goods, were laid out before the chamber in a wooden building.

Across the five hundred years of its occupation before it was abandoned about 1600 BC, Khok Phanom Di may have experienced several phases of alternating freshwater and saline-mangrove conditions aligning with the fall and rise of the sea level. At times of freshwater culture, it may have been possible to cultivate rice, but this would have ceased once the saline conditions returned. In such times, it is possible that trading relationships with inland communities developed to make up the loss of income, and hence the changing environment could have stimulated production and greater variety of goods for exchange. These appear to have included the harvesting knives and jewellery made from shellfish, and pottery, in exchange for which they obtained ivory and slate. The community at Khok Phanom Di appears to have been a well established stable culture able to profit from the rich sources of food in the riverine estuary and the marine environment. It also had developed trading relationships with other inland communities to exchange the products of the anvil and the ocean for their mutual benefit. Given this maritime/estuarine economic orientation, it is possible that the people of Khok Phanom Di were not particularly receptive to agricultural innovation, preferring to leave that to other communities further inland. From his analysis of pollen and charcoal remains Maloney (1991, 91–94) believes there is strong evidence for human

impact on the vegetation in the upper parts of all cores coinciding with the known occupation of Khok Phanom Di, strongly indicative of rice cultivation in the cultural history of the occupants of this area by 2000 BC. Rice usage, if not cultivation, is evident by about 4300 BC at this site. Once the site of Khok Phanom Di became part of the intertidal zone, the salinity of the area would have prevented rice cultivation, necessitating a move inland for such activity. Maloney considers that initial evidence for disturbance of vegetation as shown by the rise of *Lygodium* and microfossil charcoal began before 5300 BC; that a decline in sea level about 4300 BC was accompanied by intensified clearance, possibly associated with rice cultivation. The diet as evidenced by the food residues found in the later mortuary phases indicates high consumption of rice together with crustacea, shellfish, leafy green vegetables such as swamp cabbage, bananas and coconuts—a well balanced diet. The presence of the beetle, *oryzaphilus surinamensis*, found in stored products including rice, suggests that the people took precautionary measures against food shortages. (Higham et al 1992, 46). We note that Donn Bayard (1970, 1971) had assigned a date of 3500 BC for the remains of charred grain and husk impressions in pottery from the Non Nok Tha site. Taken together with the discovery of rice remains by Chester Gorman at the Spirit Cave dated some 10,000 BC the investigations at Khok Phanom Di and Non Nok Tha help to develop a picture of rice using/cultivating peoples extending across a large part of Southeast Asia from south of the Yangtse River by around 5000 BC. Although earlier claims by Solheim(1972) and Sauer (1952) that this area of Southeast Asia took a leading role in the origins of agriculture have been disputed, there is no doubt that it was one of the non-centres of plant domestication along with India, parts of Africa and tropical South America (Mannion 1995, 5, 18). Thus domestication of rice is seen as a process rather than a sudden event and the rice remains from various Hoabinhian sites in Thailand including Banyan Valley, Non Nok Tha and Khok Phanom Di could exhibit significant intersite differences representing stages in the evolutionary process (Yen 1982, 51–53). It is quite possible also that there is no clear point of transition to an agricultural way of life. While some groups became agricultural communities, others did not, and yet others only partly so. Climate change, temperature and rainfall increase in themselves would have considerably influenced the development of plant species and perhaps altered the nature of the soils, thus creating an environment conducive to plant tending. Protection and maintenance of wild populations of food plants may have been the first stage beyond foraging (Limbrey 1990, 46); the move to being settled may have been a social response to increasing demand for production (Bender 1978, 215) perhaps stimulated by the desire to trade or barter the surplus for items not produced in the home community (Mannion 1995, 11).

In Thailand the many excavations of the past decades show us that there

was a widespread and established Neolithic age rice culture in Thailand from the Khorat plateau of the northeast to the east and the central plain. Did this evolve independently, or was it brought by rice cultivators from the Neolithic cultures of the Yangtze valley of central China? In the village of pile dwellings at Hemudu, Hang-chou Bay, dated around 4,500 BC are the most extensive rice deposits yet found, extending in a vertical layer a meter thick. Until the finds at Peng-tou-shan, they were the earliest known record of domesticated rice. The material culture at Hemudu is consistent with a similar range of material culture from the Neolithic communities of northeast Thailand. Paul Benedict's (1942) reconstruction of the ethno-linguistic cultural history of these Neolithic communities, proposed an Austro-T'ai grouping in which T'ai-Kadai and Austronesian language families shared a common linguistic heritage with a group of languages spoken on the southern Chinese mainland. His list of common terms is consistent with the items found at Hemudu and other southern Chinese Neolithic age sites. K. C. Chang notes that the Spirit Cave in northwestern Thailand is in exactly the same ecosystem as that of south China. The stone artefacts, cordmarked pottery and plant remains are consistent with those of the Neolithic sites in southern China at the Tseng-p'i-yen site. Clearly, the Southeast Asian 'non-centre' including the Yangtze valley, experienced a shared culture based on common items of domesticated plants and animals, rice growing, pile houses, weaving, and pottery in the timeframe 6500–3500 BC. The rapid and large scale increase in population supported by the agricultural economy may have provided the momentum for the phenomenal Austronesian expansion (Bellwood 1995, 98). It is possible that the initial expansion of Austronesian and T'ai-Kadai languages, and also Austroasiatic, began among Neolithic rice-cultivating communities south of the Yangtze basin with a date range consistent with the archaeological record of around 5000 - 4000 BC.

Amongst the *ban*⁴ of northeast Thailand and the Khorat plateau, the first agricultural communities would have needed to take into account the sharp seasonal variation in rainfall. Bounded by the Mekong River on the east and watered by the river systems of the Mun and the Chi rivers and the smaller streams of the Sakhon Nakhon valley in the far northeast, the region has produced extensive evidence of Neolithic rice farming communities. In the valley of the Chi River, at Non Nok Tha, the 1966–68 excavations of Solheim, Bayard and Parker revealed a fully substantiated rice farming and Bronze Age culture. From 17 burials in the bronze age cemetery—two female adults, two male adults and 11 children from one to six

⁴ These are villages, or clusters of villages closely associated in material culture and social organization the remains of which testify to a non-nomadic lifestyle from the late Hoabinhian through the Neolithic; many continued into the later more complex Bronze and Iron Age socio-political structures.

years—the pottery, shell disc beads, stone adze heads and grinding stones amongst the grave goods date to 2,000–1,500 BC. One woman was accorded a necklace of two strands of 642 shell disc beads and two tubular stone beads (Higham 1998, 78). The excavation showed that the people of Non Nok Tha had herds of domesticated cattle and pigs, kept dogs, and varied their diet with fish and shellfish from the local stream and game from the forest. Since no goods of exotic origin were found, their absence might favour the view that this indigenous rice farming community had simply evolved from the earlier hunter-gatherer socio-cultural context. Rice chaff in some of the earliest potsherds indicate cultivation of this cereal at this site. Do the shell disc beads reflect a degree of societal development or trading pattern with a coastal community? Certainly, Non Nok Tha seems to be one of those self-sufficient, culturally diverse communities within a common cultural tradition, which survived within its own ecological niche as did other Neolithic rice farming communities in northeast Thailand excavated at Non Kao Noi and Non Praw.

Ban Kao is another link in the pattern of evidence for widespread occurrence of a rice farming agriculture in Thailand in the late Neolithic age. At this site its practice is inferred from the presence of stone and shell sickles and quern stones. The earliest levels of material excavated at this site have been dated by radiocarbon methods to 2,000 BC. Wheatley suggests that together with Non Nok Tha and Ban Chiang, Ban Kao represents a rice farming culture in a lower-piedmont environment in which *padi* was part of an ecosystem based on vegiculture and domesticated cattle. Padi may have been still supplemental to the overall cycle (Wheatley 1983, 85). Whilst it may be true, as Higham has stated, that to date there is no confirmed archaeological sequence proving a local transition in Thailand from Palaeolithic hunter-gatherer communities to Neolithic farming communities (Higham 1998, 76), neither do we have irrefutable evidence that this transition did not happen. Perhaps there never was an exact transition, but rather a process of fusion, or selective integration of the newer and older ecosystems. Examination of the skeletal remains at Ban Kao indicate that the people were of the same Mongoloid phenotype as those found in northeast Thailand (Pietruszewski 1982, Bellwood 1985). Some apparently suffered from beta-thalassemia - Hemoglobin E disease, widespread even today in the indigenous Mon-Khmer populations of Southeast Asia, but absent in China (Bellwood 1978, 170). It is likely that the Ban Kao culture involves a high degree of indigenous innovation by an Australoid people who spoke a language akin to the modern Austroasiatic language family and that they shared this with other agricultural populations across Thailand, Indochina and the Malaysian peninsula spreading south in the third millennium BC (Bellwood 1985), along the major waterways.

At Ban Kao is found the rare Neolithic tripod pottery similar to that at sites

in southern Thailand, in the upper layers of the Lang Rongrien site, and at six tripod pottery complexes in Malaysia including one at Jenderam Hilir (Leong Sau Heng 1990, 65). Prior to Sorensen's discoveries at Ban Kao and Sai-Yok, the tripod pottery had been unearthed at the cave site near Buang Bep, Suratthani in southern Thailand (Evans 1931), at two Malaysian peninsular sites at Gua Baik near Sungai Siput in Perak, and Gua Berhala in Bukit Kepelu at Kodiang in northeast Kedah. Leong Sau Heng reports six sites are now known, identified by the presence of this tripod pottery including the new sites at Jenderam Hilir in south Selangor, Bukit Cangkul and Gua Gergasi in Perlis. He believes it is possible to speak of a tripod pottery complex in peninsular Malaysia. Laboratory analysis using X-ray fluorescence of the clay showed that the tripod pottery found at Jenderam Hilir, Gua Berhala and Bukit Cangkul was made from local clays in each case. He suggests that this tripod pottery itself was not traded; it was the technology and distinctive pottery style which was spread from place to place (Leong Sau Heng 1990, 67). He concludes that the tripod pattern represents a distinct local regional form and that these tripod pottery vessels are quite different from the Lungshanoid and Lungshan tripods of China. If he is correct, then this tripod pottery represents a distinct cultural feature amongst the Neolithic communities on the southern arc from Ban Kao to Jenderam Hilir. Might not other Neolithic technological changes, even that of domestication of rice, have been similarly dispersed as an early example of technology transfer without the element of inflows of new population groups from elsewhere?

Neolithic and Bronze Age agricultural socio-cultural complexes also occur in the Lopburi region. Gorman had pointed out that no pre-metal age communities had been found in the central plain and that it is possible that wet *padi* farming on lowland alluvial plains was stimulated by the later Iron Age technology of the first millennium BC. The results of recent research in the Khao Wong Prachan valley, 15 km north of Lopburi, revealed evidence of Neolithic settlements extending into Bronze Age cultures at Non Pa Wai, Non Mak La, and Tha Kae. At Non Pa Wai radiocarbon dating suggests that an agricultural way of life was established here by 2,300 BC (Higham 1998, 79). At Non Mak La, the material culture of the people included pottery vessels in the form of a cow, and jewellery of greenstone, marble and shell. Pottery vessels were used as the burial urns of infants. In the Neolithic phase of the Tha Kae site, pottery vessels were placed at the head and feet and under the knees of the dead, who were buried with a north-south orientation. The variety of jewellery including shell beads, bangles and earrings, marlstone and turtle carapace bangles, and tridacna shell bangles made by removing the central core suggest that Tha Kae may have been an early industrial complex for this type of personal adornment. Did they trade with the coastal and marine communities such as that at Khok Phanom Di, to obtain the raw material for the items they

made? Another smaller excavation at Phu Noi, 40 km to the north carried out by Natapintu (1988) revealed a similar concentration of personal jewellery among the grave goods in 32 inhumations. This jewellery was also made from turtle carapace, ivory and exotic stone. Amongst the pottery vessels were animal figurines similar to those at Non Nok Tha. Again there is the strong suggestion of an established exchange network in the second millennium BC amongst these Neolithic communities. This inference is strengthened by the shell jewellery, beads and shell head ornaments, trochus bangles and rings, two conus shell rings, marble and green stone ornaments found at the site of Khok Charoen in the valley of the Pasak River.

It is certain that by the middle Holocene (6,000 to 4,000 before the present) villages dependent on subsistence farming had appeared in many locations across the northeast, the central plain and on the western escarpment, and whilst hunting/gathering and fishing continued to contribute to the food sources of the growing population, rice cultivation provided the impetus for increasing socio-cultural complexity. One is tempted to see here a developing Neolithic interaction zone similar to that posited by K. C. Chang during the fourth and third millennia BC among the Lungshan Neolithic cultures of the Shantung peninsula and middle Yellow River valley in China (Chang 1986, 243–286). Chang considers this a time when the self-sufficient Neolithic village based communities, which were the primary living units, were experiencing accelerated social organization spurred on by constant and intensive communication across regional borders (Chang 1986, 287). The ceramics which appear in Neolithic cultural sequences demonstrate great variation; improved kilns and the potter's wheel enabled the potters to refine their wares. Metal objects in copper, trinkets and small tools also appear. These are the same developments found across the Neolithic villages of Thailand. Chang notes that the Lungshanoid cultures found in the middle and lower Yangtze River valley had reached the southeast coast of China during the third millennium BC (Chang 1986, 288–289). Similarly, together with domestication of animals such as the dog, pig, cattle and chicken, the rise of the sophisticated cultures on the Khorat plateau was accompanied by the development of metallurgy.

Industrial complexes of the Bronze and Iron Age *muang*

Since the first material evidence for the development of metallurgy based on an indigenous Bronze Age culture in northeast Thailand was uncovered in the upper Chi River basin at Non Nok Tha in 1966 by Professor William G. Solheim and further excavations in 1968 revealed an extensive Bronze Age cemetery here, many more investigations in the valley of the Chao Phraya, at Ongbah Cave by Sorensen in northern Thailand, and at Ban Na Di by Higham at Ban Don Ta Phet by Glover and others have considerably added to our knowledge of the industrial

complexes underpinning the economy of this Bronze and Iron Age civilization which occurred in a cultural sequence dating from at least 3600 BC (White 1990, 125). In the mortuary site at Non Nok Tha were socketed bronze axes and bronze bracelets together with the implements to make them—sandstone moulds and clay crucibles—indicating that the artefacts had been made locally, not imported. Preliminary dating suggested that the bronze artefacts of Non Nok Tha were in the range 2300 BC, making this centre even earlier than that of the Vietnamese Bronze Age culture at Dongson in the Red River valley. Numerous Bronze Age sites occur in northeast Thailand in the valley of the Songkhram River including the World Heritage listed site at Ban Chiang now agreed to extend across a cultural sequence since the fourth millennium BC. Analysing the data from the 1975 excavations by the joint University of Pennsylvania and Thai Fine Arts Department team and taking into account data from other sites at Ban Na Di and Non Nok Tha, White presented a revised chronology for the Bronze Age culture of Ban Chiang which posits an early phase from 3600–1000 BC (subdivided into six phases); a middle phase from 1000–300 BC; and a late phase 300 BC–300 AD (White 1986). Ban Chiang seems to have been the hub of several technologies—pottery, jewellery, textiles, bronze and iron metallurgy—supporting the economy of this Bronze Age civilization, contemporaneous with the agricultural villages of Baluchistan at the end of the fourth millennium BC, with the Harappa/Mohenjo Daro culture of the Indus river valley during the third millennium BC and those developing in the river systems of the Nile and the Euphrates in the Middle East (Basham 1961, 11–18). Unlike the people of these Middle Eastern civilizations, those of the Bronze Age in northeast and central Thailand left no inscriptions, no traces of their language or linguistic heritage; no stone or brick monuments, temples or palaces such as have come down to us from the later proto-historic period. The remains of citadels found at Harappa and Mohenjo Daro thought to have been used for both religious and governmental purposes (Basham 1961, 15) are notably absent from the Bronze Age cultures spanning northeast and central Thailand. Their evolution from agricultural Bronze Age *ban* to the Iron Age *muang* and early formal state polities has to be inferred from other evidence, both material and spiritual.

What were the people like who lived here during this long cultural sequence? From almost 130 burials revealed during the 1974–75 excavations, the remains of 45 male skeletons and 39 female skeletons indicated that the people were quite tall, ranging in height, for males, from 165 to 175 centimetres, and from 150 to 157 centimetres for females. The physical bone structure was robust, indicating a healthy diet. They had broad faces with wide foreheads, high brow-ridges and narrow eye sockets, with prominent cheekbones (Natapintu 1996, 48). Studies by Pietrusewsky (1982) of the cranium and dental remains indicate that the females had well rounded foreheads broader than that of their male counterparts. The people had long legs

and were of a muscular build, apparently given to squatting as a preferred mode of sitting. They had short lives, few living beyond 27 years of age in the earlier phase; or up to 34 in the later phases. In the early phase up to 15 percent of infants under five years old died. The people suffered from arthritis and anaemia and possibly vitamin deficiency. Pietrusewsky observed that the most frequently occurring pathological condition was the thickening (porotic hyperostosis) of the cranial vault bones often associated with anaemia. Another was osteoporosis or the fine pitting on the external surfaces of the cranial vault associated with anaemias and vitamin deficiency. Whilst the results of dental pathology reveal that the people suffered from gum disease and caries indicating a diet high in carbohydrates (Rogers 1996, 21), close examination of the skeletal remains has uncovered only a few trauma-induced bone maladies (Pietrusewsky 1982, 46). Archaeologists have therefore concluded that the people living in the Ban Chiang culture enjoyed a relatively peaceful existence. The dead were buried stretched out or in a crouching position in the early and middle periods; and in the supine position in the late period. Infant burial in jars was practised only in the early period. Complete pottery was interred with the adult burials in the early and late periods, often placed at the foot or head of the dead, but only broken pots and shards were used to cover the body during the middle phase of the culture. Other grave goods included bronze and later iron objects, jewellery, beads, necklaces and carved clay rollers. Investigators have found a wide range of differences in the grave goods among various burials suggesting that social differentiation was marked among the people of Ban Chiang (Natapintu 1996, 52).

In the earliest phase of the Ban Chiang culture people already practised rice farming, possibly ratoon cultivation of rice⁵ (Wheatley 1983); rice chaff was used to temper the clay pottery. There is evidence the people had domesticated animals such as pigs, cattle and dogs. Their diet was supplemented by fish and shellfish from the waterways; they hunted and trapped deer and other mammals. The possibility that the people of Ban Chiang may be relatives of the prehistoric peoples who dispersed throughout Oceania is supported by Pietrusewsky's examination of the skeletal remains of 123 individuals from Ban Chiang and comparisons with samples from other mainland Southeast Asian sites. Pietrusewsky (1982, 48) claimed that the ancient inhabitants of Ban Chiang may represent some of the earliest ancestors of the Austronesian population which colonized the Pacific. His investigations give added credence to those of Somsak Phansomboon (1957) whose investigations of blood groups in the population of present day Thai led him to conclude that the Thai had in fact migrated from the south rather than the north, to their present home and that two or three thousand years ago they had left Indonesia to

⁵ A process of propagation by shoots from the main plant (as with bananas).

move to the regions of southern Thailand and the central Chao Phraya River system. Whilst this remains an intriguing theory, such scientific investigations are consistent with the findings of other disciplines, notably linguistics, archaeology and anthropology, and now lead to the view that the basic linguistic and cultural affinities of not only the Ban Chiang civilization, but also of the T'ai peoples is Austronesian. Another significant cultural affinity is found in the style of houses which the Ban Chiang people seemed to favour. From the postholes which occur, White (1990) has proposed that their houses were built on piles similar to those found in many northeastern Thai villages today (and also at Hemudu in the Yangtze River valley contemporaneous with Ban Chiang) and widespread amongst Austronesian peoples, the same style as is found on the Dong Son drums. The geographic spread of this Bronze Age Austronesian culture therefore seems to encompass an east-west set of cultural affinities reaching across the Mekong and Red River valley systems into the lower reaches of the Yangtze River system of present day southern China.

Examining the pottery technology and based on an analysis of artefacts present in several funerary levels, White believes that the three cultural sequences at Ban Chiang are characterized by particular types of pottery. Thus in the early phase are found footed, cord-marked pots with incised designs on the shoulders; infant burial in jars and other pots with incised designs; cord-marked pots with slender necks; straight sided beakers; round cord-marked pots with incised and painted decorations on the shoulders. In the middle phase the pottery includes carinated pots⁶ with incised and painted designs; white carinated pots; carinated and round bottom (carobel) pots with thick red rims. The late phase is marked by the familiar buff-coloured pots with red painted designs, red pots with red painted designs and red burnished pots. Since 1983 the investigators of the Museum of Applied Science Centre for Archaeology at the University Museum, University of Pennsylvania, have proposed that the ceramic technology of Ban Chiang focused on two main techniques: the coil and slab, and lump and slab techniques. Both started with a circular flat base of clay to which coils were added if the coil and slab method was being applied, or a cylinder shaped 'lump' of clay was added if the other technique was preferred. After the first process, the whole was shaped by a paddle and anvil and finally open-fired at temperatures of 500–700 degrees centigrade. Natapintu (1996, 51) considers that pottery was part of the very early prehistoric Ban Chiang culture since its inception about 3600 BC and continued down to the late phase of the culture. From these very early black and dark grey pots incised

⁶ 'A stylistic feature producing a sharp break or angle in the curve of the profile of a pot or vessel which results in a sharply angled shoulder dividing the neck from the body of the vessel.' Kipfer, 95.

with curvilinear and rock-stamped designs, the ceramic technology evolved to the attractive red and buff designs of the late phase, 300 BC–300 AD. Amongst the spiral designs some 100 spiral formed paintings have now been identified as part of the skill base of this technocomplex.

Do the three cultural phases marked by differences in the pottery styles indicate increasing socio-cultural complexity, as Underhill has proposed for the Lungshan period in northern China? (Underhill 1991, 12–27) Archaeologists have paid much attention in recent years to how changes in mode of production may indicate changes in the socio-political organization. Thus prehistoric communities are thought to utilize the household or household industry mode, often carried on by the female members of the family, which then may have evolved into the individual workshop industry as the community-based socio-cultural complexes were organized into chiefdoms and thence into urbanized states. Since pottery-making would be a dry season activity, in this early stage it is also possible that the male members of the household participated in the pottery-making at a time when the seasonal agricultural cycle did not require their labour. If supplies of appropriate clays were unavailable close by, they also may have been engaged in the intra- and interregional exchange networks, finding and transporting the raw materials from source to point of manufacture (Welch and McNeill 1990, 120). Peacock has shown how the scientific analysis of ancient ceramics can identify the origins of the clays and other materials inhering to pottery objects, thus contributing to our knowledge of the interregional transportation networks of these prehistoric cultures (Peacock 1970, 376). Cross-cultural studies of craft production suggest that the ceramics/pottery industry, since Neolithic times, is a major indicator of socio-economic change. From household industry, to complex household industry mode, the ceramics industry present at Ban Chiang produced both utilitarian and ritual ceramics. It later emerged as an individual workshop industry in other areas of Thailand, serving both the domestic and overseas markets in historic times (Guy 1993, 1–13). The Ban Chiang pottery industry, in the longevity of its operations, the complexity of its styles and sophistication of the objects it produced is a significant indicator of the presence of an extensive civilization having developed in this part of northeast Thailand from at least 3600 BC to 300 AD. If the presence of elite ceramics,⁷ those having a ritual usage associated with prestige indicators, as distinct from the utilitarian pottery restricted to domestic uses, is an indicator of hierarchical socio-political organization (Kolb 1988, 91–92), we could ask did this Ban Chiang civilization produce an early state organization as did its contemporaries in the Middle East and China? What different forces were at work in Ban Chiang which led to the major discontinuity around 300 AD?

⁷ Fine pottery produced for ceremonial and ritual purposes, or trade.

At which point did the Bronze Age metallurgy at Ban Chiang make its appearance? The 1975 excavations of Gorman and Charoenwongsa uncovered a Bronze Age cemetery at Ban Chiang in which one burial, that of a young male, included a socketed bronze spearhead; a second grave, of a child, included bronze bangles. The man, dubbed 'Vulcan' by the investigators, was granted an axe and bangles as grave goods. In Burial 40, late in the sequence, there was a T-shaped bronze bangle. Other bangles had been cast in the 'cire perdue' or lost wax method. Within Burial 23 was found a spear with a bronze haft on a forged iron blade. Higham notes that this technique was popular in southern China around the end of the first millennium BC and is also found in Vietnam (Higham 1998, 110). Under White's revised chronology, the earliest bronze object found within a burial complex is the bronze spear point excavated in Burial 76 and now dated to phase III of the early period, 2100–1700 BC. Significantly, however, she notes that the bronze spear point is too sophisticated to be the earliest bronze artefact made in the region. Natapintu comments that metallographic analysis of the content of the spear point indicates it is a true tin bronze with a low amount of, but intentionally added, tin content (1996: 51). It is not simply copper. It was cast in bivalve moulds, then cold hammered to achieve the final shape. It was then annealed, red-heated and left to cool slowly in the open air to reduce its brittleness. Its manufacture indicates that it was made by a metal craftsman skilled in the craft of bronze metallurgy.

The discovery of this Bronze Age culture at Ban Chiang naturally resulted in questions about the source of the copper and tin needed to produce the alloy, bronze. Since casting moulds of sandstone and ceramic melting crucibles were among the items excavated, investigators agree that Ban Chiang had a well-established local metallurgical industry and that the objects were the products of local individual workshops with a local metal casting tradition, an indication of the chiefdom or early urban level of socio-political organization. They were not just items traded from elsewhere. But neither copper nor tin is found at Ban Chiang itself. However, sources of these metals do occur in other locations in the northeast and central plains, as well as on the Malay peninsula. Thus the range and number of the bronze artefacts found suggest a well-organized and established trade or interregional exchange network transporting the raw materials to the local craftsmen for manufacture. What items did Ban Chiang sell or exchange for the raw materials? Jewellery? Ceramics? Or perhaps food items? Were they the finished product? Was Ban Chiang the rice basket? How were the items of trade transported? We presume the river ways were the main arteries of communication and transportation, yet these do not always connect, so land routes must have also been utilized. Yet we have no remains of paved or permanent roads as we do from the early civilizations of the Middle East and the Mediterranean world.

Since the first evidence of iron artefacts at Ban Chiang was found in 1967 by Vithya Intakosai, who uncovered iron and bronze bangles together with glass beads and red-painted pottery now dated to the late phase of Ban Chiang culture, much attention has been given to when the Iron Age in Thailand could be said to have begun. White's consideration of the bimetallic spear points and iron bangles from the middle phase burials has led her to a revised dating of 500 BC or possibly a little earlier for the appearance of iron in the technocomplex at Ban Chiang (White 1990, 127). Her revised dating sequence for the entire Ban Chiang occupation period concurs with that derived from another Bronze Age site of northeast Thailand, Ban Na Di, excavated by Higham and Kijngam (1984). Since the initial discoveries in the 1960s and 1970s, it is clear there was a widespread metallurgic culture across many areas of Thailand in the late pre-historic and early proto-historic periods. At Ban Na Di, Higham found evidence of an extensive bronze casting complex in cultural layers dated to 1400–1000 BC. They included crucibles used to pour the molten metal into moulds. In layer 7 dated to 700–400 BC, contemporaneous with the late Ban Chiang period, he found a Bronze Age cemetery and bronze casting complex of clay-lined bowl furnace still filled with charcoal. A piece of sandstone bivalve mould and crucible fragments were nearby. Two complete crucibles, bowl shaped and complete with pouring spout to which the remains of bronze still adhered, were also found. Higham considers that each would have held 75–80 ml of metal, enough to cast a socketed axe (1998, 100). It is difficult to resist the suggestion that Ban Na Di participated in the exchange network of which Ban Chiang was a part. Clearly, as Coote has suggested (1990, 137), the increasing demand for metals and participation in a sophisticated metallurgic technocomplex would have affected the social and economic structures of the early chiefdoms.

The investigations of Anna Bennett, Pigott, Natapintu and Theeiparivatra, and Glover on the sources of copper, tin and iron suggest that the rise of metallurgy was a powerful stimulus to increasingly complex socio-political structures as the semi-autonomous village *ban* became part of the larger regional *muang*. Did the networks facilitating transport and provision of the raw materials for the metal casting first stimulate, and then underpin the organizational development leading to the type of centralization inferred by the appearance of regional centres? Similar socio-political development has been traced by K. C. Chang from the interaction zones of the third millennium sites of the Lungshan and Lungshanoid cultures in the Yellow and Yangtze river valleys (Chang 1986, 287–294) which slowly spread to the south China coastal areas of Fukien and Kwangtung by the first millennium BC. If Tessitore (1990, 31–44) is correct in suggesting a shared Bronze Age culture from the Dong Son civilization of Vietnam to the Lake Tien culture in Yunnan during this same time frame, the metal age culture of the Ban Chiang and Ban Na Di civilization of northeast Thailand may be seen as part of this evolving regional metal culture.

Where did the metal raw materials come from, since these settlements themselves were obviously not the sources of copper, tin, arsenic, or iron on which the metallurgy depended. Certainly the raw materials were imported from elsewhere, but it is not yet certain whether they arrived already mixed as an alloy, or whether the ingots were delivered to be mixed on site. Vincent's detailed analysis of the clays used in the Ban Na Di ceramics has enabled him to identify imported, exotic vessels made from clays external to the region and thus propose a set of established exchange relationships with the Sakhon Nakhon basin. He suggests movements in population with new sites such as Ban Muang Pruk occupied for the first time and technologically induced change being traced from south to north across the Khorat plateau (Vincent 1988, 188–191). Linkages with the eastern Sakhon Nakhon basin bronze industry network seem to have extended into the larger Khorat basin system, providing access to a greater range of goods and technologies as iron, glass beads and prestige items begin to appear in the archaeological record around 200 AD (Vincent 1988, 221).

The shared Bronze Age culture across northeast Thailand included sites on the eastern edge of the Phetchabun mountains, at Non Pa Kluay, Non Nong Chik and Non Praw northeast of Non Nok Tha, Ban Chiang Hian in the Chi River basin, and a series of sites in the Mun valley, in the Phimai area of Nakorn Ratchasima at Ban Prasat and Ban Lum Khao. Their bronze industries date from around the end of the second millennium BC. All share similar burial rituals, grave goods, animal sacrifice and inclusions of bronze bangles and bronze socketed axes, shell disc beads and pottery vessels. Infant burials at Ban Lum Khao were often in large lidded pots and placed at the heads of women. The crucible and sandstone mould interred with one male burial at Non Nok Tha is further evidence that the bronze casting took place locally. The alloy included 15 percent tin. Similar finds emerged from the sites of the Chi and Mun valleys. The pattern of settlement for this shared culture appears to favour the confluence of small tributary streams. In addition to providing fertile soils for rice cultivation, such sites seem to have been chosen for their access to the transport and communication systems of the exchange networks down which the raw materials and exotic goods would have arrived from the ore mining sites in the Wong Prachan valley of the Lopburi area and Phu Lon in the Phetchabun mountains not far from Ban Chiang, Ban Na Di and Nong Nok Tha. Southeast Asia is one of the few regions in the Old World where copper and tin, the basic ingredients for bronze metallurgy, occur in relative proximity to each other, making it more likely that an innovation in bronze with a high tin content occurred here (Pigott 1992, 50). High tin bronze includes a mixture of at least 20 percent tin, producing a bronze product which ranges in colour from yellowish to whitish as the amount of tin increases. The bronze necklace found in a child's burial at Ban Chiang is an example of a high tin bronze artefact. The hand-made rice chaff tempered crucibles for melting copper, the bivalve, sandstone moulds for casting

socketed axes and adzes, and artefacts exclusively fashioned in bronze, as well as the comparatively early beginning all suggest that high tin bronze technology was a local innovation.

Evidence of large scale copper production, mining and smelting activities in the Lopburi area of central Thailand from late prehistoric times to the Dvaravati period has been excavated at Non Mak La, Non Pawai and Nilkhamhaeng in the Wong Prachan valley. Here Anna Bennett (1990) examined the ore, slag and artefacts to produce a picture of the socio-economic life associated with the development of metal technology. These sites reveal an entire prehistoric metals industry in operation based on many smelting sites with some degree of specialization within the settlements, but without complete or external centralization. Bennett's research reveals that these prehistoric metallurgists were smelting locally available weathered sulphides which gave rise to oxides, carbonates and silicates possibly containing small quantities of arsenates. She found no evidence that the ore was roasted prior to smelting, but the copper artefacts and ingots were permeated with small copper sulphide inclusions which, together with a low percentage of iron impurity, would have impaired the quality of the copper. Bennett concluded that the Wong Prachan valley was producing raw copper ingots which may have been further refined at the artefact production sites where they were traded. Only a few very thin unalloyed copper artefacts were cast at the smelting sites, leading to the conclusion that the metallurgists, who had a knowledge of iron smelting, had no supply of, or access to, tin for the production of bronze. The arsenic occasionally present in the raw metal would have improved its hardness, but the sensitivity of arsenic to oxidation would have produced poisonous fumes during the casting and sulphurous gases detrimental to the health of the metalworkers. Several skeletons were closely associated with metal debris at all the smelting sites in the Lopburi area.

One of the key socio-cultural issues is how much trading occurred between communities in mineral-rich areas and others in mineral-poor, but agriculturally-fertile areas? Was there a trade in tin to copper-producing districts, and copper to tin-mining districts? Was the production of bronze undertaken only at those localities which produced both copper and tin? With respect to Ban Chiang and Ban Na Di, certainly the answer to this last question seems to be negative as these rich bronze producing communities mined neither copper nor tin locally. Coote (1990, 136) has suggested that a mineral deposit may have been the property of several communities with mining being a seasonal occupation for the whole community rather than the occupation of a specialized few. Such an approach may have alleviated the problem of mine drainage during wet season flooding. It is possible as Coote suggests that increasing demand for the metal may have affected the social and economic structures of these communities, with peaceful trading or exchange mechanisms giving way to more aggressive strategies to seize and retain control of

mineral deposits for both economic and defence reasons. In these prehistoric communities however, there is as yet no archaeological evidence for such a development.

Geological field surveys of Theetiparivatra, Natapintu and Piggott identified the Phu Lon complex high on the bank of the Mekong River as a copper-rich hill consisting of a sulfide ore body with an indigenous oxide zone (Natapintu 1992, 52) exposed on the surface during the collision of the Shan-Thai and Indochina continental blocks during Late Paeleozoic or Early Mesozoic era. The hill's west face has been cut away leaving considerable mining debris. Mine shafts pepper the remains of the hill. On the west slope, mining rubble lies to a depth of over 10 metres and hundreds of square metres in area, apparently the product of hand labour. Natapintu considers that heavy river cobble tools were used to mine the rock containing the copper ore (1992, 54) as hundreds of these cobble tools remain with the deposit. From the substantial amount of tailings it appears that the site was mined for a long time. Radiocarbon dating has placed mining activity at Phu Lon from the early second millennium BC to the first millennium BC. Potsherds located with crushed ore host rock matrix, ore crushing tools, ceramic crucible fragments with copper dross adhering to them, socketed tool mould fragments, and charcoal, lead to the conclusion that Phu Lon was a major ore processing site. Tin in the dross adhering to the crucible fragments suggested the production of bronze. Another fragment of cast bronze was found in a mine shaft at the base of the hill, and although particles of tin oxide were detected in analysis of slag on crucibles, it is not yet clear whether copper and tin ores were smelted together in these vessels, or whether copper and tin metal were just melted together to make bronze. Taking into account all the evidence, Natapintu has identified the similarities between the metal contents of the slagged layers lining crucible fragments at both Phu Lon and Ban Chiang and come to the conclusion that the metal workers of these two sites shared a basic technological tradition (1992, 56). It is possible that metalworkers came from the Khorat villages to process copper at Phu Lon and that on arrival they made the small crucibles from the local clays. A specially-made quartz-rich clay lining inserted in the crucibles protected their interiors, reduced the possibility of metal being incorporated in the body of the crucible, increased their refractory properties in high temperatures, and permitted re-use of the vessels at a later time. The work of Natapintu et al. has thus provided further credibility for the view that metal working was an early indigenous development within the region and that the operations were based on an industry workshop mode of production⁸ located away

⁸ A cottage industry where multiple workers were employed with the object of producing a surplus for trade; as distinct from single artisan mode of production for the purpose of satisfying just the needs of the immediate individual or family.

from the workers' homes and geared to mass-production of specific items of utilitarian purpose.

Phu Lon was a well-placed site, particularly in the days before territorial demarcation by maps. Alluvial tin deposits for the making of bronze were readily available just across the Mekong in present-day Laos and could be easily floated down the river to the manufacturing point for bronze wares. Similar to Coote in the case of the mines of the Lopburi area, Natapintu favours a dry season mining activity at Phu Lon in view of the heavy monsoons affecting the area and in accordance with the labour needs of the agricultural cycle when the people would have needed to tend their crops. Significantly, the Phu Lon excavation reveals no signs of long term occupation consistent with a village lifestyle, no fish or animal bones; only hundreds of square metres of crushed ore gravel, potsherds, stone tools, bracelets, metal processing equipment of a society which extracted ore at this site over a long period of time (Natapintu 1992, 57).

Moated settlements, state formation and trade

Extensive archaeological research in Thailand in the past two decades established a factual base for concluding that the basins of the Mun and Chi rivers on the Khorat plateau and around Maha Sarakham in northeast Thailand hosted hierarchic patterns of settlement reflecting early state formation in the period 1,000 BC–1,000 AD. Kijngam and Higham (1980) have shown that these larger, moated settlements ranged from 20 to over 35 hectares in size, and were characterized by iron working, an expanding population, plough cultivation of permanent fields, and participation in interregional and international exchange networks. Both Kennedy (1977) and Wheatley (1983) argued for an integrated development of later and earlier socio-cultural structures rather than displacement of the earlier by the later. The overall pattern of increasing diversity in the early proto-historic era led to a variety of societies and cultures each in its own environmental eco-niches, but interdependent and interacting with each other in a series of reciprocal exchange networks. The transformation of these sub-urban regional traditions into urbanized 'states' or 'city states' was once thought to have been a result of external forces such as 'Indianization'—the transfer of Indian cultural influences either through immigrants/colonizers or traders in the second century AD—or passively received stimuli from overseas trade networks. In correcting this extreme view, scholars then adopted the position that the rise of social complexity among the Iron Age *muang* came about as a result of both internal dynamics and external cultural contacts. Vallibhotama (1984, 1992) and Dhida Saraya (1989, 1992) argue that this view fails to give adequate recognition to the system of interdependent linkages underpinning the social, cultural, economic and political interactions of the pre-

and proto-historic settlements. Thus Dhida Saraya (1992) argues that these pre-urban centres did not develop in isolation from each other; and that the strength of their internal relationships not only conditioned their interactions with the external influences, India and China, as well as the Middle East and the Austronesian world, but also with the new political entities, Funan and Chenla in the Mekong basin, Lin-yi and Champa in central Vietnam, and the early city states of the Irrawaddy and Chao Phraya basins. To this list could also be added Tibet and Nan-chao, independent political entities, which in the seventh to ninth centuries AD had considerable effect on the trading patterns and socio-cultural developments of the region prior to 1200 AD.

Penny (1984, 156–157) is surely enlightening in his view that the expansion of relations with neighbouring states amongst the Iron Age *muang* in Thailand reflects the basic stability and continuity of the village-based culture. There was no need to employ the elements of coercion or exploitation, since both land and water resources were adequate for the needs of the village-based culture. Cautioning against drawing invalid comparisons with the emergence of states in other parts of the world, Penny takes the view that cultural development amongst the Iron Age chiefdoms of Thailand should be seen on its own merits as a reflection of the underlying prosperity and rich subsistence resources of the region. The prosperity of the area gave people the confidence to interact with external trading networks; in turn these were attracted to the Iron Age *muang*. Such interaction is usually inspired by need, or the urge to acquire items not readily available locally, both exotic items which may be classed as luxury items desired by emerging elite groups, and utilitarian items for household use, and raw materials for manufacture. As shown by the archaeological evidence of the moated sites of the Mun and Chi river valleys in northeast Thailand, spatial expansion in response to population growth and central place organization across the Khorat plateau was occurring throughout the first millennium BC, pre-dating evidence in the archaeological record of Indianized hierarchical socio-political structures. Thus development of, or participation in, interregional and international exchange networks should be seen as a consequence of increasing socio-cultural complexity rather than an originating stimulus to such structural changes. Long-distance exchange networks, after all, can exist without giving rise to urbanized states with monumental superstructure, for example the Lapita cultural complex of Melanesia, across which obsidian was transported at least as early as 5000 BC (Kirch 1990, 26). Since the conference on early Southeast Asia held in London in 1974 (Smith and Watson, 1979) focused on the value of interdisciplinary and multidisciplinary approaches in enriching our understanding of the processes of social and cultural change during the pre- and proto-historic periods of Southeast Asian history, the research of social and cultural anthropologists has led to re-examination and re-interpretation of the few extant written sources

and particularly of the concept of 'Indianization' of Southeast Asia and the role played by the ancient maritime and overland trade networks in the transition from 'chiefdoms' to sophisticated, urbanized 'states'. While the early polities of mainland Southeast Asia may be seen as links in the series of international and interregional exchange networks stretching from the Mediterranean world to Han China (Glover, 1989) concern has been to challenge the view that the region was merely a trans-shipment point for foreign merchants (Wang Gungwu, 1989). A closely related line of scholarly research has focused on the nature of indigenous states, how they evolved from the prehistoric socio-cultural complexes of the region, and how different their political and social dynamics were from the picture presented in the Chinese dynastic histories which described these polities in terms of the Chinese structural experience. As Wang Gungwu has stated, no Southeast Asian polity, statue or monument is unmistakably Indian (1989, xvi). Greater recognition is now given to local, indigenous, political and cultural dynamics. Similarly, the role of early maritime trade is weighed in the balance against the cultural exchanges effected across the ancient overland trade routes. The overland Silk Route and the maritime Spice and Silk Route were the communications and transportation networks across which flowed the new ideas, technologies, soldiers, sailors, merchants, craftsmen and tradesmen, politicians and religious missionaries as well as the luxury products of forest, field and mine between east and west. Nor were these luxury goods the only items of trade; there is clear evidence that much of the ancient trade across the early maritime networks was in bulk goods—grains, teak, and minerals (Asthana 1947, Adams 1974, Moorey 1975, Ratnagar 1981, Casson 1984, Edens 1992). Above all, these famous trading networks came into being and were maintained only in response to the requirements of the indigenous polities, both east and west, which formed the markets and production points giving the networks their justification for being. Without such polities the networks would have ceased to function, as happened during periods of political upheaval. The sum of the results of this scholarly research has underpinned the recognition that Southeast Asia has an historical unity of its own, distinct from both Indianization and Sinicization. More importantly, it has shown that Southeast Asia has always been part of the continuum of communications east and west pre-dating Augustan Rome and Han China, and in its linkages going back to the early empires of Sumeria, Babylonia, the Indus Valley civilization of Harappa and the early empires of Central Asia. The researches of scholars in many disciplines have conclusively shown that just as there was probably no one moment when agriculture was 'invented', so too the initiative to interact with neighbouring groups and to exchange commodities, ideas, technologies over both water and land routes was not delineated by any one moment in time. There is ample evidence that by the third millennium BC, there were well-established trading networks, both interregional and international, operating

within and across the expanding centres of civilization from the Mediterranean-Middle East world, to the Southeast Asian-Chinese-Austronesian-Pacific world. These built on much older interaction networks both by land and sea developed since man learnt to move his wares by donkey overland, or across water on hollowed out logs or reed boats (Casson 1971, 3–10). It would be inaccurate therefore to consider the ‘world system’ interlinkages of Augustan Rome and Han China in the first century AD as having suddenly originated at that time. They followed long-established, pre-existing patterns of intercultural communication, what some scholars have argued was an interconnecting series of trading and exchange networks forming a Bronze Age ‘world system’ observable in the archaeological record since at least the fourth millennium BC amongst the city ‘states’ of ancient Sumeria (Adams 1974, Lamberg-Karlovsky 1975, 1989; Johnson 1975; Schneider 1977; Kohl 1989; Edens 1992; Abu-Lughod 1993; Amin 1993; Gills and Frank 1991, 1993; Wilkinson 1993; Potts 1993; Chew 1999). Sumeria/Babylonia and the Indus Valley civilization could therefore be seen as the engines of economic growth driving the expansion of settlements during the middle and later Bronze Age. The centres of accumulation in the urbanized civilizations which had emerged in the riverine ecosystems of Mesopotamia, Egypt, and the Indus Valley by the third millennium BC lacked the metals and luxury items necessary to sustain their hierarchical social structures.

International linkages of the Iron Age *muang*

What evidence is there for participation in the international and interregional trading networks by the Iron Age *muang* in Thailand? Seeking answers to some of the questions surrounding the rise of social complexity in the ancient settlements of the Chao Phraya basin of central Thailand, Srisakra Vallibhotama believes that the people of the Iron Age *muang* moved down into the various river basins of the deltaic area probably in pursuit of wet-padi agriculture in the late metal age, i.e. around 500 BC, the time when contact with people from other regions becomes evident (1984; 123–128). This is shown by the presence of artefacts from the Dongson culture, by metal work displaying advanced technology, ornaments of precious stones such as jade, cornelian and agate imported from elsewhere. Cornelian objects, a reddish variety of chalcedony, were imported from the west, from Arabia and India (Schafer 1963; 228, Beale 1973; 137) and used to make ornaments, small utensils, bowls and jars.

Examining these settlements along the river banks in the flood plains, Vallibhotama notes that those in the same river basin practised the same burial tradition and had similar types of grave goods, although in each burial ground of the same community differences in individual wealth were marked, reflecting a

degree of social stratification beyond that of the egalitarian village or *ban* level social structure. Cultural differences between settlements of different river basins were evident. Those in the upper part of the Chao Phraya valley exhibited spindle whorls around the waists of the dead, suggesting their craft affiliation during life. Did the products of their looms find their way into the international textile trade? Based on the increasing numbers of burial mounds shared by the same community, there was evidently an increasing population, as more settlements developed at the beginning of the Christian era along the river basins in the west, north and east of the delta, near the Gulf of Siam, in an area exposed to economic and cultural contact with external influences by sea. Evidence for participation in interregional and international exchange networks is shown by the foreign cultural elements mixed in with artefacts of local origin. Thus Vallibhotama notes, amongst these foreign elements, cult objects, coins, beads, earrings, combs and seals bearing symbolic designs. Amongst the locally made objects were images of the Buddha and deities, coins and seals based on Indian designs, fragments of terracotta and stucco decorations for long-vanished religious structures.

Analysing these finds, Vallibhotama suggests that two localities amongst these ancient settlements may have functioned as chief ports for contact with the international exchange networks and as re-distribution centres to other settlements within the deltaic regions. They are U Thong in the Tha Chin River basin in the west delta region, and Sri Mahosod in the Bang Pakong river basin to the east. In addition to the presence of foreign cultural objects indicating participation in the long-distance trade network, east and west, both sites exhibit distinct characteristics of urbanization showing development from the pre-historic chiefdom status. These traits are the number of religious monuments and buildings, irrigation and transportation networks, fortifications, and satellite communities within a 5–10 kilometre radius from the centre, thus suggesting a substantial population deployed around the main centre. Vallibhotama believes that most of the finds are contemporaneous with those at Oc-Eo in Vietnam and Beikthano in Burma, thus dating them to between the second and sixth century AD, and that these centres represent the earliest ‘states’ that ever developed in central Thailand (1984; 123–128). They exhibited the proliferation of symbolic, ritualized objects of individual social position and power identified as the materialized ideology of emerging state level society (DeMarrais et al. 1996, 17–23).

In addition to U Thong and Sri Mahasod, Vallibhotama identified another four large moated settlements in the major river basins of Thailand at Nakhon Chaisri in the lower Tha Chin, Kubua in the Mae Klong, Lavo or Lopburi on the eastern bank of the Lop Buri River, and Sri Thep in the upper Pasak valley. The first three had access to the sea by means of large waterways connected to the Gulf of Thailand, while Sri Thep on the overland route connecting the Central Plain with

the Khorat plateau in northeast Thailand may have been the inland junction for the network. Vallibhotama (1989, 1992) has noted the cultural differences in these centres: those in the west show signs of having embraced Buddhism whilst those in the east exhibit Hindu cultural remains. The difference in belief systems is equated with a difference in political entity. Thus Vallibhotama and Dhida Saraya reject the hypothesis that central Thailand's earliest political centre was at Nathon Pathom and later at Lop Buri. By studying the cultural evidence such as burial mounds, Buddhist monuments and artefacts, Vallibhotama concluded that a socio-economic network existed amongst the settlements in the same river basins and that larger centres were able to extend their cultural network far beyond their own river basins to other regions. Thus in separating art style from political entity and surveying the size and distribution of ancient settlements in the Chao Phraya delta of central Thailand at the beginning of the Christian era, Vallibhotama (1989) discounts the view that there was a single integrated state called Dvaravati. Rather there were at least two rival city states identified as U Thong in the west, a centre which embraced Buddhism, and Sri Mahosod in the east, a centre which embraced Hinduism. These were formed from hierarchies of village, town and city grouped together in their own river basins with the largest settlement as the centre.

Evidence of the participation of mainland Southeast Asian polities in the long-distance international exchange network first came from the work of Louis Malleret who, in 1942–44, unearthed archaeological remains at another delta port site at Oc-Eo in the lower Mekong River basin. Here Malleret uncovered two Roman medallions, one minted during the reign of Antoninus Pius (138–152 AD), and another in the reign of his successor, Marcus Aurelius (161–180 AD), as well as a Chinese mirror of the Later Han dynasty of the same vintage, Iranian coinage, Indian-inspired jewellery, gold rings and merchant seals, tin amulets with symbols of Visnu and Siva. Amongst a wealth of material culture, the finds led scholars to conclude that Oc-Eo was a major entrepot in an international trading network which linked Ancient Rome and India with Han China. Oc-Eo was well placed to function as a gateway for goods traded up and down the Mekong basin (Higham 1989, 254). In this way it would have been linked with the interregional networks across the Khorat plateau of northeast Thailand and through them to Sri Thep and Sri Chanasa in the Pasak River basin, thence to the emerging contemporaneous polities of the central Chao Phraya basin investigated by Vallibhotama, U Thong and Sri Mahosod.

Vallibhotama suggests that U Thong emerged from an outcrop of earlier settlements dating from the second half of the first millennium BC, the archaeological remains of which testify to cultural influence from overseas at this time during a notably pre-Buddhist phase of its cultural development. Upstream from U Thong, the number of pre- and proto-historic settlements in the Tha Chin valley increases

as far as Suphanburi, Singburi and Chainat in the upper reaches of the valley. The archaeological remains indicated that U Thong was the most densely populated of the settlements. It may have been the distribution centre for goods of economic and ritualistic, religious and symbolic value to the centres upstream (Vallibhotama, 1992). Sri Mahasod, on the other hand, appears to have been a newer centre having no prehistoric base. Situated in the Bang Pakong River valley to the east, the intermediary role it played in transshipment of goods, trade and communications with the hinterland centres towards the Cambodian lowlands in the east allowed it to develop rapidly into an important urbanized centre in the region. It quickly surpassed the inland regional prehistoric centres around Amphoe Phanat Nikom, Chonburi, which appear not to have engaged in overseas economic and cultural contacts. The distribution of imported cultural artefacts associated with U Thong and Sri Mahosod—the beads, ear-rings, armlets, precious stones, jade, cornelian and coloured glass—and the religious objects, terracotta and metal seals showing Hindu and Buddhist sacred symbols, indicate that by at least the first half of the first millennium AD these settlements in the Chao Phraya valley were participating in the international and interregional exchange networks linking them to the Middle East and India, Vietnam and China. The Tha Chin and Bang Pakong rivers played a crucial distribution and transportation role between the coastal regions and the upper riverine settlements co-ordinating the interregional trading networks.

Support for this view is also provided by Glover (1989) who has argued that such cultural finds, like that of the famous Roman lamp found at P'ong T'uk on the bank of the Meklong River in west Thailand, are not the result of 'drift' or intermittent transportation through reciprocal exchange networks over short distances as postulated by Wheeler (1954; 206–7), but are evidence of participation in a system of regular exchange links between Southeast Asia and India in this era. Ban Don Ta Phet, Glover states, provides the earliest and most extensive evidence of trading and cultural links between this part of Southeast Asia and India. Such evidence includes a copper coin of the Western Roman Emperor Victorinus (268–70 AD) which was minted at Cologne and found at U Thong in western Thailand, and which now resides in the Thai National Museum; an Indian ivory comb from the moated settlement at Chansen in central Thailand excavated by Bronson and Dales and dated to between first and third centuries AD, now also in the Thai National Museum; Roman cornelian intaglio seals from Khlong Thom, Krabi Province, southern Thailand, dated to second century AD, one of which portrays the goddess Tyche (Fortuna), the other a pair of fighting cockerels; some 600 (out of 3,000) beads of semi-precious stones such as agate, cornelian, rock crystal and jade found at Ban Don Ta Phet; a carved cornelian leaping lion pendant from Ban Don Ta Phet which Glover (1989, 28) considers a first century AD representation of the Buddha, thus being one of the earliest

Buddhist artefacts in this region. Taking into account the evidence of all the material culture, Glover therefore agrees with Vallibhotama and Saraya that by the first century AD this region was already part of the ancient prehistoric international exchange networks linking east and west which extended from the Mediterranean Sea to South China.

Wheatley has drawn attention to the fact that the great maritime trade route should be seen more accurately as a series of trade routes across which no one group of merchants operated from end to end, nor one class of merchandise was transported. On the western end of the route, the Bronze Age merchants of the Indus Valley civilization and those of Sumeria gave way to the Iron Age Arab, Greek and Egyptian merchants. Indian Tamil merchants also travelled westwards. After the withdrawal of the Greco-Roman merchants around the end of the second century AD, these Indian Tamil seafarers continued to ply their trade from the ports on the Coromandel Coast of India across the Bay of Bengal to the ports on the Thai/Malay peninsula. On the eastern end of the route, the trade of the Austronesian world and the South China seas at the beginning of the Christian era was largely in the hands of various sea-faring peoples collectively known in the Chinese records as the K'uen-luen (Wheatley 1975, 231), the same people who had plied the sea lanes of the Austronesian world since the Holocene and had ventured to as far away as Madagascar.

Long distance metals trade

Long distance trade in the time of Sumeria focused on the metals trade and the need to supply the bronze and copper tipped weapons of war which had given rise to the early empires around the Levant, Egypt, Syria, Asia Minor and Mycenaen Greece. Were any of these needs met from the copper and tin deposits of the Bronze Age cultures of Thailand, perhaps as ingots exported through such an entrepot as Khuan Lukpad/Khlong Thom on the west coast of Thailand across the Bay of Bengal to the ports on the east coast of India and thence linking with the international trade routes to the west? The sources of tin to supply the early Bronze Age cultures of Mesopotamia and the Mediterranean have long been a disputed issue (Crawford 1938, 1939; Muhly and Wertime 1973; Dayton 1973). One is attracted to Bronson's (1989) view that tin—scarce in the west, but already mined for local use in the Bronze Age cultures of Thailand where it was available in very large quantities easily extractable with crude tools from tin-bearing granites such as those in southern Thailand—is likely to have become an export item by the early proto-historic period. Were these deposits and those in the adjacent areas of Burma and Malaysia an important reason for early trading contacts with India and other cultures further west? (Bronson 1989, 293–297) Were they exchanged for the high

quality stone and obsidian in which Thailand was deficient, but which occurred in significant deposits in Mesopotamia and Anatolia?

Beale (1973, 139–43) has analysed the metal and stone resources which formed part of the trade in ancient Mesopotamia in Period IV C-B at Yahya (from c. 3,400 BC) and concluded that since the fourth millennium BC it was a redistributive centre which took part in long distance organized trade intended to access directly the resource areas without the need to depend on middlemen in the transshipment centres. His research on the changing characteristics of trickle trade, local redistributive trade and organized regional trade in Mesopotamia prior to the third millennium BC raised the possibility that the change to long distance organized trade at this time, long before the *Pax Romana*, was driven by the need to access resource materials. Susa, with its commercial network extending to the Indus Valley civilization, also had trade relations with Yahya and Shahr-i-Sokhta in Iran. The third millennium BC records of Girsu in Sumeria indicate that individual shipments of up to ten tons of grain and other materials sent to Dilmun (modern Bahrain) were exchanged for consignments of copper (Adams 1974, 248). Tin bronze has been found in the Sumerian royal cemetery at Ur. Analysis of some 3,000 ancient Assyrian texts by Veenhof shows that in this one archive alone, 11 tons of tin were shipped into Anatolia from southern Mesopotamia. In the debate on the origin of the tin used in the earliest tin bronzes in the Middle East, the one issue on which Dayton, Muhly and Wertime all agree is the absence of substantial tin sources in Anatolia itself (Crawford 1974, 242). Gold and silver from Anatolia were apparently carried southward to Ashur where they were exchanged for tin and textiles originating from further east along the lapis lazuli route which crossed the Afghan-Iranian border at Sharh-i-sokhta (Crawford 1974, 243). In Ashur a merchant is said to have been able to obtain 15 shekels of tin for a shekel of silver while in Anatolia the rate was seven to one (Adams 1974, 246). The source of the tin is not identified, although Crawford has argued that a chain of contacts on the lapis route existed from Sumer via southern Iran to Turkmenia linking with a source of tin east of Bokhara in the second half of the third millennium BC. Tin bronze in Mesopotamia is said to date from the early third millennium BC, then occurs in Syria a little later (Muhly and Wertime 1973, 114). Although in the early Bronze Age the Black Sea mountains and the Zagros mountains of Mesopotamia provided alluvial tin (and alluvial gold), such sources were quickly exhausted (Muhly and Wertime 1973, 119). Crawford agrees that the tin in Armenia was not worked before c. 1200 BC (Crawford 1974, 245).

Whilst other more distant sources were quickly found from Bohemia and Spain to Thailand, the precise role such sources played in the development of metallurgy and the metals trade of the Near Eastern Bronze Age is still to be determined. There is no hard evidence yet of tin coming to the Near East from Hunan or

Southeast Asia, some 2,500 miles from the transshipment points in the Indus Valley (Dayton 1973, 124). Dayton does, however refer to a German translation of an Arab text of 1301 which, he claims, purports to show that the Arabs were obtaining tin from 'the areas where it occurs to this day' (Dayton 1973, 124). Does Dayton mean Southeast Asia? Chang, discussing the bronze ritual and warfare artefacts which appear in the Chinese cultural tradition at the beginning of the Three Dynasties period (around 2000 BC) emphasizes that these were made from copper-tin alloys mostly serving the affairs of the state, and associated with the emergence of a powerful kingship (Chang 1989, 159). In an earlier article he states that the exact sources of the tin used in such Chinese bronzes remains unknown, and that although tin deposits are known from Honan and other parts of North China, the early Chinese texts specify that good tin ochres were said to come from the south (Chang 1975, 217). The exact geographical extent of the area designated as South China remains indeterminate as this area was only taken under the control of Chinese authority during the Han Dynasty (206 BC–223 AD).

One might be forgiven for siding with Muhly and Wertime in their view that the problem of the source of tin for the Near East Bronze Age is still with us. It is certain that copper and tin were transported in ingots by ship as evidenced from the wreck of a ship dated 1400 BC found at Ulu Burun, off the coast of Turkey (Haldane 1993, 349). Dayton (1973, 123) agrees that tin was sent by ship to Emar and Halab; it was transported from Ashur to Mari and from Susa to Mari according to the texts. Did the middlemen keep the source of their tin supply at this time secret as happened with cinnamon and silk? Citing the Lagash texts in which copper and tin figure with textiles, grain, fish, beasts, oils, fats, wood and silver as items regularly exported from Lagash in the third millennium, Crawford supports the view that south Mesopotamia was an important intermediary in the trade of the ancient world as well as a primary producer (Crawford 1974, 233). The trade in the texts, he believes, refers both to that with other cities in Mesopotamia and with foreign countries. More recently, Potts, also citing Gudea of Lagash who said he received tin from Meluhha, favours an eastern origin for most of the tin used in southern Mesopotamia in the Old Babylonian period; however, although the evidence to date might sustain the view that tin from Bukkhara in Central Asia was transported to Susa, there is as yet insufficient evidence to prove that tin from Southeast Asia found its way to Mesopotamia in this era (Potts 1997, 174, 269). Given the extent of the metals manufacturing industry in the technocomplexes of the Ban Chiang civilization, and the apparent lack of a substantial ceremonial culture to utilize all the products of the local, indigenous artisans, one might question who the end users were for all the products.

If Beale is correct in his view that the thriving regional trade network which arose locally and independently in the Iranian plateau was the precursor of the long

distance trade between Mesopotamia and Iran in the late fourth and third millennium BC, then it may be possible to view the international maritime trading network which linked Rome and China in the proto-historic period as simply the last and most visible phase of the series of regional interlinkages utilizing riverine, coastal and oceanic routes attested to by the archaeological finds at Oc-Eo in the Mekong delta, and at U Thong and Khlong Thom in Thailand. By the time Greco-Roman merchants made Arikamedu their base on the Coromandel Coast of India across the Bay of Bengal from Takuapa and Khlong Thom on the west coast of southern Thailand, they were following an already well-known trading route by which Sumeria and the Harappans of the Indus Valley civilization had a flourishing maritime trade, 2500–1750 BC. After this the maritime trade to the southern cities in Mesopotamia disappeared, the consequence of climatological changes leading to increased irrigation in the delta lowlands which produced salinity in formerly fertile agricultural lands. Chew sees the decline of the Harappan civilization in the Indus Valley as a direct result of the end of this Gulf trade. When the demand for their exports in the southern port cities of Mesopotamia declined, the Harappans could not sustain the accumulation process on which their urbanized society depended (Chew 1999, 100). With the decline in agricultural yields which accompanied the salinization process, the centres of population and power shifted to northern Mesopotamia, away from the southern ports, thus setting in train a series of consequences for the trading patterns of the region as the focus shifted to the overland trading routes of the north and northeast (Chew 1999, 102). The collapse of this maritime trading network had dire consequences for all the ports of call along the Gulf from Magan to Meluhha. If it is correct to consider these regions as interdependent parts of a Bronze Age trading system linked to Southeast Asia via the Indus Valley civilization and the hinterland trading routes of southern India down to the Coromandel Coast, then the question could be asked, were there further downstream consequences for those ports on the Malay peninsula, southern Thailand and the lower Chao Phraya basin identified by Vallibotama? Yet the web of cultural interlinkages survived these political and economic upheavals and by 1000–500 BC economic expansion was underway again. Were any of these needs met from the copper and tin deposits of the Bronze Age cultures of Thailand, perhaps as ingots exported through such an entrepot as Khuan Lukpad/Khlong Thom on the west coast of Thailand across the Bay of Bengal to the ports on the east coast of India?

Arikamedu and the bead makers of the Peninsula

Southern Thailand's pre-historic international linkages with these ports is evidenced by archaeological finds at Arikamedu, in particular the bead industry

based at Khlong Thom. On the Coromandel Coast of southeastern India, excavations in 1945 at Arikamedu, Ptolemy's Podouke, (also known as Virampatnam) by Sir Mortimer Wheeler showed that it was an emporium similar to Barygaza (Pattabiramin 1946, 9–13). The archaeological remains of merchant residences, warehouses and harbour provide mute testimony to the part it played in the east-west trade of the first century of the Christian era. In 1885, Walter Elliot had commented on the large number of Roman coins found with Chinese and Arab coins at various places on the Coromandel Coast after every high wind, which he thought indicated extensive commerce between China and the Red Sea (Pattabiramin, 1946: 42). But Arikamedu was not merely a Greco-Roman trading station as Wheeler had thought. Excavations by Casal, 1947–1950, showed the existence of an earlier settlement pre-dating the Augustan era, which existed from at least 250 BC and continued to be occupied until around 200 AD. On the basis of the distribution of the distinctive ceramic rouletted ware found at Arikamedu, Begley suggests that there was a well-established trading and communication network linking the entire east coast of India (Begley 1983, 462) in the few centuries prior to the Christian era. His investigations led him to conclude that Arikamedu was a significant commercial centre linking the coastal/inland trade with the long distance international trade long before the Greco-Roman sailors appeared around the tip of Cape Cormorin. Moreover, it was not alone. Along the eastern seaboard of India, facing the Bay of Bengal, further port sites have been identified in association with river estuaries at Korkai, Kaveripattinam, Karaikadu, Vasavasamudram in the first millennium BC. It is only in what Begley calls Phase C that ceramic remains are found of Mediterranean amphorae which once contained wine and oil. From this phase come the remains of a cluster of small scale workshops exhibiting evidence of working in metal, ivory and shell, glass and semi-precious stones. A large number of finished and unfinished beads was found all over the site (Begley 1983, 472). Of 22 inscriptions from this era, 19 are in Tamil, leading to the conclusion that Tamil was the language in common use. One inscription in Prakrit appears to have come from a votive Buddhist tablet, although no archaeological evidence of a Buddhist religious edifice has yet been revealed, unlike Kaveripattinam where an entire wing of seven rooms, each 2.4 metres square, of a Buddhist monastery has been identified (Chakrabarti 1995, 234). Such Buddhist establishments were often established on trade routes.

Key indicators of Arikamedu's eastward trading links are found in the bead making industry, specifically what Francis designates the Indo-Pacific beads, glass beads made by the drawn and wound methods (Francis 1990(a), 1; 1991, 34). The art of glass-making was practiced in China and India by 1100 BC, having spread from the Middle East where glass samples were found at Tel Asmar, Mesopotamia, in a context dating around 2500 BC (Dikshit 1969, 1; Francis 1990, 1). At Arikamedu,

all stages of beadmaking by the lada process⁹ have been found, including slag, the wastage from the process, thus proving that the bead industry was local, and not imported from the West. The fragments of glass uncovered even in Casal's excavation¹⁰ suggest that the lada process was used throughout the occupation of Arikamedu. Different chemical additives were used to produce various colours. Thus soda was used at Arikamedu in making the red glass beads; potash for other colours (Francis 1990, 6). The most common Arikamedu bead was a monochrome drawn bead less than 6 mm in diameter. Some glass beads were made by the minor technique of being ground and perforated, unfinished examples of which have been found at Arikamedu indicating local production. Significantly, such beads are known from Ban Don Ta Phet, Thailand with a date of early fourth century BC, Mantai, Sri Lanka in the late first millennium AD, Nishapur, Iran in the early Islamic period and Uyaw Cave in the Philippines in about the same period as Arikamedu (Francis 1991, 33). Such a distribution, particularly those from Ban Don Ta Phet and Uyaw Cave, would suggest trading linkages eastwards of these beads. Indo-Pacific beads have been found at seven sites in Southeast Asia where they were manufactured as proven by the evidence of diagnostic wasters. These sites are Mantai, Sri Lanka, Oc-Eo, Vietnam, Klong Thom, Sating Pra and Takua Pa, southern Thailand, and Kuala Selingsing and Sungai Mas, Malaysia. Of these, Klong Thom, Oc-Eo and Mantai had links with Arikamedu (Francis 1991, 34), and may all have been established in the first to second century AD. Francis suggests (*idem*) that Tamil bead makers from Arikamedu may have settled at these sites after Arikamedu itself was abandoned. Not only did they trade with each other, but also each was among the first urban centres in their region; each was a major port with Roman, Persian and Chinese imports. Each is identified with Roman emporia in Ptolemy's *Geographia*: Arikamedu with Poduke; Mantai with Modutti; Oc-Eo with Kattigara, and Klong Thom with Takkola (Gerini's identification of Takkola with Takua Pa is no longer considered valid). Francis considers that as each site was abandoned, the beadmakers moved on, those from Oc-Eo to Sating Pra then to Takua Pa, those of Klong Thom to Kuala Selingsing then to Sungai Mas (Francis 1991, 34–35). By the tenth century when the Cholas overran Mantai, the beadmaking industry was in difficulties; the descendants of the beadmakers may have moved back to India, possibly to Nagapattinam. There is another interesting link between Arikamedu and Ban Don Ta Phet in that Arikamedu is among the earliest sites where the use of double tipped

⁹ A method of making beads from smelted glass which is cooled, then 'pinched' off at the appropriate size.

¹⁰ At Arikamedu. See Casal, J-M 1949, *Fouilles de Virampatnam-Arikamedu*, Paris: Imprimerie Nationale. He also conducted three seasons of fieldwork in the Kulli complex in collaboration with the Pakistan Department of Archaeology in 1962-65.

diamond drills is recorded for use in perforating stone beads, whilst this practice is also documented for Ban Don Ta Phet dating from the fourth century BC (Glover 1989, 21). Francis has pointed out that all stone beads manufactured at Arikamedu were bored with this type of drill, except those bored from only one side. Diamonds from India were sent to Rome and China during the heyday of Arikamedu (Francis 1991, 38). Thus it is believed that Arikamedu was a major lapidary centre exporting its products east as well as west. Amongst its products were the sought-after onyx, used to make cameos at this period in Rome, red glass, collar beads, and folded beads. Possibly different guilds or social groups specialized in different types of beads. Francis agrees with Begley that it is no longer valid to consider Arikamedu merely an Indo-Roman trading station, or to assess its contribution to the world system merely in terms of its linkages to the Mediterranean world. Its pioneering beadmaking production techniques lived on at other sites in Southeast Asia long after Arikamedu itself was abandoned, which strongly suggests that Arikamedu looked east far more than it looked west (Francis 1991, 40).

The part Arikamedu played in the process of state formation in Southeast Asia is only just coming to light as research on Indo-Pacific beads is able to provide new insights into the socio-economic relations of the early urban centres engaged in this industry. Indo-Pacific beads were made for some two thousand years. The two types—the drawn bead cut from glass tubes, and the wound bead made by twirling hot glass around a mandrel—are widespread throughout Southeast Asia, southern China, Korea, Japan, southern India and Sri Lanka, but are less common in the Persian Gulf and northern India (Francis 1990a, 1). Some 50,000 beads and wasters now in the Pondicherry museum testify to the importance of this industry for Arikamedu (250 BC–200 AD) which was making beads at least two hundred years before the first Greco-Roman traders appeared, and continued to do so for more than a century after their departure. This was a century or more before the invention of the blow-pipe in the western Mediterranean (Francis 1990a, 3). Thus it is important to keep the notion of the Roman emporium in perspective. The group of Mediterranean merchants trading to Arikamedu was engaged in personal entrepreneurial activities; they were not the spearhead of empire. They were essentially more important to themselves than to the locals on whose tolerance they relied for continuance of their activities. In such ‘Treaty Ports’ as Charlesworth suggested they were, the *Yavana* (Greek) merchants were allowed to reside and transact business (Charlesworth 1951, 142). When civil strife in Rome during the reign of Marcus Aurelius (161–180 AD) led to reduced capacity to undertake eastern trading ventures, most of the emporia were abandoned. Of greater importance, and longer lived, were Arikamedu’s trading relations eastward with the early urban centres at Oc-Eo, Mantai, and Klong Thom. At Mantai, Ptolemy’s Modutti emporium, Arab and Persian merchants from the west could meet those of the east, each

brought by the opposite monsoon winds, and relying on the monsoon reversal to guide their homeward journeys. Here beads made in Arikamedu have been found, as they have in Klong Thom, Krabi Province, southern Thailand, and at Oc-Eo, the port of Funan. Klong Thom would have been a centre for the trans-isthmus trade, comparable to Mantai, whilst Oc-Eo, Ptolemy's Kattigara, has been called the chief relay port in the Malay-Chinese trade (Francis 1990a, 5). The four ports shared a common technology in the art of Indo-Pacific beadmaking, a technology which continued at the Southeast Asian centres for some centuries after Arikamedu was abandoned.

It could be said the interregional, and indeed intraregional, trading networks arose from, and continued to meet, the needs of emerging urbanized states both long before the *Pax Romana* intensified commercial activity across the sea lanes from the Mediterranean to the China Sea, and long after political crises in Rome saw the withdrawal of the Greco-Roman merchants from the trading entrepôts of Southeast Asia. Their withdrawal did not mean that the world trading system ceased. Their withdrawal may have been barely a minor ripple across the system as the Arab, Middle Eastern, Indian, K'uen Lun and Chinese merchants continued their ancient seafaring commerce.

International Buddhism and the rise of urban culture

Buddhism with its institutional links to the state, its location of key centres on trade routes and close association with urban centres, wealth-controlling and literate elites, its inspiration to erecting complex architectural features and encouragement of craft specialization in the production of cotton cloths, beads, moulds, polishers, ceramics, terracottas, artefacts in shell, stones and ivory to serve in the worship of holy things, provided a significant structural element in the emergence of socio-political complexity. As consumers, monks required vast quantities of donated food, cloths and ceremonial items. Monasteries needed to be near the sources of such items, both the people and the towns, the production centres, and along the highways of transportation. Institutional Buddhism played a key role in the expansion of trade in the period 200–500 AD, and had a close association with urbanism and complex state polities. Long distance exchange alone is insufficient to account for the proliferation of city states in this proto-historic period; other elements including the economic and religious restructuring had significant impact on the emerging polities (Morrison 1995, 216–218) as cities became sacred centres.

U Thong and other centres of the Tha Chin River valley in western Thailand, which Vallibhotama identified on the basis of archaeological remains and cultural artefacts as having embraced Buddhism in the early proto-historic era, shared with the early *muang* of the peninsula the Buddhist cultural heritage

bequeathed to Asia by the historical Buddha. Chakrabarti's analysis of the Buddhist canonical writings suggests that early Buddhism was city-based, enjoying the patronage of city-dwellers, kings and wealthy merchants. He notes that 95.37 percent of references in the literature (4,257 items) are to urban centres, with only 4.67 percent (208 items) to rural settlements (Chakrabarti 1995, 194). In the deep south facing the trade routes to Southeast Asia, the archaeological record shows that Buddhism was well established in Kerala and Tamil Nadu, then further up the coasts at Gujarat and Bengal, all areas which became heavily involved in the trade with Southeast Asia during the period from the sixth century AD onwards. Inscriptions show grants made to monasteries, and kings establishing monasteries in these areas, with some monasteries taking on the characteristics of centres of learning and then universities. Under the Maitraka rulers during the sixth to eighth centuries AD, one such centre of Buddhist learning was at Valabhi in Gujarat another at Nagapattinam in Tamil Nadu where the Chola kings gloried in their patronage of the Buddhist centre of learning whose fame drew pilgrims and patrons from China and Malaya. Buddhist centres of learning at Ratnagiri in Orissa, Paharpur in Bengal, Nalanda, Vikramsila and Odantapuri in Bihar flourished under the Buddhist Pala kings of Bengal and the Bhauma-Kara kings of Orissa. The fame of Indian Buddhism attracted pilgrims from overseas. From the seventh to twelfth centuries AD many monks made the journey from China to India and back, attracted to the famous centres of Buddhist learning in Bengal, Tamil Nadu, Orissa and Bihar. Given the close links between Buddhism and the economically advantaged groups in society, it would appear that there was a strong prestige element in being linked with Buddhism, in having one's name engraved on a list of donors to a Buddhist establishment or in endowing a Buddhist centre of learning. Buddhism's external manifestations required considerable technical skills in construction, sculpture, textile weaving, printing, writing, painting, community management, medicine, urban dwelling, plumbing, as well as investment and commercial procedures. Buddhism's spread in the archaeological record to Southeast Asia therefore may have been part of the adoption of technological innovation as much as philosophical or commercial origins. Buddhism itself clearly contributed to the development of urban cultures. When massive temple building overtook the simple erection of stupas, considerable physical and economic resources of the state were expended in support of Buddhism. Of necessity, these bespoke a prosperous community or kingdom.

Early Buddhist city states

It is not surprising then that a proliferation of Buddhist city states occurs across Thailand, on the peninsula at Kedah, a favourite port of call for Buddhist

pilgrims sailing across the Bay of Bengal to India, Tambralinga (Nakhon Sri Thammarat), in the valleys of the Chao Phraya and Pasak and on the Khorat plateau between sixth and eleventh centuries AD. Vallibhotama has suggested that the T'ai-Lao peoples inhabited the region up to the Mun River, whilst the southern part of the Khorat plateau was occupied by the Mon-Khmer peoples who seem to have established an early pre-Khmer Mon Buddhist civilization in the Mun River basin up to Aranyaprathet similar to that of the Dvaravati culture of central Thailand. Inscriptions in the Mon language on four terracotta Buddhist votive tablets found at Muang Fa Daed in Kalasin province, Buddhist silver plaques and other Buddhist remains indicate that Theravada Buddhism from central Thailand was established here by the seventh century and continued into the late Dvaravati period around the tenth–eleventh centuries (Diskul 1979, 369) At Sri Thep in the Pasak valley on the route connecting the Chao Phraya valley with the civilizations in the Mun and Chi river systems, Dhida Saraya found an extensive proto-historic state dating from the sixth to eleventh centuries which exhibited traits of both Dvaravati Theravada Buddhism and Chenla Hinduism (Saraya 1984, 136). Archaeological evidence from ancient settlements, religious monuments and secular artefacts indicate communication between the Khorat plateau and the Pasak valley in this period proceeded from the coastal area of the western Chao Phraya valley along the old waterways to Chainat and Nakhon Sawan then across the mountain range to Sri Thep before going further east via the Don Phraya Klang pass to the upper valleys of the Mun and Chi river systems. From the Chi River, the merchant and traveller could proceed to the Upper Mekong valley in Laos and the early state of Chenla. Aerial photographs show that Sri Thep in the first phase of its history (sixth–eleventh centuries AD) was oval in plan with an inner and outer section similar to Muang Bon in Nakhon Sawan and is considered part of Dvaravati culture. Its defensive moats and ramparts were used for water control and provided passage to the waterways outside the city. Monuments inside the city at Khlang Nai show similarities to the Wat Khlong at Kubua, Ratburi, also part of the Dvaravati culture. Saraya suggests that Sri Thep's vitality resulted from its location at the crossroads of economic and cultural influence between the Dvaravati culture of the Chao Phraya valley and the Indian-influenced pre-Angkorian culture of Laos and Cambodia (Saraya 1984, 136). On the basis of his analysis of a further set of inscriptions relating to a state existing in the ninth and tenth centuries in the northeast hinterland of the Chao Phraya valley called Sri Chanasa, Saraya believes that Sri Thep and Sri Chanasa are one and the same polity over which, in the sixth century according to the Sri Thep inscription (K. 978) a ruler exercising leadership status compared himself to King Bhavavarman of Chenla and commemorated in the inscription his own rise to power (Saraya 1984, 142–144). Contemporaneous with U Thong and Nakhon Chaisri in the western Chao Phraya valley, Sri Thep's

position in the exchange network of towns in the Nakhon Sawan region was superseded in the eleventh century by the Khmer administrative outpost at Lavo on the Lopburi River when the hinterland trade route changed, by-passing Sri Thep, as goods and merchants moved directly from Lavo to Nakhon Sawan and thence to the Khorat plateau. Overseas traders coming to Lavo soon made this state the centre for international communication in this part of the Chao Phraya valley.

Sab Champa, excavated by Veerapan Maleipan in Lopburi province, exhibits similar socio-cultural developments. Here, Buddhist images and fragments of a sandstone Wheel of the Law dated sixth to seventh centuries AD, mark this polity as being part of the Dvaravati culture. Built on an earlier Neolithic site, Sab Champa shares cultural traits with U Thong and Nakhon Pathom, also prehistoric sites which developed into Buddhist city states in the proto-historic era (Veerapan 1979, 337–341). At Chansen, Bronsen's analysis of ceramic artefacts of Chinese, Burmese and Ceylonese origin, led him to suggest that here there was sub-regional economic integration, a developing local elite, an increase in local economic activity and a large volume of long-distance trade. Such trade provided the revenue flow to sustain the erection of public works, temples, palaces and maintain a military or police-like establishment. State development provided the expansionist incentive to exert control over material and human resources, with which to fuel the trade and administer the bureaucracy required to reap the economic benefits from the activity (Bronson 1979, 334). Perhaps these early Buddhist city states were more interested in controlling manpower and material resources, than constructing large scale ceremonial state monuments along Angkorian lines. These sites—U Thong, Nakhon Pathom, Kubua, Chansen, Sab Champa in central Thailand—are, for M. C. Subhadradis Diskul, the cradle of Dvaravati culture which spread north to Haripunjaya, northeast along the Mun and Chi rivers of the Khorat plateau, east to Aranyaprathet and south down the peninsula (Diskul 1979, 364). The shared Buddhist culture informed the polities of Dvaravati and Srivijaya which were pre-eminent in the region from the eighth century to the eleventh century. As shown by the Ligor (Nakhon Sri Thammarat) inscription of 775 AD and other 'Dvaravati' cultural remains, their social structures evolved during this time from single city state, *muang*, to the more complexly organized *mondhon*,¹¹ incorporating a much larger number of centres in a shared culture.

Coins demonstrate one element of this shared culture as issued in the various urbanized centres at Oc-Eo, the Mon centres of Thailand and southern Burma, the Pyu cities of Beikthano, Halin and Sriksetra, the Arakanese cities of Khanyavati

¹¹ A group or 'circle' of Iron Age sites, often moated, and sharing a common material culture which exhibit features of urbanization such as religious, (e.g. temples, stupas) and political (e.g. palaces) structures indicative of a more complex socio-political organization beyond the simple village (*ban*) complex. The *mondhon* probably gave rise to the first chiefdoms and kingdoms.

and Vaisali, and the 'Srivijayan' centres of the peninsula and the archipelagian world. In the eighth century AD, Dvaravati cast silver coins, the minting of which was retained as a state monopoly. The coins of the 'six markets' were described as 'small like elm-seeds' and about 14 mm in diameter (Gutman 1978, 9). One Dvaravati coin weighed 7.5 g (Gutman 1978, 11). In the mainland centres, where coinage was based on the Conch/*Srivatsa* model of Pegu, silver appears to have been the preferred metal for casting coins, while gold was preferred in the island regions (Wicks 1992, 313). Gutman has noted that most of the Dvaravati coins found in Thailand have a conch on the obverse indicating that this was perhaps a Mon emblem. The *srivatsa* motif on the reverse reflects the royal power and functions and is associated with Puranci and Buddhist cosmology, the microcosmic alliances of the king and his role in protecting the country's prosperity. Fish, lotus, tortoise or wavy lines appear on some coins (Gutman 1978, 13) such as that found at U Thong which has a large fish. On the 'rising sun' coins from Oc-Eo, U Thong and Beikthano, a stylized human figure appears. Later Dvaravati coins had a bunch of three stalks tied in the centre. Each urban centre appears to have had its own stylistic motif on its coins. Thus the conch on the obverse is found on the coins of Nakhon Pathom and Prachin Buri and occurs around Pegu following what Gutman has called the 'westward drift of Mon culture' (Gutman 1978, 17). When Dvaravati was overcome by the Khmer expansion from 802 AD onwards, the local casting of coins ceased and was replaced by barter, cowrie shells or metal lumps and bars. It was not until the fourteenth century that the use of coins is again found, in association with the activities of European and Muslim traders.

The 'Dvaravati' centres of central and northeast Thailand, of which Nakhon Pathom is known to have been the largest, measuring 3,700 x 2,000 metres with a seventh century *chedi*, Chula Chedi Pathom, at its centre, all exhibit remains of fortified enclosures by which Smith distinguishes them from the temple building societies of lower Cambodia. Such fortified towns, in the Menam basin from Nakhon Pathom to Prachinburi, and in the northeast at Muang Fa Daed, may indicate the presence of an organized political life amongst relatively equal centres which may have engaged in intermittent warfare, rather than the dominance over a wide area of a single centre characterized by temple building (Smith 1979, 454–455). The plans of these fortified towns given by Quaritch Wales (1969) and their comparative sizes as identified by Smith (1979, 455) indicate habitation areas ranging from 700 x 700 metres at Chansen, 775 x 730 metres at Kampheng Sen, to 2,000 x 1,000 metres at Muang Fa Daed, 1,690 x 840 metres at U Thong, 2,010 x 800 metres at Kubua, and 1,500 x 800 metres at Dong Si Maha Pot (Prachinburi). These sizes compare favorably with those of Oc-Eo (3,000 x 1,500 metres), Pagan (1,190 metres square) and some of the Chinese cities of the Warring States period (Smith 1979, 454). As Smith has suggested, the rise of such fortified centres in the Menam basin

and in northeast Thailand represents significant socio-political development between the seventh and ninth centuries. At the beginning of the ninth century, the Dvaravati culture had probably reached its peak. In the north, the Mon Dvaravati kingdom of Haripunjaya probably survived until the late thirteenth century leaving a legacy of magnificent Buddhist sculpture, terracotta and stucco reliefs evoking the Amaravati and post-Gupta styles of India yet incorporating those elements of local genius which represented the first flowering of indigenous Buddhist culture in Thailand. It may be seen as the essential base to which Thailand returned after the Khmer period (ninth to thirteenth centuries), when Theravada Buddhism became the official state religion of the Sukhothai culture.

Ceramics, cultural diplomacy and the emergent T'ai

The Arab geographer, Masudi, writing about 943 AD, commented on the ships from China meeting the Muslim ships from Oman and Siraf, a port on the Persian Gulf in Sassanian times, at the trading centre of Kalah (Kedah) on the west coast of the Malay peninsula. Chinese ceramics, silks and other textiles transported thence to meet the demands of the Persian and Arabian markets followed the maritime silk route detailed in the writings of Masudi and his fellow Arab-Islamic geographers (Ferrand 1913, 91–93; Guy 1986, 9). Their charts and knowledge of astronomical navigation sustained knowledge of the maritime communications between east and west during the ninth to twelfth centuries (Hua Tao 1991, 142). Along the sea lanes from India to the Mediterranean, Chinese silks and porcelain were transported, appearing in markets from Lyons to Mogadishu, their patterns and colours becoming incorporated in the cultural and artistic context of Mediterranean potters and designers (McPherson 1991, 58). Chinese ceramics at five peninsular sites—Tungtuk, Tha Chana, Laem Pho-Payang, Tha Rua River and Takria—document this trade. Here occur Changsha wares from Hunan province, bowls, ewers, cups jars for the Muslim markets; Ding ware from Hebei, Yue ware from Zhejiang (Ho 1991, 291). Ongoing links between the peninsular states and the Arabic world are evidenced in the Middle Easternware sherds, Basra turquoise ware and other items found at Kho Khao. At Songkhla, Sung coins have been found, whilst large quantities of early Sung ceramics of the Yue type green ware, Qingbai ware, black, white wares and large green and brown storage jars have been found at Chaiya, Nakhon Sri Thammarat, old Satingpra and other places. The peninsula ports were part of a local redistribution system, the cargoes of Sung ceramics being unloaded at Ratburi and Nakhon Sri Thammarat to supply the local market. In the Sung period from the ninth to the twelfth centuries, southern Thailand had an essential role as a channel for Chinese and Middle Eastern communications. Nakhon Sri Thammarat came to prominence as the centre for regional trade in ceramics

interfacing with southern Fujian and Longquan in Zhejiang which had replaced Guangdong (Ho 1991, 301). It is possible that the extension of control of the Khmer King Suryavarman I (1002–1050 AD) over Lopburi and the lower Chao Phraya valley to the Kra Isthmus may have been motivated by a desire to control access to the international trading routes via the peninsular ports. In the eleventh and twelfth centuries, Srivijaya was no longer the power it had been during Dvaravati times when seventh century Chinese Buddhist pilgrims stopped there en route to India. By the eleventh century a different set of political and cultural dynamics was drawing the upper peninsular states into the developments on mainland Southeast Asia (Whitmore and Hall 1976, 319).

Takua Pa, Kedah and Tambralinga were key players in these developments. In the age of the Cholas of south India (850–1279 AD), their centuries-old commercial links with the Coromandel Coast made them a preferred destination on the west coast of the peninsula for international traders. Just as Suryavarman I of Angkor died (1050 AD), the Burmese, established at Pagan since the mid-ninth century, were expanding into southern Mon territory, taking Thaton in 1057 and moving into the Kra peninsula. The Chola sacking of the Mon port of Pappala on the Pegu coast, according to the Tanjore inscription, may be seen in the context of emergent polities seeking to re-align the axes of commercial power in the peninsular world. Aniruddha (Anawrahta) of Pagan soon moved further south to Mergui, supported Ceylon against the Cholas, who in turn supported the peninsular states against the exigencies of the Burmese. Thus within 25 years of the first Chola raid on Sumatran Srivijaya in 1025 AD, the balance of power amongst competing regional polities was being contested in the peninsular region, a consequence of its strategic importance in the international commercial network. Takuapa on the Kra isthmus became the centre of this conflict between the former hegemonic polity, Srivijaya, and the newly emerging Burmese, Khmers, Ceylonese and Chola polities. The second Chola raid of 1067 AD on Takuapa seems to have destroyed it as the chief entrepot on the west coast of the Malay peninsula, this role shifting to Kedah in the late eleventh century. Mindful of this conflict, Tambralinga on the east coast, in the Khmer sphere of influence, in 1070 AD sent a mission to the Chinese Sung court, its first since 1016 AD, perhaps signalling its intention to be seen as allied with this more powerful Chinese sphere. If such was the intention, it seems to have failed, for by the mid-twelfth century Tambralinga seems to have come within the Ceylonese, rather than Khmer, sphere of influence, a position apparently contested by the Burmese at Pagan (see Whitmore and Hall, 1976). In 1176 AD King Narapathisithu of Pagan (1174–1211 AD) sent his own expedition to the Kra isthmus to establish control of Tambralinga.

Recognized as a centre of Theravada Buddhist learning in the twelfth century, Tambralinga's religious and political ties with Ceylon gave way to the eco-

conomic exigencies of the Burmese international trade policy. Kyanzitta (1077–1112 AD) of Pagan sent religious missions to both north and south India and Ceylon as part of this drive to establish close economic ties around the Bay of Bengal and draw the trade revenues towards the Pegu coast. The Ceylonese chronicle, the *Culavamsa*, records the Burmese claim to the ports on the west coast of the peninsula in the twelfth century at Mergui, Tenasserim, Takuapa and Phuket. The importance of the trans-peninsular routes to international trade may be seen in the interruption to Burmese-Ceylonese relations in the 1160s, when Burmese monopoly of the elephant trade inhibited access across the peninsula to the Khmer Angkorian polity. Ceylon felt so strongly that it raided the southern Burmese coast and normal relations were only restored in 1186 AD with a guarantee from the Burmese of continued Ceylonese access to the Angkorian regions. The upper peninsula and isthmian states in the twelfth century (see Whitmore and Hall, 1976: 319 ff) clearly played a key role in sustaining the international trading networks linking the Arab world, the Coromandel Coast, Ceylon, the Bay of Bengal, with the Burmese at Pagan, the Khmer of Angkor and Sung China. It is likely that the linkages with these polities were religious, cultural and economic rather than direct political control.

The T'ai beachhead states and Nakhon Sri Thammarat

In the twelfth century, Nakhon Sri Thammarat was the pre-eminent centre for Theravada Buddhist religious culture and commerce on the peninsula. It had a close relationship with Ceylon, based on these religious/cultural ties. In the reign of the Ceylonese king, Parakramabahu II (1153–1186 AD) of Dambedeniya, according to the Ceylonese chronicle, the *Mahavamsa*, an eminent Buddhist monk named Dhammakitti was invited to Ceylon from Nakhon Sri Thammarat (Paranavitana 1932, 190). The rise of Nakhon Sri Thammarat to commercial and political prominence and the parallel decline of Chaiya in the twelfth century coincided with the establishment of Theravada Buddhism and the displacement of the rival Mahayana Buddhist school. These religious, cultural, commercial and political developments reflected the changing pattern of international rivalries being played out in the peninsula states between the Cholas, the Burmese, the Ceylonese and the Khmer in the twelfth century. Into this cultural and political cauldron irrupted the T'ai drawn by the pre-eminence of Nakhon Sri Thammarat, the obvious commercial and political advantages stemming from its international trading links, and perhaps a desire to shortcircuit the Burmese at Pagan in gaining a monopoly position on the peninsula. The story of their establishment in the T'ai beachhead states at Fang, Payao, Kampaengbejr, Chieng Saen, Chalieng, Chieng Rung from at least the tenth century has been ably told by Professors Charnwit

Kasetsiri (1976), and Kachorn Sukhabanij (1957). Suffice it to say here that the T'ai were well established in the north and central parts of the Menam valley by the ninth century and came under titular Khmer overlordship as the Mon polity contracted in the face of Khmer expansion. There was no sudden rise of the T'ai at Sukhothai in the thirteenth century. In the centuries between Jayavarman II (802–850 AD) and Jayavarman VII (1181–1219 AD) of Angkor, two distinct dynastic lines, the Sri Dhammasokaraja line and the U Thong line challenged the Khmer and the Mon for predominance in the region until their mid-thirteenth century victory by the forces of the Sukhothai chief administered a decisive defeat in a contest which had been going on for some centuries. Sukhabanij has shown that the T'ai appearance on the historical scene was neither sudden nor peaceful, nor was it a spontaneous nationalistic revolt against a Khmer overlord. T'ai contact with Mon Theravada Buddhism during the eleventh century religious revival had provided the impetus for their further politico-cultural interactions with the wider Buddhist world of Mon/Ceylonese institutionalized religion (Wyatt 1984, 3). Nakhon Sri Thammarat's reputation for international religious and cultural diplomacy attracted the T'ai/Syam, perhaps in a way similar to the attraction Thaton had held for Aniruddha. It is this interaction with the wider world of international Buddhist urbanized culture which provided the essential dynamic of change as the thirteenth century opened.

References

- Abu-Lughod, J. 1993. Discontinuities and Persistence: One world system or a succession of systems? *The World System: Five hundred Years or Five Thousand?* A. G. Frank and B. K. Gills, eds. London: Routledge, pp. 278–291.
- Adams, R. McC. 1974. Anthropological Perspectives on Ancient Trade. *Current Anthropology*. 15 (3): 239–258.
- Adams, R. M. 1966. *The Evolution of Urban Society: Early Mesopotamia and Prehispanic Mexico*. Chicago: Aldine.
- Agarwal, D. P. 1984. *The Archaeology of India*. New Delhi: Selectbook Service Syndicate.
- Alden, J. R. 1982. Trade and Politics in Proto-Elamite Iran. *Current Anthropology*. 23(6): 613–635.
- Allen, J. Golson, J. and R. Jones, eds. 1977. *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia and Australia*. London: Academic Press.
- Allen, J. 1990. Agriculture, Hydraulics and Urbanism at Satingpra. *Asian Perspectives*. 28(2): 163–177.
- Amin, S. 1993. The Ancient World-Systems Versus the Modern Capitalist World-System. *The World System: Five hundred Years or Five Thousand?* A. G. Frank and B. K. Gills, eds. London: Routledge, pp. 247–277.
- Anderson, D. 1989. Prehistoric Human Adaptations to Environments in Thailand. *Culture and Environment in Thailand: A Symposium of the Siam Society*. Bangkok: Duang Kamol, pp. 101–124.
- Ansari, Z. D. and M. K. Dhavalikar. 1971. New Light on the Prehistoric Cultures of Central India. *World Archaeology*. 2(3): 337–346.
- Asthana, S. *History and Archaeology of India's Contacts with Other Countries from earliest times to 300 BC*. Delhi: BR Publishing Corporation.
- Backus, C. 1981. *The Nan-chao Kingdom and T'ang China's Southwestern Frontier*. Cambridge: Cambridge University Press.
- Bag, A. K. 1985. *Science and Civilization in India: Harappan Period (c3000 BC–1500 BC)*. New Delhi: Navrang.
- Bakel, M. van, R. Hagesteijn, and P. van de Velde, eds. 1994. *Pivot Politics: Changing Cultural Identities in Early State Formation Processes*. Leiden: Het Spinhuis.
- Barber, E. W. 1999. *The Mummies of Urumchi*. London: Macmillan.
- Barnes, G. L. 1995. An Introduction to Buddhist archaeology. *World Archaeology*. 27(2): 165–182.
- Basham, A. L. 1954. *The Wonder that Was India: A Survey of the Culture of the Indian Sub-Continent before the coming of the Muslims*. London: Sidgwick and Jackson.

- Bayard, D. 1970. Excavation at Non Nok Tha, Northeastern Thailand, 1968: an interim report. *Asian Perspectives* 13: 109–144.
- Bayard, D. 1971. Non Nok Tha: The 1968 Excavation: Procedure, stratigraphy and a summary of the evidence. *Studies in Prehistoric Anthropology* 4. University of Otago, Dunedin.
- Bayard, D. 1984. A Tentative Regional Phase Chronology for Northeast Thailand. *Southeast Asian Archaeology at the XV Pacific Science Congress: The Origins of Agriculture, Metallurgy and the State in Mainland Southeast Asia*. D. Bayard, ed. University of Otago Studies in Prehistoric Anthropology, Vol. 16, Dunedin, pp. 161–166.
- Bayard, D. 1992. Models, Scenarios, Variables and Suppositions: Approaches to the Rise of Social Complexity in Mainland Southeast Asia, 700 BC–500 AD. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P., and J. Villiers, eds. Bangkok, White Lotus, pp. 13–38.
- Beale, T. W. 1973. Early Trade in highland Iran: a view from a source area. *World Archaeology*. 5(2): 133–145.
- Beckwith, C. I. 1987. *The Tibetan Empire in Central Asia: A History of the Struggle for Great Power among Tibetans, Turks, Arabs, and Chinese during the early Middle Ages*. Princeton: Princeton University Press.
- Begley, A. 1983. Arikamedu Reconsidered. *American Journal of Archaeology*. 87(4): 460–481.
- Bellwood, P. 1978. *Man's Conquest of the Pacific*. Auckland, Collins.
- Bellwood, P. 1985. *Prehistory of the Indo-Malaysian Archipelago*. North Ryde, Academic Press.
- Bellwood, P., J. Fox, and D. Tryon, eds. 1995. *The Austronesians: Historical and Comparative Perspectives*. Canberra, Research School of Pacific and Asian Studies, Department of Anthropology.
- Bender, B. 1978. Gatherer-hunter to farmer: a social perspective. *World Archaeology*. 10(2): 204–222.
- Benedict, P. 1942. Thai, Kadai and Indonesian: A New Alignment in Southeastern Asia. *American Anthropologist*. 44: 576–601.
- Benedict, P. 1976. Austro-Thai and Austroasiatic. *Austro-Asiatic Studies I*. Honolulu, University of Hawaii Press, pp. 1–36.
- Benjamin, G. 1976. Austroasiatic Subgroupings and Prehistory in the Malay Peninsula. *Austro-Asiatic Studies I*. Honolulu: University of Hawaii Press. pp. 37–128.
- Bennet, A. 1990. Prehistoric copper smelting in Central Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford: British Archaeological Reports (International Series), 561,

- pp. 109–119.
- Betts, A. V. G. 1987. The Hunter's perspective: 7th millennium BC rock carvings from eastern Jordan. *World Archaeology*. 19(2): 214–225.
- Boeles, J. J. 1986. A Note on Tamil Relations with South Thailand and the Identification of Ptolemy's Tacola. *The Archaeology of Peninsular Siam: Collected Articles from the Journal of the Siam Society*. Bangkok: The Siam Society, pp. 118–122.
- Boulnois, L. 1966. *The Silk Road*. D. Chamberlain, trans. London: Allen and Unwin.
- Brandauer, F. P. and C. C. Huang, eds. 1994. *Imperial Rulership and Cultural Change in Traditional China*. Seattle and London: University of Washington Press.
- Bronson, B. 1977. The Earliest Farming: Demography as Cause and Consequence. *Origins of Agriculture*. C. A. Reed, ed. The Hague and Paris: Mouton, pp. 23–47.
- Bronson, B. 1990. Glass and Beads at Khuan Lukpad, Southern Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford: British Archaeological Reports, (International Series), 561, pp. 213–229.
- Bronson, B. 1992. Patterns in the Early Southeast Asian Metals Trade. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P., and J. Villiers, eds. Bangkok, White Lotus, pp. 63–114.
- Brown, R. 1988. *The Ceramics of South-East Asia: Their Dating and Identification*. Second ed. Singapore: Oxford University Press.
- Brumfel, E. M. and T. K. Earle. 1987. *Specialization, Exchange, and Complex Societies*. Cambridge: Cambridge University Press.
- Bukkyo Dendo Kyokai. 1966. *The Teaching of Buddha*. rev. ed. 1975. Tokyo: Buddhist Promoting Foundation.
- Burn, A. R. 1965. *The Pelican History of Greece*. Harmondsworth: Pelican Books.
- Burney, C. and D. M. Lang. 1971. *The Peoples of the Hills: Ancient Ararat and the Caucasus*. London, Weidenfeld and Nicolson.
- Byrne, D. 1995. Buddhist *stupa* and Thai social practice. *World Archaeology*. 27(2): 266–281.
- Casal, J-M. 1949. *Fouilles de Virampatnam-Arikamedu*. Paris: Imprimerie Nationale.
- Casson, L. 1971. *Ships and Seamanship in the Ancient World*. Princeton: Princeton University Press.
- Casson, L. 1984. *Ancient Trade and Society*. Detroit: Wayne State University Press.
- Casson, L. 1989. *The Periplus Maris Erythraei: Text with Introduction, Translation, and Commentary*. Princeton: Princeton University Press.
- Ceci, L. 1984. Shell midden deposits as coastal resources. *World Archaeology*. 16(1): 62–74.

- Chakrabarti, D. K. 1995. Buddhist sites across South Asia as influenced by political and economic forces. *World Archaeology*. 27(2): 185–202.
- Chakrabarti, D. K. 1995(a). *The Archaeology of Ancient Indian Cities*. Delhi: Oxford University Press.
- Chamberlain, A. T. 1991. A Chronological Framework for Human Origins. *World Archaeology*. 23 (2): 138–148.
- Chang, K. C. 1963. *The Archaeology of Ancient China*. Fourth ed. 1986. New Haven and London, Yale University Press.
- Chang, K. C. 1975. Ancient Trade as Economics or as Ecology. *Ancient Civilization and Trade*. J. A. Sabloff, and C. C. Lamberg-Karlovsky, eds. Albuquerque: University of New Mexico Press, pp. 211–223.
- Chang, K. C. 1981. Archaeology and Chinese historiography. *World Archaeology*. 13(2):156 – 169.
- Chang, K. C. 1989. Ancient China and its anthropological significance. *Archaeological Thought in America*. C. C. Lamberg-Karlovsky, ed. Cambridge: Cambridge University Press, pp. 155–166.
- Chang, T-T. 1976. The Rice Cultures. *The Early History of Agriculture*. London, Royal Society Philosophical Transactions B Biological Sciences, Vol. 275.
- Charlesworth, M. P. 1924. *Trade Routes and Commerce of the Roman Empire*. Cambridge: Cambridge University Press. Reprint 1961. Hildesheim.
- Charlesworth, M. P. 1951. Roman Trade with India: A Resurvey. *Studies in Roman Economic and Social History in Honor of Allan Chester Johnson*. P.R. Coleman-Norton, ed. Princeton, New Jersey: Princeton University Press, pp 131–143.
- Chew, S. C. 1999. Ecological Relations and the Decline of Civilizations in the Bronze Age World-System: Mesopotamia and Harappa 2500 BC–1700 BC. *Ecology and the World System*. W.L. Goldfrank, D. Goodman, A. Szasz, eds. Westport: Greenwood Press, pp. 87–106.
- Childe, V. G. 1930. *The Bronze Age*. Cambridge: Cambridge University Press.
- Childe, V. G. 1940. India and the West before Darius. *Antiquity*. 14(1940): 5–15.
- Clark, H. R. 1991. *Community, Trade and Networks: Southern Fujian from 3rd to 13th centuries*. Cambridge: Cambridge University Press.
- Clark, H. R. 1991. The Politics of Trade and the Establishment of the Quanzhou Trade Superintendency. *China and the Maritime Silk Route*. Proceedings of the UNESCO Quanzhou International Seminar on China and the Maritime Routes of the Silk Roads. Quanzhou: Fujian People's Publishing House, pp. 376–394.
- Clark, H. R. 1994. Three Studies on the Local History of Southern Fujian. *Journal of Sung-Yuan Studies*. 24:
- Cleuziou, S. 1986. Dilmun and Makkan during the third and early second millennia BC. *Bahrain through the Ages: the Archaeology*. S.H.A.A. Khalifa, and

- M. Rice, eds. London: Routledge and Kegan Paul, pp. 143–155.
- Coedes, G. 1975. *The Indianized States of Southeast Asia*. W.F. Vella, ed., and S. B. Cowing, trans. Canberra: Australian National University Press.
- Cohen, R. and E. R. Service. 1978. *Origins of the State: The Anthropology of Political Evolution*. Philadelphia: Institute for the Study of Human Issues.
- Coningham, R. A. E. 1995. Monks, caves and kings: a reassessment of the nature of early Buddhism in Sri Lanka. *World Archaeology*. 27(2): 222–242.
- Coote, V. 1990. Mining in Southwest Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford: British Archaeological Reports (International Series), 561, pp. 134–137.
- Crawford, H. E. W. 1973. Mesopotamia's invisible exports in the third millennium BC. *World Archaeology*. 5(2): 232–242.
- Crawford, O. G. S. 1938. Tin Deposits in the Near East. *Antiquity*. 12(45): 79–81.
- Crawford, O. G. S. 1939. Iranian Tin. *Antiquity*. 13(49) 195–197.
- Curtin, P. D. 1984. *Cross-Cultural Trade in World History*. Cambridge: Cambridge University Press.
- Dani, A. H. 1986. Bahrain and the Indus Civilisation. *Bahrain through the Ages: the Archaeology*. S.H.A.A. Khalifa, and M. Rice, eds. London: Routledge and Kegan Paul, pp. 383–388.
- Dani, A. H. and V. M. Masson, eds. 1992 *History of civilizations of Central Asia*. Vol. 1. The Dawn of Civilization: earliest times to 700BC. Unesco Publishing.
- David, N., J. Sterner, and K. Gavua. 1988. Why Pots are Decorated. *Current Anthropology*. 29(3): 365–389.
- DeMarrais, E., L. J. Castillo, and T. Earle. 1996. Ideology, Materialization, and Power Strategies. *Current Anthropology*. 37 (1): 15–27.
- Dhavalikar, M K. 1974. The Beginning of Coinage in India. *World Archaeology*. 6(1): 330–338.
- Dikshit, M. G. 1969. *History of Indian Glass*. Bombay: University of Bombay.
- Diskul, M. C. Subhadradis. 1979. The Development of Dvaravati Sculpture and a Recent Find from North-east Thailand. *Early South East Asia*. R.B. Smith and W. Watson, eds. New York and Kuala Lumpur: Oxford University Press, pp. 360–370.
- Diskul, M. C. Subhadradis. 1986, sixth ed. *Art in Thailand: A Brief History*. Bangkok, Amarin Press.
- Diskul, M. C. Subhadradis. 1980. *The Art of Srivijaya*. Paris and Kuala Lumpur: UNESCO and OUP.
- Ducrocq, S. 1999. *Siamopithecus eocaenus*, a late Eocene anthropoid primate from Thailand: its contribution to the evolution of anthropoids in Southeast Asia. *Journal of Human Evolution*, 36 (6): 613–635.

- Dowson, T. A. 1994. Reading art, writing history: rock art and social change in southern Africa. *World Archaeology*. 25(3): 332–345.
- Earle Smith, C. 1973. ed. *Man and His Foods: Studies in the Ethnobotany of Nutrition-Contemporary, Primitive and Prehistoric Non-European Diets*. Alabama: University of Alabama Press.
- Ebrey, P. B. and P. N. Gregory. 1993. *Religion and Society in T'ang and Sung China*. Honolulu: University of Hawaii Press.
- Edens, C. 1986. Bahrain and the Arabian Gulf during the second millennium BC: urban crisis and colonialism. *Bahrain through the Ages: the Archaeology*. S.H.A.A. Khalifa and M. Rice, eds. London: Routledge and Kegan Paul, pp. 195–216.
- Edens, C. 1992. Dynamics of Trade in the Ancient Mesopotamian “World System.” *American Anthropologist*. 94: 118–139.
- Eggermont, P. H. L. 1966. The Murundas and the Ancient Trade Route from Taxila to Ujjain. *Journal of the Economic and Social History of the Orient*. 11(3):257–296.
- Eidem, J. and F. Hojlund. 1993. Trade or diplomacy? Assyria and Dilmun in the eighteenth century BC. *World Archaeology*. 24 (3): 441–448.
- Ellen, R F. 1990. Trade, Environment, and the Reproduction of Local Systems in the Moluccas. E. F. Moran, ed. *The Ecosystem Approach in Anthropology: From Concept to Practice*. Ann. Arbor: University of Michigan Press, pp. 191–203.
- Engelhardt, R. A. 1989. Forest-Gatherers and Strand-Loopers. *Culture and Environment in Thailand: A Symposium of the Siam Society*. Bangkok, Duang Kamol, pp.125–142.
- Evans, I. H. N. 1931. On some pottery objects from Surat. *Journal of the Siam Society*. 24(2): 207–209.
- Evans, J G. 1969. Land and Freshwater Mollusca in archaeology: chronological aspects. *World Archaeology*. 1(2): 170–183.
- Fairservis, W. 1989. An Epigenetic View of the Harappan Culture. C.C. Lamberg-Karlovsky, ed. *Archaeological Thought in America*. Cambridge: Cambridge University Press.
- Ferguson, B. 1990. Explaining War. *The Anthropology of War*. J. Haas, ed. Cambridge: Cambridge University Press, pp. 26–55.
- Ferrand, G. 1904. *Madagascar et Les Iles Uaq-Uaq*. Paris: Imprimerie Nationale.
- Ferrand, G. 1913. *Relations de Voyages et Textes Géographiques Arabes, Persans et Turks Relatifs à l'Extrême-Orient du VIIIe AU XVIIIe Siècles*. Tomes I et II. Paris: Ernest Leroux.
- Forbes, A. D. W. 1986. The “CIN-HQ” (Yunnanese Chinese) Muslims of North Thailand. *Journal of the Institute of Muslim Minority Affairs*. 7(1): 173–186.
- Forbes, A. D. W. 1986. The “Panthay” (Yunnanese Chinese) Muslims of Burma.

- Journal of the Institute of Muslim Minority Affairs*. 7(2): 384–394.
- Forbes, A. D. W. 1987. The “CIN-HQ” (Yunnanese Chinese) Caravan Trade with North Thailand during the late nineteenth and early twentieth centuries. *Journal of Asian History*. 21(1): 1–47.
- Forbes, A. D. W. 1998. The role of Hui Muslims in the Traditional Caravan Trade between Yunnan and Thailand. *Marchands et hommes d'affaires asiatiques dans l'océan Indien et la Mer de Chine 13e-20e siècles*. D. and J. Lombard, eds. Paris: Editions de l'Ecole des Hautes Etudes en Sciences Sociales, pp. 289–294.
- Francis, P. 1990. Glass Beads in Asia. Part 1. Introduction. *Asian Perspectives*. 28(1): 1–22.
- Francis, P. 1990(a) Glass Beads in Asia. Part 2. Indo-Pacific Beads. *Asian Perspectives*. 29(1): 1–23.
- Francis, P. 1991. Beadmaking at Arikamedu and beyond. *World Archaeology*. 23(1): 28–43.
- Franck, I. M. and D. M. Brownstone. 1986. *The Silk Road: A History*. New York and Oxford: Facts on File Publications.
- Franke, H. 1983. Sung Embassies: Some General Observations. *China Among Equals: The Middle Kingdom and its Neighbours, 10th–14th Centuries*. Morris Rossabi, ed. Berkeley: University of California Press, pp. 116–144.
- Friedman, J. and M. J. Rowlands. 1977. Notes towards an epigenetic model of the evolution of ‘civilisation’. J. Friedman, and M. J. Rowlands, eds. *The Evolution of Social Systems*. London: Duckworth, pp. 211–276.
- Gerini, G. E. 1909. *Researches on Ptolemy's Geography of Eastern Asia (Further India and Indo-Malay Archipelago)*. Reprint 1974. New Delhi: Oriental Books Reprint Corporation.
- Gibson, D. B. and M. N. Geselowitz. 1988. The Evolution of Complex Society in Late Prehistoric Europe. *Tribe and Polity in Late Prehistoric Europe: Demography, Production, and Exchange in the Evolution of Complex Social Systems*. D.B. Gibson, and M. N. Geselowitz, eds. New York: Plenum Press, pp. 3–37.
- Giles, H. A. 1923. *The Travels of Fa-hsien (399–414 AD), or Record of the Buddhistic Kingdoms*. Cambridge: Cambridge University Press.
- Gills, B. K. and A. G. Frank. World System Cycles, Crises, and Hegemonic Shifts, 1700 BC to 1700 AD. *The World System: Five hundred Years or Five Thousand?* A.G. Frank, and B K Gills, eds. London: Routledge, pp. 143–196.
- Glover, I. 1989. *Early Trade Between India and Southeast Asia: A Link in the Development of a World Trading System*. University of Hull Centre for Southeast Asian Studies, Occasional Papers, No 16, Hull.
- Glover, I. 1990. Ban Don Ta Phet 1984 - 85. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian*

- Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford, British Archaeological Reports (International Series), 561, pp. 139–177.
- Glover, I, Suchitta, P. and J. Villiers, eds. 1992. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. Bangkok: White Lotus.
- Glover, I. and J. Henderson. 1995. *Early Glass in South and South East Asia and China: Art, Interaction & Commerce*. R. Scot and J. Guy, eds. London: University of London, School of Oriental and African Studies, Colloquies on Art & Archaeology in Asia No. 17, pp. 141–169.
- Goitein, S. D. 1967-78. *Mediterranean Society*. 3 vols. Berkeley: University of California Press.
- Gorman, C. 1971. The Hoabinhian and after: subsistence patterns in Southeast Asia during the late Pleistocene and early recent periods. *World Archaeology*. 2 (3): 300–320.
- Gorman, C. 1973. Excavations at Spirit Cave, north Thailand: some interim interpretations. *Asian Perspectives*. 13: 79–107.
- Gorman, C. 1977. A Priori Models and Thai Prehistory: A Reconsideration of the Beginnings of Agriculture in Southeastern Asia. *Origins of Agriculture*. C. A. Reed, ed. The Hague and Paris: Mouton, pp. 321–355.
- Grave, P. 1995. Beyond the *mandala*: Buddhist landscapes and upland-lowland interaction in north-west Thailand AD 1200–1650. *World Archaeology*. 27(2): 243–265.
- Gregory, P. N. and P. B. Ebrey. 1993. The Religious and Historical Landscape. In *Religion and Society in T'ang and Sung China*. P. B. Ebrey, and P. N. Gregory, eds. Honolulu: University of Hawaii Press, pp. 1–44.
- Griffin, P. B. and W. G. Solheim II. 1988. Ethnoarchaeological Research in Asia. *Asian Perspectives*. 28(2): 145–162.
- Grousset, R. 1932. *In the Footsteps of the Buddha*. London: George Routledge.
- Gungwu, W. 1958. *The Nanhai Trade*. Reprint 1998. Singapore: Times Academic Press.
- Gungwu, W. 1989. Introduction. *Southeast Asia in the 9th to 14th Centuries*. D. G. Marr and A C. Milner, eds. Singapore: Institute of Southeast Asian Studies, pp. xii - xviii.
- Gurumurthy, S. 1981. *Ceramic Traditions in South India Down to 300 AD*. Madras: United Printers' Syndicate.
- Gutman, P. 1978. The Ancient Coinage of Southeast Asia. *Journal of the Siam Society*. 66(1): 8–21.
- Guy, J. S. 1986. *Oriental Trade Ceramics in Southeast Asia Ninth to Sixteenth Centuries*. Singapore: Oxford University Press.
- Guy, J. S. 1993. *Thai Ceramics: The James and Elaine Connell Collection*. Kuala Lumpur: Oxford University Press.
- Hagesteijn, R. R. 1994. Kyanzittha and Beyond: Amalgamating Cultural Identities

- in Early Myanmar. M. van Bakel, R. Hagesteijn, and P van de Velde, eds. *Pivot Politics: Changing Cultural Identities in Early State Formation Processes*. Leiden: Het Spinhuis, pp. 181–195.
- Haldane, C. 1993. Direct evidence for organic cargoes in the Late Bronze Age. *World Archaeology*. 24(3): 348–360.
- Hall, D. G. E. 1968. *A History of South-East Asia*. Third ed. New York: St. Martin's Press.
- Hall, K. R. 1980. *Trade and Statecraft in the Age of the Colas*. New Delhi: Shakti Malik Abhinav Publications.
- Hall, K. R. 1985 *Maritime Trade and State Development in Early Southeast Asia*. Honolulu, University of Hawaii Press.
- Hammond, M. 1972. *The City in the Ancient World*. Cambridge, Mass: Harvard University Press.
- Hanks, L. 1972. *Rice and Man: Agricultural Ecology in Southeast Asia*. Ithaca, Cornell University Press.
- Harlan, J. R. 1977. The Origins of Cereal Agriculture in the Old World. *Origins of Agriculture*. C. A. Reed, ed. The Hague and Paris: Mouton, 357–383.
- Harmatta, J, B. N. Puri, and G. F. Etemadi, eds. 1994. *History of Civilizations of Central Asia*. Vol. II. The Development of Sedentary and Nomadic civilizations: 700 BC to AD 250. Unesco Publishing.
- Hartwell, R. 1966. Markets, Technology and the Structure of Enterprise in the Development of the Eleventh-Century Chinese Iron and Steel Industry. *Journal of Economic History*. 26(1): 29–58.
- Hawkes, K. 1993. Why Hunter-Gatherers Work: An Ancient Version of the Problem of Public Goods. *Current Anthropology*. 34 (4): 341–351.
- Headland, T. and L. A. Reid. 1989. Hunter-Gatherers and Their Neighbours from Prehistory to the Present. *Current Anthropology*. 30(1): 43–66.
- Heng, L. S. 1990. A Tripod Pottery Complex in Peninsular Malaysia. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover eds. Oxford: British Archaeological Reports (International Series), 561.
- Heider, K. G. 1957. New Archaeological Discoveries in Kanchanaburi. *Journal of the Siam Society*. 45(1): 61–70.
- Herodotus. *The Histories*. A. de Selincourt, trans.; intro and notes by J. Marincola. Rev. ed. 1996. Harmondsworth: Penguin.
- Herre, W. and M. Rohrs. 1977. Zoological Considerations on the Origins of Farming and Domestication. *Origins of Agriculture*. C. A. Reed, ed. The Hague and Paris: Mouton, 245–279.
- Higham, C. F. W. 1977. Economic Change in Prehistoric Thailand. *Origins of Agriculture*. C. A. Reed, ed. The Hague and Paris: Mouton, pp. 385–412.

- Higham, C. F. W. 1989. *The Archaeology of Mainland Southeast Asia*. Cambridge: Cambridge University Press.
- Higham, C. F. W. 1990. *The Excavation of Khok Phanom Di, a Prehistoric Site in Central Thailand*. Volume I: *The Excavation, Chronology and Human Burials*. London: Society of Antiquaries of London, Research Report no. XLVII.
- Higham C. F. W. and R. Bannanurag. 1991. *The Excavation of Khok Phanom Di, A Prehistoric Site in Central Thailand*. Vol II: *The Biological Remains (Part 1)*. London: Society of Antiquaries of London, Research Report no. XLVIII.
- Higham, C. F. W., R. Bannanurag, G. Mason, and N. Tayles. 1992. Human biology, environment and ritual at Khok Phanom Di. *World Archaeology*. 24(1): 35–54.
- Higham, C. F. W. 1993. *The Excavation of Khok Phanom Di*. Volume III (part 1): *The Material Culture*. London, Society of Antiquaries of London, Research Report no. L
- Higham, C. F. W. 1996. *The Bronze Age of Southeast Asia*. Cambridge, Cambridge University Press.
- Higham, C. F. W., and Rachanie Thosarat. 1998. *Prehistoric Thailand: From Early Settlement to Sukhothai*. Bangkok, River Books.
- Hinz, W. 1972. *The Lost World of Elam: Recreation of a Vanished Civilization*. trans. J. Barnes. London: Sidgwick and Jackson.
- Hirth, F. and W. W. Rockhill. trans. 1911. *Chau Ju-Kua: On the Chinese and Arab Trade of the Twelfth and Thirteenth Centuries*. St Petersburg: Imperial Academy of Sciences.
- Ho, Chuimei. 1991. Chinese Presence in Southern Thailand before 1500AD from Archaeological Evidence. *China and the Maritime Silk Route*. Proceedings of the UNESCO Quanzhou International Seminar on China and the Maritime Routes of the Silk Roads. Quanzhou: Fujian People's Publishing House, pp. 290–303.
- Ho, Ping-Ti. 1966. Lo-yang, AD 495–534: A Study of Physical and Socio-Economic Planning of a Metropolitan Area. *Harvard Journal of Asiatic Studies*. 26: 52–101.
- Ho, Ping-Ti. 1969. The loess and the origin of Chinese agriculture. *American Historical Review*. 75: 1–36.
- Horridge, A. 1995. The Austronesian Conquest of the Sea - Upwind. *The Austronesians: Historical and Comparative Perspectives*. P. Bellwood, J. Fox, and D. Tryon eds. Canberra: Research School of Pacific and Asian Studies, Department of Anthropology.
- Hua Tao. 1991. Ibn Khurdadhbah's Description about the Maritime Route to China and its position in the Arab-Islamic Geographical Literature. *China and the*

- Maritime Silk Route*. Proceedings of the UNESCO Quanzhou International Seminar on China and the Maritime Routes of the Silk Roads. Quanzhou: Fujian People's Publishing House, pp. 131–143.
- Hublin, J. J. 1999. The Quest for Adam. *Archaeology*. 52 (4): 26–31.
- Hudson, G. F. 1931. *Europe and China: A Survey of their Relations from the Earliest Times to 1800*. Reprint 1961. Boston: Beacon Press.
- Hutterer, K. L. 1977. Reinterpreting the Southeast Asian Palaeolithic. *Sunda and Sahul. Prehistoric Studies in Southeast Asia, Melanesia and Australia*. J. Allen, J. Golson, and R. Jones, eds. New York: Academic Press.
- Hutterer, K. L. ed. 1977. *Economic Exchange and Social Interaction in Southeast Asia: Perspectives for Prehistory, History and Ethnography*. Ann Arbor: Center for South and Southeast Asian Studies, University of Michigan, no. 17.
- Hutterer, K. L., T. Rambo, and G. Lovelace, eds. 1985. *Cultural Values and Human Ecology in Southeast Asia*. Ann Arbor: Center for South and Southeast Asian Studies, no. 27.
- Hutterer, K. L. 1988. *Ethnic Diversity and the Control of Natural Resources in Southeast Asia*. Ann Arbor: Center for South and Southeast Asian Studies, University of Michigan. no. 32.
- Isaac, G. 1969. Studies of Early Culture in East Africa. *World Archaeology*. 1(1): 1–28.
- Isaac, G. 1971. The Diet of Early Man: Aspects of Archaeological Evidence from Lower and Middle Pleistocene Sites in Africa. *World Archaeology*. 2(3): 278–299.
- Jacob, J. M. 1979. Pre-Angkor Cambodia: Evidence from the Inscriptions in Khmer concerning the Common People and their Environment. *Early South East Asia: Essays in Archaeology, History and Historical Geography*. R. B. Smith, and W. Watson, eds. New York and Kuala Lumpur: Oxford University Press, pp. 406–426.
- Jayawickrama, N. A. 1968. trans. *The Sheaf of Garlands of the Epochs of the Conqueror: being a translation of Jinakalamalinipakaranam of Ratanaphanna Thera*. London: The Pali Text Society.
- Johnson, G. A. 1975. Locational Analysis and the Investigation of Uruk Local Exchange Systems. *Ancient Civilization and Trade*. J. A. Sabloff and C. C. Lamberg-Karlovsky, eds. Albuquerque: University of New Mexico Press, pp. 285–337.
- Jung-pang Lo. 1955. The Emergence of China as a Sea Power during the Late Sung and Early Yuan Periods. *Far Eastern Quarterly*. 14 (4): 489–504.
- Jung-pang Lo. 1969. Maritime Commerce and its Relation to the Sung Navy. *Journal of the Economic and Social History of the Orient*. 12(1): 5–100.

- Jung-pang Lo. 1970. Chinese Shipping and East-West Trade from the Tenth to the Fourteenth Century. *Societies et Compagnies de Commerce en Orient et dans l'Océan Indien*. Michel Mollat, ed. Paris: SEVPEN, pp. 167–175.
- Kaplan, D. 1963. Men, Monuments and Political Systems. *Southwestern Journal of Anthropology*. 19(2): 397–410.
- Kasetsiri, C. 1976. *The Rise of Ayudhya: A History of Siam in the Fourteenth and Fifteenth Centuries*. Kuala Lumpur: Oxford University Press.
- Kennedy, J. 1977. From Stage to Development in Prehistoric Thailand: An Exploration of the Origins of Growth, Exchange and Variability in Southeast Asia. *Economic Exchange and Social Interaction in Southeast Asia: Perspectives for Prehistory, History and Ethnography*. K. L. Hutterer, ed. Ann Arbor: Centre for South and South East Asian Studies, University of Michigan.
- Kenoyer, J. M., M. Vidale, and K. K. Bhan. Contemporary Stone Beadmaking in Khambhat, India: patterns of craft specialization and organization of production as reflected in the archaeological record. *World Archaeology*. 23(1): 44–63.
- Khalifa, S. H. A. A. and M. Rice. 1986. *Bahrain through the Ages: the Archaeology*. London: Routledge and Kegan Paul.
- Kiernan, K. J. Spies, and J. Dunkley. 1988. Prehistoric Occupation and Burial Sites in the Mountains of the Nam Khong Area, Mae Hong Son Province, Northwestern Thailand. *Australian Archaeology*. 27: 24–44.
- Kijngam A, C.F.W. Higham, and W. Wiriayaromp. 1980. *Prehistoric Settlement Patterns in Northeast Thailand*. Dunedin: University of Otago Studies in Prehistoric Anthropology, Vol. 15.
- Kirch, P. V. 1990. Specialization and Exchange in the Lapita Complex of Oceania (1600–500 BC). *Asian Perspectives*. 29(2): 25–38.
- Klimburg Salter, D. E. 1982. *The Silk Route and the Diamond Path: Esoteric Buddhist Art on the Trans-Himalayan Trade Routes*. Los Angeles: UCLA Art Council.
- Knuth, E. 1962. Further Report on the Sai-Yok Excavations and on the Work at the Picture Cave. *Journal of the Siam Society*. 50(1): 19–23.
- Kurtz, D. V. 1994. Cultural Identity, Politics and Legitimation. M. van Bakel, R. Hagesteijn, and P. van de Velde, eds. *Pivot Politics: Changing Cultural Identities in Early State Formation Processes*. Leiden: Het Spinhuis, pp. 31–43.
- Lahiri, L. 1986. trans. I-Ching. *Chinese Monks in India: Biography of Eminent Monks who went to the Western World in Search of the Law During the Great T'ang Dynasty*. Delhi: Motilal Banarsidass.
- Lamberg-Karlvosky, C. C. 1974. *The Rise and Fall of Civilizations: Modern*

- Archaeological Approaches to Ancient Cultures*. Menlo Park: Cummings Publishing Co.
- Lamberg-Karlovsky, C. C. 1975. Third Millennium Modes of Exchange and Modes of Production. *Ancient Civilization and Trade*. J.A. Sabloff and C. C. Lamberg-Karlovsky, eds. Albuquerque: University of New Mexico Press, pp. 341–365.
- Lamberg-Karlovsky, C. C. 1989. Mesopotamia, Central Asia and the Indus Valley: so the kings were killed. *Archaeological Thought in America*. C.C. Lamberg-Karlovsky, ed. Cambridge: Cambridge University Press, pp. 241–270.
- Leakey, M. 1999. Perspectives on the Past. *Archaeology*. 52(4): 32–35.
- Lombard, D. and J. Aubin, eds. 1988. *Marchands et hommes d'affaires asiatiques dans l'océan Indien et la Mer de Chine 13e-20e siècles*. Paris: Editions de l'Ecole des Hautes Etudes en Sciences Sociales.
- Limbrey, S. 1990. Edaphic opportunism? A discussion of soil factors in relation to the beginnings of plant husbandry in south-west Asia. *World Archaeology*. 22(1): 45–52.
- Lo, J-P. 1970. Chinese Shipping and East-West Trade from the Tenth to the Fourteenth Century. in *Sociétés et Compagnies de Commerce en Orient et dans l'Océan Indien*. M. Mollat, ed. Paris: SEVPEN, pp. 167–176.
- Lyons, E. 1973. Two Dvaravati Figurines. *Journal of the Siam Society*. 61(1): 193–201.
- Ma, L. J. C. 1971. *Commercial Development and Urban Change in Sung China*. Ann Arbor: University of Michigan Geographical Publication No. 6.
- Ma Touan-Lin. 1883. *Ethnographie des Peuples Etrangers à la Chine. Ouvrage composé au XIIIe siècle de notre ère*. trans. Hervey de Saint-Denys. Paris: Ernest Leroux.
- Mabbett, I. W. 1977. The Indianization of Southeast Asia: Reflections on the Prehistoric Sources. *Journal of Southeast Asian Studies*. 8(1): 1–14.
- Mabbett, I. W. 1977. The Indianization of Southeast Asia: Reflections on the Historic Sources. *Journal of Southeast Asian Studies*. 8(2): 143–161.
- Mackerras, C. 1972. ed. and trans. *The Uighur Empire according to the T'ang Dynastic Histories: A Study in Sino-Uighur Relations 744–840*. Canberra: Australian National University Press.
- Maloney, B. K. 1991. The Pollen, Pteridophyte Spore and Microscopic Charcoal: Conclusions. *The Excavation of Khok Phanom Di, A Prehistoric Site in Central Thailand*. Vol II: *The Biological Remains (Part 1)*. London: Society of Antiquaries of London, Research Report no. 48, pp. 91–94.
- Maloney, B. K. 1992. Late Holocene climatic change in Southeast Asia: the palynological evidence and its implications for archaeology. *World Archaeology*. 24(1): 29 – 33.

- Masry, A. H. 1981. Traditions of archaeological research in the Near East. *World Archaeology*. 13(2): 222–239.
- McGrail, S. 1985. Towards a classification of water transport. *World Archaeology*. 16(3): 289–303.
- McPherson, K. 1991. *China and the Maritime Silk Route*. Proceedings of the UNESCO Quanzhou International Seminar on China and the Maritime Routes of the Silk Roads. Quanzhou: Fujian People's Publishing House, pp. 55–60.
- Miksic, J. N. and C. T. Yap. 1990. Fine-bodied White Earthenwares of Southeast Asia: Some X-Ray Fluorescence Tests. *Asian Perspectives*. 28(1): 45–0.
- Mollat M. 1970 ed. *Sociétés et Compagnies de Commerce en Orient et dans l'Océan Indien*. Paris: SEVPEN.
- Moore, E. 1990. Moated Settlement in the Mun Basin, Northeast Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds., Oxford: British Archaeological Reports, (International Series), 561, pp 201–211.
- Moore, E. and S. Siribhadra. 1992. *Palaces of the Gods: Khmer Art and Architecture in Thailand*. Bangkok: Asia Books.
- Moorey, P. R. S. 1986. The emergence of the light, horse-drawn chariot in the Near-East c. 2000– 1500 BC. *World Archaeology*. 18(2): 196–215.
- Moran, E. F. 1990. *The Ecosystem Approach in Anthropology: From Concept to Practice*. Ann Arbor: University of Michigan Press.
- Moran, E. F. 1990. Ecosystem Ecology in Biology and Anthropology: A Critical Assessment. E. F. Moran, ed. *The Ecosystem Approach in Anthropology: From Concept to Practice*. Ann Arbor: University of Michigan Press, pp. 3–40.
- Moran, E. F. 1996. *Transforming Societies, Transforming Anthropology*. Ann Arbor: University of Michigan Press.
- Morrison, K. D. 1995. Trade, urbanism, and agricultural expansion: Buddhist monastic institutions and the state in the Early Historic western Deccan. *World Archaeology*. 27(2): 203– 221.
- Murty, M. L. K. 1981. Hunter-gatherer ecosystems and archaeological patterns of subsistence behaviour on the south-east coast of India: an ethnographic model. *World Archaeology*. 13(1): 47–58.
- Narada Maha Thera. 1973. *The Buddha and His Teachings*. Second ed. Singapore: Singapore Buddhist Meditation Centre.
- Natapintu, S. 1988. Current research on ancient copper-base metallurgy in Thailand. *Prehistoric Studies: The Stone and Metal Ages in Thailand*. Bangkok: Thai Antiquity Working Group, pp. 107–24.

- Natapintu, S., V. C. Piggott, and U. Theetiparivattra. 1990. The Thailand Archaeometallurgy Project 1984 - 85: Research in the Development of Prehistoric Metal Use in Northeast Thailand. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P. and J. Villiers, eds. Bangkok: White Lotus, pp. 47–62.
- Natapintu, S. 1996. *Ban Chiang: A World Heritage in Thailand*. Bangkok: Fine Arts Department.
- Nielsen, E. 1962. The Thai Danish Prehistoric Expedition 1960–1962. *Journal of the Siam Society*. 50 (1): 7–14.
- Oates, J. 1993. Trade and power in the fifth and fourth millennia BC: new evidence from northern Mesopotamia. *World Archaeology*. 24(3): 403–421.
- O'Connor, S. J. 1986. An Ekamukhalinga from Peninsular Siam. *The Archaeology of Peninsular Siam: Collected Articles from the Journal of the Siam Society*. Bangkok: The Siam Society, pp. 111–117.
- O'Connor, S. J. Si Chon: 1986. An Early Settlement in Peninsular Thailand. *The Archaeology of Peninsular Siam: Collected Articles from the Journal of the Siam Society*. Bangkok: The Siam Society, pp. 123–134.
- O'Connor, S. J. 1986. Tambralinga and the Khmer Empire. *The Archaeology of Peninsular Siam: Collected Articles from the Journal of the Siam Society*. Bangkok: The Siam Society, pp. 135–149.
- O'Connor, S. J. 1986. Some Early Siva Lingas in Nakhon Si Thammarat, Peninsular Thailand. *The Archaeology of Peninsular Siam: Collected Articles from the Journal of the Siam Society*. Bangkok: The Siam Society, pp. 159–163.
- Oppenheimer, S. 1998. *Eden in the East: The Drowned Continent of Southeast Asia*. Reprint 1999. London: Phoenix.
- Paranavitana, S. 1932. Religious Intercourse between Ceylon and Siam in the 13th–15th Centuries. *Journal of the Ceylon Branch of the Royal Asiatic Society*. 32(85): 190–213.
- Pattabiramin, P. Z. 1946. *Les Fouilles d'Arikamedou (Podouke)*. Paris: Presses Universitaires de France; Pondichéry: Bibliothèque Coloniale.
- Peacock, D. P. S. 1970. The scientific analysis of ancient ceramics: a review. *World Archaeology*. 1(3): 375–389.
- Penny, J. S. 1984. Fish in the Water and Rice in the Paddy: Contributions to Studies of the Southeast Asian Iron Age. *Southeast Asian Archaeology at the XV Pacific Science Congress: The Origins of Agriculture, Metallurgy and the State in Mainland Southeast Asia*. D. Bayard, ed, University of Otago Studies in Prehistoric Anthropology, Vol. 16, Dunedin, pp. 152–157.
- Phansomboon, S. 1957. A Bioserological Consideration of the Migration of the Thai Race. *Journal of the Siam Society*. 45: 55–64.
- Phillips, E. D. The Scythian domination in Western Asia: its record in history, scripture and archaeology. *World Archaeology*. 2(2): 129–138.

- Pietrusewsky, M. 1982. The Ancient Inhabitants of Ban Chiang: The Evidence from the Human Skeletal and Dental Remains. *Expedition*. 24(4): 42–50.
- Pookajorn, S. 1990. Hoabinhian cave excavations in Ban Kao District, West Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. Oxford: British Archaeological Reports (International Series), 561, pp. 11–25.
- Pope, G. G. et al. 1978-1986. Palaeoanthropological Investigations of the Thai-American Expedition to Northern Thailand: an Interim Report. *Asian Perspectives*, 21:147–63.
- Possehl, G. L. and M. H. Raval 1989. *Harappan Civilization and Rojdi*. Leiden and New York: E J Brill.
- Postgate, J. N. 1992. The Land of Assur and the yoke of Assur. *World Archaeology*. 23(3): 248–263.
- Potts, D. T. 1993. Rethinking some aspects of trade in the Arabian Gulf. *World Archaeology*. 24(3): 423–440.
- Potts, D. T. 1997. *Mesopotamian Civilization: The Material Foundations*. London: The Athlone Press.
- Potts, T. F. 1993. Patterns of trade in third-millennium BC Mesopotamia and Iran. *World Archaeology*. 24(3): 379–402.
- Price, T. D. and J. A. Brown. eds. 1985. *Prehistoric Hunter-Gatherers: the Emergence of Cultural Complexity*. New York: Academic Press.
- Price, D. H. 1994. Wittfogel's Neglected Hydraulic/Hydroagricultural Distinction. *Journal of Anthropological Research*. 50(2): 187–204.
- Pritchard, J. B. 1950. ed. *Ancient Near Eastern Texts relating to the Old Testament*. Princeton: Princeton University Press.
- Quanzhou International Seminar on China and the Maritime Routes of the Silk Roads Organization Committee. 1991. *China and the Maritime Silk Route*. UNESCO: Fujian People's Publishing House.
- Quaritch Wales, H. G. 1953. *The Mountain of God: A Study in early Religion and Kingship*. London: Bernard Quaritch.
- Quaritch Wales, H. G. 1957. *Prehistory and Religion in Southeast Asia*. London: Bernard Quaritch.
- Quaritch Wales, H. G. 1957. An Early Buddhist Civilization in Eastern Siam. *Journal of the Siam Society*. 45(1): 42–60.
- Quaritch Wales, H. G. 1965. *Angkor and Rome: A Historical Comparison*. London: Bernard Quaritch.
- Quaritch Wales, H. G. 1967. *The Indianization of China and of South-East Asia*. London: Bernard Quaritch.
- Quaritch Wales, H. G. 1969. *Dvaravati: The Earliest Kingdom of Siam*. London: Bernard Quaritch.

- Quaritch Wales, H. G. 1974. *The Making of Greater India*. London: Bernard Quaritch.
- Rao, S. R. 1985. *Lothal A Harappan Port Town*. New Delhi: Archaeological Survey of India.
- Rao, S. R. 1986. Trade and cultural contacts between Bahrain and India in the third and second millennia BC. *Bahrain through the Ages: the Archaeology*. S.H.A.A. Khalifa, and M. Rice, eds. London: Routledge and Kegan Paul, pp. 376–382.
- Rappaport, R. A. 1990. Ecosystems, Populations and People. E.F. Moran, ed. *The Ecosystem Approach in Anthropology: From Concept to Practice*. Ann Arbor: University of Michigan Press, pp. 41–74.
- Ratnagar, S. 1981. *The Westerly Trade of the Harappa Civilization*. Delhi: Oxford University Press.
- Rawson, J. 1993. Sets or Singletons? Uses of Chinese Ceramics: 10th–14th Centuries. *Journal of Sung-Yuan Studies*. 23: 71–94.
- Ray, H. P. 1986. *Monastery and Guild: Commerce under the Satavahanas*. Delhi: Oxford University Press.
- Ray, H. P. 1994. Kanheri: the archaeology of an early Buddhist pilgrimage centre in western India. *World Archaeology*. 26(1): 35–46.
- Reade, J. 1986. Commerce or Conquest: variations in the Mesopotamia-Dilmun relationship. *Bahrain through the Ages: the Archaeology*. S.H.A.A. Khalifa and M. Rice, eds. London: Routledge and Kegan Paul, pp. 325–334.
- Reischauer, E. O. 1955. *Ennin's Travels in T'ang China*. New York: The Ronald Press Company.
- Renfrew, C. 1975. Trade as Action at a Distance: Questions of Integration and Communication. *Ancient Civilization and Trade*, J.A. Sabloff and C C. Lamberg-Karlovsky, eds. Albuquerque: University of New Mexico Press, pp. 3–37.
- Renouf, M. A. P. 1984. Northern coastal hunter-fishers: an archaeological model. *World Archaeology*. 16(1): 18–27.
- Reynolds, T. E. G. 1990. Problems in the Stone Age of Thailand. *Journal of the Siam Society*, 78(1): 109–114.
- Reynolds, T. E. G. 1991. Revolution or resolution? The archaeology of modern human origins. *World Archaeology*. 23(2): 155–166.
- Reynolds, T. E. G. 1992. Excavations at Banyan Valley Cave, Northern Thailand: a report on the 1972 season. *Asian Perspectives*, 31: 77–98.
- Rice, P. M. 1989. Ceramic diversity, production and use. R. D. Leonard and G. T. Jones, eds. *Quantifying Diversity in Archaeology*. Cambridge: Cambridge University Press.
- Richards, M., K. Smalley, B. Sykes, and R. Hedges. 1993. Archaeology and genetics: analysing DNA from skeletal remains. *World Archaeology*. 25(1): 18–28.

- Rogers, P. 1996. *Northeast Thailand from Prehistoric to Modern Times*. Bangkok: Duang Kamol.
- Rooney, D. F. A Field Guide to Glazed Thai Ceramics. *Asian Perspectives*. 28(2): 125–143.
- Rossabi, M., ed. 1983. *China among Equals: The Middle Kingdom and its Neighbours, 10th–14th Centuries*. Berkeley: University of California Press.
- Rowley-Conwy, P. 1984. Postglacial foraging and early farming economies in Japan and Korea: a west European perspective. *World Archaeology*. 16(1): 28–42.
- Rubel, P. and A. Rosman. 1994. The Past and the Future of Anthropology. *Journal of Anthropological Research*. 50(4): 335–343.
- Sahlins, M. 1972. *Stone Age Economics*. Chicago: Aldine.
- Santoni M., J-P. Pautreau, and S. Prishanchit. 1990. Excavations at Obluang, Province of Chiang Mai, Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford: British Archaeological Reports (International Series) 561, pp. 37–54.
- Santoni M., J-P. Pautreau, and S. Prishanchit. 1990. Stone Tool manufacturing areas in the Province of Nan, Thailand. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford: British Archaeological Reports (International Series) 561, pp. 55–63.
- Saraya, D. 1992. The Hinterland State of Sri Thep *Sri Deva*—A Reconsideration. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P. and J. Villiers, eds. Bangkok: White Lotus.
- Sather, C. 1995. Sea Nomads and Rainforest Hunter-Gatherers: Foraging Adaptations in the Indo-Malaysian Archipelago. *The Austronesians: Historical and Comparative Perspectives*. P. Bellwood, J.J. Fox, and D Tryon, eds. Canberra: Research School of Pacific and Asian Studies, pp. 229–241.
- Sauer, C. O. 1952. *Agricultural Origins and Dispersals*. New York: American Geographical Society.
- Schafer, E. H. 1963. *The Golden Peaches of Samarkand: A Study of Tang Exotics*. Berkeley and Los Angeles: University of California Press, 1963.
- Schneider, J. 1977. Was there a Precapitalist World-System? *Journal of Peasant Studies*. 6(1): 20–29. Reprint. *Core/Periphery Relations in Precapitalist Worlds*. 1991. C. Chase-Dunn, and T. D. Hall, eds. Boulder: Westview Press, pp. 45–66.
- Service, E. R. 1975. *Origins of the State and Civilization: The Process of Cultural Evolution*. New York: W. W. Norton.
- Service, E. R. 1978. Classical and Modern Theories of the Origins of Government. *Origins of the State: The Anthropology of Political Evolution*. R. Cohen

- and E. R. Service, eds. Philadelphia: Institute for the Study of Human Issues. pp. 21–33.
- Shaw, J. C. 1987. *Introducing Thai Ceramics, also Burmese and Khmer*. Chiang Mai: Duangphorn Kemasingki.
- Silverman, S. 1979. The Peasant Concept in Anthropology. *Journal of Peasant Studies*. 7(1): 49–69.
- Slayman, A. L. 1999. A Cache of Vintage Ships. *Archaeology*. 52: 36–39.
- Smith, A. 1995. The need for Lapita: explaining change in the Late Holocene Pacific archaeological record. *World Archaeology*. 26(3): 366–379.
- Smith, B. D. 1995. *The Emergence of Agriculture*. New York: Scientific American Library.
- Smith, J. M. and F. Plunkett. 1968. Gold Money in Mongol Iran. *Journal of the Economic and Social History of the Orient*. 11(2): 273–297.
- Smith, J. M. 1969. The Silver Currency of Mongol Iran. *Journal of the Economic and Social History of the Orient*. 12(1): 16–41.
- Smith, R. B. and W. Watson, eds. 1979. *Early South East Asia: Essays in Archaeology, History and Historical Geography*. New York and Kuala Lumpur: Oxford University Press.
- So Kee Long. 1994. The Trade Ceramics Industry in Southern Fukien During the Sung. *Journal of Sung-Yuan Studies*. 24: 1–20.
- Solheim, W. G. II 1972. An Earlier Agricultural Revolution. *Scientific American*. 226: 34–41.
- Solheim, W. G.. II 1985. Nusantao Traders Beyond Southeast Asia. Paper presented at Research Conference on Early Southeast Asia, Bangkok and Nakhon Pathom, 8–13 April, 1985. Published in *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P. and J. Villiers, eds. Bangkok: White Lotus, 1992, pp. 199–212.
- Solheim, W. G. II. 1990. A Brief History of the Dongson Concept. *Asian Perspectives*. 28(1): 23–30.
- Sorensen, P. 1963. North-south indications of a prehistoric migration into Thailand. *East and West*, 14: 211–217.
- Sorensen, P. 1990. Kettledrums of Heger Type 1: Some Observations. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. I. and E. Glover, eds. Oxford: British Archaeological Reports (International Series), 561, pp. 195–200.
- Spencer, G. W. 1969. Religious Networks and Royal Influence in Eleventh Century South India. *Journal of Economic and Social History of the Orient*. 12(1): 42–55.
- Stargardt, J. 1983. *The Environmental and Economic Archaeology of South*

- Thailand*. Studies in Southeast Asian Archaeology 1, BAR International Series 158. Singapore: Institute of Southeast Asian Studies.
- Stark, M. T. Ceramic production and community specialization: a Kalinga ethnoarchaeological study. *World Archaeology*. 23 (1): 64–78.
- Steele, J. 1994. Communication networks and dispersal patterns in human evolution: a simple simulation model. *World Archaeology*. 26 (2): 126–143.
- Stopford, J. 1994. Some approaches to the archaeology of Christian pilgrimage. *World Archaeology*. 26(1): 57–72.
- Stringer, C. and R. McKie. 1996. *African Exodus: The Origins of Modern Humanity*. New York: Henry Holt.
- Sukhabanij, K. 1956. Was Nam Thom the first King of Sukhodaya. *Journal of the Siam Society*. 44(2): 139–144.
- Sukhabanij, K. 1957. The Thai Beach-Head States in the 11th-12th Centuries. *Silpakorn Journal*. 1(3-4): 1–19.
- Sukhabanij, K. 1958. Proposed Origin of the Siamese Thai. A lecture delivered at the U.S Information Centre, Bangkok, 23 January 1958.
- Takakusu, J. 1986. trans. *A Record of the Buddhist Religion as Practised in India and the Malay Peninsula (AD 671–695) by I-Tsing*. Oxford: Clarendon Press.
- Tattersall, I. 1999. Rethinking Human Evolution. *Archaeology*. 52 (4): 22–25.
- Terwiel, B. J. 1978. The Origin of the T'ai Peoples Reconsidered. *Oriens Extremus*. 25(2): 239–258.
- Tessitore, J. 1990. View from the East Mountain: An Examination of the Relationship between the Dong Son and Lake Tien Civilizations in the First Millennium BC. *Asian Perspectives*. 28 (1): 31–44.
- Thomas, K. D. 1993. Molecular Biology and Archaeology: a Prospectus for interdisciplinary Research. *World Archaeology*. 25 (1): 2–17.
- Tiemi, C. and Z. Yinyun. 1991. Paleolithic Chronology and possible Co-existence of *Homo erectus* and *Homo sapiens* in China. *World Archaeology*. 23(2): 149–154.
- Tosi, M. 1986. Early Maritime Cultures of the Arabian Gulf and Indian Ocean. S. H. A. A. Khalifa and M. Rice, eds. *Bahrain through the Ages: the Archaeology*. London: Routledge and Kegan Paul, pp. 94–107.
- Trigger, B. 1971. Archaeology and Ecology. *World Archaeology*. 2(3): 321–336.
- Trigger, B. 1990. Monumental architecture: a thermodynamic explanation of symbolic behaviour. *World Archaeology*. 22(2): 119–132.
- Twitchett, D. C. 1963. *Financial Administration under the T'ang Dynasty*. Cambridge: The University Press.
- Twitchett, D. C. 1965. Provincial Autonomy and Central Finance in Late T'ang. *Asia Major*. n. s. 11(2): 211–232.
- Twitchett, D. C. 1966. Chinese Social History from the Seventh to the Tenth

- Centuries. The Tunhuang Documents and their Implications. *Past and Present*. 35(3): 28–53.
- Twitchett, D. C. 1968. Merchant, Trade and Government in Late T'ang. *Asia Major*. n. s. 14: 63–95.
- Twitchett, D. C. 1970. Economic and Social Changes in T'ang and Sung China. in *Traditional China*. J. T. C. Liu and Wei-ming Tu, eds. Englewood Cliffs: Prentice-Hall Inc. pp. 38–41.
- Ucko, P. 1969. Ethnography and archaeological interpretation of funerary remains. *World Archaeology*. 1 (2): 262–280.
- Underhill, A. P. 1991. Pottery production in chiefdoms: the Longshan Period in northern China. *World Archaeology*. 23(1): 12–27.
- UNESCO. 1991. *China and the Maritime Silk Route*. Proceedings of the UNESCO Quanzhou International Seminar on China and the Maritime Routes of the Silk Roads. Quanzhou: Fujian People's Publishing House.
- Vallibhotama, S. 1984. The Relevance of Moated Settlements to the Formation of States in Thailand. *Southeast Asian Archaeology at the XV Pacific Science Congress: The Origins of Agriculture, Metallurgy and the State in Mainland Southeast Asia*. D. Bayard, ed. University of Otago Studies in Prehistoric Anthropology, Vol. 16, Dunedin, pp. 123–129
- Vallibhotama, S. 1989. Political and Cultural Continuities at Dvaravati Sites. *Southeast Asia in the 9th to 14th Centuries*. D. G. Marr and A. C. Milner, eds. Singapore: Institute of Southeast Asian Studies, pp. 229–238.
- Vallibhotama, S. 1990. *A Northeastern Site of Civilization*. Bangkok: Pinkanet Printing Centre.
- Vallibhotama, S. 1992. Early Urban Centres in the Chao Phraya Valley of Central Thailand. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P, and J. Villiers, eds. Bangkok: White Lotus, pp. 123–129.
- Van Heekeren, H. R. 1961. A Preliminary Note on the Excavation of the Sai-Yok Rock Shelter. *Journal of the Siam Society*. 49(2): 99–108
- Veraprasert, M. 1992. Klong Thom: An Ancient Bead-Manufacturing Location and an Ancient Entrepot. *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*. I. Glover, Suchitta P, and J. Villiers, eds. Bangkok: White Lotus, pp. 149–162.
- Vincent, B. 1988. *Prehistoric Ceramics of Northeastern Thailand with special reference to Ban Na Di*. Oxford: BAR International Series 461.
- Warmington, E. H. 1928. *The Commerce Between the Roman Empire and India*. Cambridge: Cambridge University Press. Revised ed. 1974. New York: Octagon.
- Warmington, E. H. and M. Carey. 1929. *The Ancient Explorers*. London: Methuen.

- Revised ed. 1963. London: Pelican.
- Watson, B. 1961. trans. *Records of the Grand Historian of China*. New York: Columbia University Press.
- Watson, W. 1970. The Chinese contribution to Eastern nomad culture in the pre-Han and early Han periods. *World Archaeology*. 2(2):139–149.
- Weisgerber, G. 1984. Makan and Meluha – third millennium BC copper production in Oman and the evidence of contact with the Indus Valley. *South Asian Archaeology 1981. Proceedings of the Sixth International Conference of the Association of South Asian Archaeologists in Western Europe*. B. Allchin, ed. Cambridge: Cambridge University Press, pp. 196–200.
- Weisgerber, G. 1986. Dilmun—A Trading Entrepot: evidence from historical and archaeological sources. *Bahrain through the Ages: the Archaeology*. S.H. A. A. Khalifa and M. Rice, eds. London: Routledge and Kegan Paul, pp.135–142.
- Welch, D. J. 1984. Settlement Pattern as an Indicator of Subsistence and Political Organization in the Phimai Region, Thailand. *Southeast Asian Archaeology at the XV Pacific Science Congress: The Origins of Agriculture, Metallurgy and the State in Mainland Southeast Asia*. D. Bayard, ed. University of Otago Studies in Prehistoric Anthropology, Vol. 16, Dunedin, pp. 129–149.
- Welch, D. J. and J. R. McNeill. 1990. Excavations at Ban Tamyae and Non Ban Kham, Phimai Region, Northeast Thailand. *Asian Perspectives*. 28(2): 99–123.
- Wheatley, P. 1961. *The Golden Khersonese*. Kuala Lumpur: Oxford University Press.
- Wheatley, P. 1961a. Sung Maritime Trade. *Journal of the Malayan Branch of the Royal Asiatic Society*. 32(2): 5–134.
- Wheatley, P. 1970. Archaeology and the Chinese City. *World Archaeology*. 2(2): 159–185.
- Wheatley, P. 1975. Satyanrta in Suvarnavdipa: From Reciprocity to Redistribution in Ancient Southeast Asia. *Ancient Civilization and Trade*. J.A.Sabloff and C. C. Lamberg-Karlovsky, eds. Albuquerque: University of New Mexico Press.
- Wheatley, P. 1983. *Nagara and Commandery: Origins of the Southeast Asian Urban Traditions*. Chicago, University of Chicago Press.
- Wheeler, R. E. M., A. Ghosh, and K. Deva. 1946. Arikamedu: An Indo-Roman trading station on the coast of India. *Ancient India 2*: 17–124.
- Wheeler, R. E. M. 1954. *Rome beyond the Imperial Frontiers*. London: Bell and Sons.
- Wheeler, R. E. M. 1966. *Civilizations of the Indus Valley and Beyond*. London: Thames and Hudson.

- White, J. C. 1984. Ethnoecology at Ban Chiang and the emergence of Plant Domestication in Southeast Asia. *Southeast Asian Archaeology at the XV Pacific Science Congress: The Origins of Agriculture, Metallurgy and the State in Mainland Southeast Asia*. D. Bayard, ed. University of Otago Studies in Prehistoric Anthropology, Vol. 16, Dunedin, pp. 26–34.
- White, J. C. 1990. The Ban Chiang Chronology Revisited. *Southeast Asian Archaeology 1986. Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*. Oxford: British Archaeological Reports (International Series), 561, pp. 121–129.
- Whitehouse, D. 1970. Siraf: a medieval port on the Persian Gulf. *World Archaeology*. 2(2): 141–158.
- Whitley, D. S. 1994. By the hunter, for the gatherer: art, social relations and subsistence change in the prehistoric Great Basin. *World Archaeology*. 25(3): 362–373.
- Whitmore, J. K. and K. R. Hall. 1976. *Explorations in Early Southeast Asian History: The Origins of Southeast Asian Statecraft*. Ann Arbor: University of Michigan Press.
- Wicks, R. 1992. *Money, Markets and Trade*. Ithaca: Cornell University Press.
- Wilén, R. N. 1989. *Excavations at Non Pa Kluay, Northeast Thailand*. Oxford: British Archaeological Reports (International Series), 517.
- Wilkinson, D. 1993. Civilizations, Cores, World Economies, and Oikumenes. *The World System: Five hundred Years or Five Thousand?* A.G. Frank and B. K. Gills, eds. London: Routledge, pp. 221–246.
- Wolters, O. W. 1967. *Early Indonesian Commerce: A Study of the Origins of Srivijaya*. Ithaca: Cornell University Press.
- Wolters, O. W. 1970. *The Fall of Srivijaya in Malay History*. Kuala Lumpur: Oxford University Press.
- Wolters, O. W. 1979. Khmer ‘Hinduism’ in the Seventh Century. *Early South East Asia: Essays in Archaeology, History and Historical Geography*. R. B. Smith and W. Watson, eds. 1979. New York and Kuala Lumpur. Oxford University Press, pp. 427–442.
- Wright, H. E. 1977. Environmental Change and the Origin of Agriculture in the Old and New Worlds. C. A. Reed, ed. *Origins of Agriculture*. The Hague and Paris: Mouton, pp. 281–318.
- Wright, H. T. 1978. Toward an Explanation of the Origin of the State. R. Cohen and E. R. Service, eds. *Origins of the State: The Anthropology of Political Evolution*. Philadelphia: Institute for the Study of Human Issues. pp. 49–5.
- Wright, M. 1992. Ayudhya and its place in Pre-Modern Southeast Asia. *Journal of the Siam Society*. 80(1): 81–86.
- Wyatt, D. K. 1975. *The Crystal Sands: The Chronicles of Nagara Sri Dhammaraja*.

- Ithaca: Cornell University Press.
- Wyatt, D. K. 1984. *Thailand: A Short History*. New Haven: Yale University Press.
- Yen, D. E. 1977. Hoabinhian horticulture? the evidence and the questions from Northwest Thailand. *Sunda and Sahul. Prehistoric Studies in Southeast Asia, Melanesia and Australia*. J. Allen, J. Golson, and R. Jones, eds. London: Academic Press.
- Yen, D. E. 1982. Ban Chiang Pottery and Rice: A Discussion of the Inclusions in the Pottery Matrix. *Expedition*. 24(4): 51–64.
- Ying-shih Yu. 1967. *Trade and Expansion in Han China: A Study in the Structure of Sino-Barbarian Economic Relations*. Berkeley and Los Angeles: University of California Press.
- Yoffee, N. and A. Sherratt. 1993. *Archaeological Theory: who sets the agenda?* Cambridge: Cambridge University Press.
- Yoffee, N. 1993. Too many chiefs? (or, Safe texts for the '90s). N. Yoffee and A. Sherratt, eds. 1993. *Archaeological Theory: who sets the agenda?* Cambridge: Cambridge University Press, pp. 60–78.
- Zeilin, R. N. 1994. Accounting for the prehistoric long-distance movement of goods with a measure of style. *World Archaeology*. 26(2): 208–234.
- Zurcher, E. 1959. *The Buddhist Conquest of China: the Spread and Adaptation of Buddhism in Early Medieval China*. Leiden: Brill.