
Reviewed by JADELYN J. MONIZ, University of Hawai‘i at Mānoa

The papers in this edited volume were first presented at the Seventeenth Pacific Science Congress in June 1991. The impetus for the 1991 symposium grew out of the groundbreaking and very successful Tenth Pacific Science Congress in 1961. In the 1961 symposium, titled “Man’s Place in the Island Ecosystem,” chairperson Raymond Fosberg gathered together a group of researchers who were applying the ecosystem concept to the role humans played in the environment. The focus of the papers presented at this symposium was the impact of humans on the environment during the early historic period. Topics centered primarily on issues in cultural anthropology.

In 1991 the Pacific Science meetings returned to Hawai‘i. For this gathering the co-chairs and editors of this volume (P. V. Kirch and T. L. Hunt) revisited some of the very same topics and issues developed some thirty years before. They had several objectives for the 1991 symposium. The first was to update the information presented in 1961. Second, they wanted to go beyond the early historic period and look at the impact humans had on the environment in the distant past. Finally, Kirch and Hunt presented these topics from an archaeological perspective and discussed the contributions archaeology could make to this issue.

This edited volume contains twelve papers presented at the 1991 symposium. The first chapter by Kirch introduces the reader to the volume and gives a brief review of historical trends in the Pacific in addressing ecological issues. Kirch discusses how ideas such as the “Noble Savage” drove many of the early descriptions of the Pacific and skewed early scientific endeavors that emphasized the role of islands as “natural laboratories.” He goes on to outline the changing nature of scientific research in the Pacific and the recognition that humans greatly altered landscapes on the Pacific islands.

Kirch contends, as do the other authors in this volume, that islands are an excellent place in which to apply a historical ecological approach. They adopt the position that no place on earth was spared the effects of humans on the environment and that historical ecology is the best means to understand this change. The subsequent chapters carry on this theme and apply it to various islands in both Near Oceania (Australia, Bismarck Archipelago, and New Guinea) and Remote Oceania (Samoa, Cook Islands, Tahiti, Hawai‘i, and New Zealand). The result is a well-developed volume that presents interesting and stimulating research covering a wide range of subjects and cultural areas. Due to the required length of this review I chose to highlight one representative chapter from each. I chose each chapter based on personal knowledge of the topic area.
The growing research on prehistoric environmental change is evident in the number of chapters directly devoted to this issue (chapters 2, 3, 4, 5, 8, 9, and 12). The work on avifaunal extinctions in the Pacific has been pivotal in this arena. David Steadman (Chapter 4) reviews these records of avifaunal extinction highlighting the large number of extinctions occurring in the prehistoric period in a variety of island settings. This well-outlined, thorough piece emphasizes the advances in this area of research and the important role avifaunal extinction can play in our understanding of past change. His research has implications for the rest of the Pacific as well, where researchers are striving to understand the role of natural versus anthropogenic change.

To understand the role of humans in the environment, archaeologists must determine whether changes in faunal and floral taxa are a part of the natural process of extinction, or if this decline is increased by anthropogenic factors. Chapters 6, 7, 11, and 13 attempt to untangle these contributing forces. On Aitutaki, Melinda Allen (Chapter 7) found that three natural processes had significant effects on the island: sea-level change, sedimentation change, and “second-order” climate trends. Allen writes that these processes can impact both where humans choose to settle as well as what resources they will exploit and to what degree humans will exploit these resources.

A third area for which this ecological approach is useful to archaeologists is determining the timing of colonization and settlement. Chapters 6 and 8 in this volume are devoted to this topic. In Chapter 8, Patrick Kirch uses a three-pronged research effort to understand environmental changes on Mangaia in the Cook Islands. The archaeological, paleontological, and palynological methods applied by the author identified erosion and infilling of valley bottoms, a decline in fruit bats and birds, and the disturbance of the vegetation communities. The evidence for substantial impact to the environment is well established; however, the onset in relation to humans is still controversial.

Chapters 2, 6, and 11 consider the ability of an island ecosystem to support the introduction of humans. One of the key issues is the rate at which environmental change occurs. If islands are small and have fragile ecosystems, one would expect a sharp, rapid decline of the native fauna and flora. The question remains, however, as to whether all environments will respond to the impact of humans in this manner.

In Chapter 2, Jim Allen uses data from Australia and Melanesia to discuss the timing of the decline and extinction of the native flora and fauna. He contends that Pleistocene humans did indeed have some impact on their distribution, but the rate of change is still debatable. Disagreeing with the much touted “blitzkrieg” idea, he suggests human predators maintained a deliberate hunting strategy rather than a “conservation ethic.”

As scientists we must remember that environmental change and our research do not take place within a vacuum. Three chapters in this volume (Chapters 3, 5, and 8) address the effects environmental alteration can have on human populations in both the past and the present. Matthew Spriggs introduces a political element to the discussion of environmental change in Chapter 5 when he takes up the issue of interpretation. He poses the question of whether native clearing of forests for agriculture should be labeled as “degradation” or “landscape enhancement.” The information presented in this chapter is important for both archaeologists and non-archaeologists whose use of such data can have significant impact on the future of these islands.

Like Spriggs’ individual piece, the ideas and data presented in this edited volume will serve to shape future research in the region. The chapters in this volume blend together to form a cohesive piece of research. This volume is an important contribution to the growing literature on Pacific island ecology and is a must for Pacific island archaeologists and others interested in environmental change.

Reviewed by C. LORING BRACE, University of Michigan, Ann Arbor

People of the Great Ocean by Philip Houghton, long-time faculty member of the Department of Anatomy in the medical school at the University of Otago in New Zealand, is the most ambitious attempt so far to deal with the biological anthropology of the peoples of the “Remote Pacific,” the inhabitants of the islands to the east, northeast, and southeast of New Guinea—Polynesia—in contrast to those of Micronesia, due north and northeast, and also of those of Melanesia, along the northern shore and immediately to the east. As a compilation of biological information on the peoples of the Pacific, it is the most complete work available. As an attempt to make sense out of it all, it is almost a total loss. The assembling and processing of the information contained entailed so much work, and it is driven by so many good intentions that it is a shame to see where it all ends up. I feel an additional twinge of remorse because, in August of 1973, Phil Houghton generously made his entire collection of Maori skeletal material available to me for study, and this served as the basis for my own first steps in dealing with the biological anthropology of the peoples of the Pacific.

The strengths of the book lie in its descriptive portions. It begins with a fine geographic and ethnographic survey of the “Pacific world,” and continues with a description of the “physique” of Pacific peoples. The accounts of Captain James Cook and other early European observers are mined for their information, and quantities of anthropometric and osteometric data are assembled in tabular form. There is no better survey of such information. The conceptual limitations begin to become apparent in Chapter 3, “People and Environment,” and emerge full-blown by Chapter 5, “Models and Methodology.”

It is evident that Houghton is not comfortable with the implications of ethnological—and particularly linguistic—data, and the same can also be said of his grasp of the perspectives and mechanics of evolutionary biology. It is his thesis that the physique of the peoples of the Pacific has been shaped by the environment in which they are found today, and that these results “could have emerged within a few hundred years,” although he concedes that most analysts would want “a few thousand” (p. 175). The selective forces emphasized are those encountered in voyaging from one set of islands to another. The cold and perpetual damp, and the stresses associated with the actions of paddling, are invoked as the reasons why Polynesians are famously large and muscular with short legs and bulky chests and shoulders.

When Stephen Jay Gould and Richard Lewontin framed their famous critique of the “Panglossian Paradigm” nearly twenty years ago, this was precisely the kind of manifestation they had in mind. The model of the peopling of the Pacific, reinforced by linguistics, as “a grand but relatively recent movement of people out of Asia” is rejected as being “too simplistic and naive a concept to sensibly frame the human happenings through Oceanic prehistory” (p. 178). The linguistic evidence is regarded as speculative and “unprovable” and not in the same league as “the rather exact sciences” of physics, chemistry, and biology (p. 134). But what Houghton offers instead is a model that is even more “simplestic and naive.”

The biological and genetic data presented are all perfectly accurate, but there is one biological dimension that receives no attention at all, and a brief mention of that here can show the flaws in his ex-
pectations and treatment of all the others. That is the matter of skin color. There is no doubt that selection has affected the quantity of pigment in the human skin. From the picture presented by the time depth involved in the settlement of the western hemisphere from northeast Asia, it is apparent that 15,000 years cannot produce any obvious change in skin pigmentation. That being the case, the assumption that Houghton shares with John Terrell that selection produced Polynesians out of eastern Melanesians within the time available is simply impossible. Polynesian skin color is darker than that of temperate zone eastern Asia by just about the degree that the genetic evidence cited by Houghton shows that a Melanesian genetic contribution has been added to what is otherwise an Asian configuration. There is just no way that the degree of pigmentation characteristically visible in Melanesia and clearly the legacy of much longer than 100,000 years of selection in the tropics could have turned markedly lighter right there on the equator after only a couple of centuries or even three or four thousand years. The only possible explanation is that the ancestors of the Polynesians had to have resided in the temperate zone for a good 100,000 years prior to their entry into Oceania. Houghton does make mention of the odontometric model that runs parallel to skin color, and then dismisses it, suggesting that the selection for large "upper face and airway" reduced the size of the lower face and dentition (p. 147). In good Panglossian fashion, he suggests that the overgrowth of the body somehow actually caused the reduction of the dentition (p. 154). Houghton is aware that his picture of the skull as an integrated complex responding rapidly to selection is at odds with what we actually know about the genetic control of morphological elements and the picture of mosaic evolution that is emerging from the assessment of the human fossil record (p. 122), but his faith in the adaptive value of a whole configuration is such that he is unable to deal separately with those portions that actually are constrained by selection and those that are not.

He is quite properly suspicious of old-fashioned "racial" typology, but it has led him to overlook regional differences in configuration that have no particular adaptive significance but which can be demonstrated to survive in identifiable form for tens of thousands of years. At one point he does pose the rhetorical query that, if his in situ selection model for the production of Polynesian body form is wrong, "then where are these big pre-Polynesians back in Asia ... and why are they in defiance of biogeography?" (p. 175). If he had ever attended a sumo match in Japan, he would have seen the answer to that question right in front of him. Interestingly enough, the only two non-Japanese to have attained recognized ranking in the sumo ring have been from Samoa and Hawaii. Then if he were to examine the skeletal material of the Jomon in Japan, he would find exactly the same femoral curvature and limb proportions and exactly the same flattened cranial base and expanded upper facial airway that he associates with the selective environment of the island Pacific. It should come as no surprise that the published record shows that the Ainu and Jomon of Japan will cluster with Polynesians when their craniofacial measurements are compared with Chinese, Japanese, Australians, and other Pacific Rim populations.

In his admiration for the "exact sciences," he did note that one of the nineteenth century champions of measurement and accuracy, Lord Kelvin, disastrously underestimated the age of the earth in demonstrating metrically why Darwin had to be wrong (p. 141). Kelvin's problem was in his basic assumptions concerning the source of the heat within the earth. Houghton's problem is not in assuming that there was not enough time for Darwinian changes to occur by natural means. Instead it stems from vastly underestimating the time actually needed for those changes to take place. There is a literature dealing with such things as bone thickness and, yes, tooth dimensions, that has dealt with change through time in relation to changes in selective force intensity, although it is not mentioned in this volume. Morphological
changes of the nature of those discussed cannot occur in just a few hundred or even in a few thousand years. Ten thousand years is barely enough to record significant changes in tooth size, but changes in the kinds of configurations Houghton mentions do not even occur within the span of 30,000 years. The continuity from Cro-Magnon to living northwest Europeans is one example, but a more apt one would be to note that discriminant function treatment cannot distinguish the 30,000-year-old Choukoutien Upper Cave individual from the Jomon of Japan or the living Polynesians. Houghton will not go down as the Kelvin of the twentieth century, but his misperception of the length of the time and the nature of the selective forces needed to account for human biological change recalls Kelvin’s misperception of the geological and biological evidence analyzed and interpreted by Lyell and Darwin.


*Reviewed by Lamont Lindstrom, Department of Anthropology, University of Tulsa*

A colleague, a North Americanist book-collector, who saw this volume on my desk paused to praise its aesthetic appeal. The book, which surveys the arts of Vanuatu, is itself a work of art. It was compiled partly as a catalog (also published in French as *Vanuatu Océanie: Arts des îles de cendre et de corail*) to accompany an exhibition of art and artifacts from Vanuatu that is traveling between the Pacific and Europe during 1996–1998. But the volume is much more ambitious than an exhibition catalog. It is, as Christian Kaufmann suggests, a first contribution to an “awakening to the arts of Vanuatu” (p. 51).

The editors have defined “arts” broadly to include the well-known carvings and masks of north-central Vanuatu and plaited objects such as the “red money” mats of Pentecost and Ambae, but also music and dance, architecture and the aesthetics of space and language, rock art, and even taro-irrigation system design—“the largest pre-twentieth century artifacts in the archipelago.” This book covers a lot of ground. It offers detailed discussion and photographs of a range of art forms including slit gongs, masks, prehistoric and contemporary pottery, mats, tapa, female waistbands, haircombs, bamboo flutes, food knives, plates and bowls, food pounders, bamboo and cane ornaments, and sand drawings. Descriptive sections about particular art forms are situated among broader commentaries that provide overviews of Vanuatu’s history, archaeology, languages, and cultures.

Contributors include linguists, art historians, geographers, archaeologists, musicologists, and anthropologists—a large share of the global community of Vanuatuists (if that can be a word) who specialize in the study of this archipelago. Staff from Vanuatu’s National Cultural Center have also written for the volume. Ralph Regenvanu, Director of the Cultural Center, for example, offers an important introduction to the contemporary art scene in Port Vila and Luganville. Kirk Huffman, a previous director of the Cultural Center and the leading expert on Vanuatu’s material culture, provides much of the volume’s expository core. Huffman draws on his close knowledge of the archipelago’s artistic traditions in writing descriptive summaries of Vanuatu’s masks and headdresses, waistbands, tapa, hair combs, flutes, food knives, plates, bowls, pounders, ornaments, and sand drawings. Huffman also provides a history of the Cultural Center’s renowned local field-worker program and of its archives of audio-visual records of Vanuatu cultures.

The Réunion des Musées Nationaux in Paris and the Museum für Völkerkunde in Basel, Switzerland, were the principal insti-
tutions in the development of the traveling exhibition. Accordingly, pieces featured in the volume—some dating back to the 1890s—come mainly from European collections and not from North America or from the collections of Vanuatu's own national museum. Basel's Museum für Völkerkunde, the Musée de l'Homme and the Musée National des Arts d'Afrique et d'Océanie in Paris, the Musée d'Aquitaine of Bordeaux, Cambridge University's Museum of Archaeology and Anthropology, and other European museums contributed most of the pieces the volume features. The Basel items come principally from a collection made by early Swiss ethnographer Felix Speiser, who undertook research in Vanuatu between 1910 and 1912. The volume also features photographs of art in situ that Speiser took during those years. The book is lushly illustrated with maps, graphics, and vivid photographs throughout. (And at least two of the volume's editors can be spied in a photograph, on p. 289, of the 1994 meeting of Cultural Center fieldworkers in Port Vila.)

With 105 or so languages, Vanuatu has a good claim to be the most linguistically complex place on earth, and its people appreciate and skillfully elaborate artistic variation and difference as well as linguistic. Volume authors document the relations between local and personal identity and artistic style. Many motifs and styles belong to certain families associated with particular villages and regions. A traditional system of copyright protects rights to reproduce these forms and motif variations. Only certain people, for example, may legitimately trace out one or another sand drawing, and only certain artists can carve slit gongs with a certain style of arm. In the north-central part of the archipelago, men and women acquire rights to stylistic elements as they pursue a series of honored titles within "graded societies." Each of these titles authorizes a title-holder to display a variety of body ornaments and ritual paraphernalia of the sort that European museums have collected as island "art." This copyright system also controls the public rehearsal of local myths, songs, and stories, maintaining vital connections between each place and its artistic archive.

Art in Vanuatu is local and signifies personal identity and title rights, yet it also links places together. Traditional copyright holders may sell or otherwise exchange the artistic elements they control. Such exchange has brought into being nexuses of localities that are linked by shared rights to the same artistic elements. Darrell Tryon and Kirk Huffman trace connections between Vanuatu's chains of dialects (wherein people share words) with trade networks through which they exchange stylistic elements alongside a variety of other goods. Several contributors also discuss the emerging place of art within constructions of Vanuatu national identity. Mary Patterson, for example, traces how the Ambrymese version of the slit gong has become standardized in nationalist iconography.

Other contributors focus on relations between art style and production and gender identity. Margaret Jolly suggests that European explorers, missionaries, and ethnologists concentrated on the carvings and masks that men create, overlooking the cultural significance of the less plastic art forms of women. Annie Walter and Lissant Bolton partially redress this bias with detailed analyses of the beautiful, mostly female-produced, dyed mats of Pentecost and Ambae.

Many volume contributors speak of artistic continuity, change, and possible revivals of now-abandoned forms and styles. Everyone celebrates the vitality of Vanuatu's traditional arts, although some worry about the effects of contemporary economic forces, including tourism, on those traditions. Christian Coiffier, more positively, suggests that tourism development could give new life to the archipelago's traditional architectural styles. But art in Vanuatu serves more than the tourist marketplace. It maintains its notable richness and vivacity because it functions locally to celebrate the diversity of Vanuatu's people and places as well as the important connections between them.
Professional archaeological excavations on Easter Island started in the 1950s. Since then, the main research has focused on the ceremonial structures and the coastal area, but in this volume excavations of sites in the upland area are presented. The excavations were carried out in 1989, 1992, and 1993 with the aid of Earthwatch volunteers. This project is to be seen as a continuation of earlier work performed by Christopher Stevenson concerning social organization and dating with the aid of the obsidian hydration method on Easter Island.

The volume is divided into 7 parts and has two appendices. In the introductory part the general framework for this study is outlined and in the second part the survey of the upland area of Maunga Tari and the research hypotheses of this project are presented. Parts 3 through 6 deal with the presentation and description of the various excavated sites and different analyses of the recovered material remains. Finally, in part 7 the results of the excavations are summarized and the hypotheses are evaluated. In Appendix I a site description of the project area is presented and in Appendix II an inventory of artifacts is found.

The framework for this study is set in part 1 by presenting earlier research concerning the Easter Island settlement system. Site typologies have been developed in earlier research, but Stevenson indicates the lack of representative regional samples and temporal components.

A preliminary settlement model with five different phases is suggested by Stevenson, extending in time from A.D. 700-1868: phase 1 (A.D. 700–1100) settlement and adaptation, phase 2 (A.D. 1100–1425) expansion and development, phase 3 (A.D. 1425–1680) chiefdom integration, phase 4 (A.D. 1680–1750) warfare and fragmentation, and phase 5 (A.D. 1750–1868) post-contact decline. He postulates that the initial population was 50–150 people who competed for the land and resources, and at A.D. 1100–1200 the culturally dependent changes of the environment caused declining productivity, which led to cooperation between groups. At A.D. 1350–1680, the most complex societal development occurred with a hierarchically organized chiefdom of two to three levels of chiefly ranks. This developed through a long process of competition and cooperation between groups and factions. He suggests that five general trends are reflected concerning the settlement pattern over time: environmental deterioration, population growth and decline, agricultural intensification, centralization and segmentation, and the emergence of hereditary status.

One of the hypotheses set forth by Stevenson concerning the Maunga Tari upland complex is that the prehistoric remains there reflect the intensification of agriculture between A.D. 1425 and 1680. Another hypothesis is that it represents production beyond the household level that was managed by elite personnel during short-term occupations, followed by abandonment by A.D. 1680. The area had been previously surveyed and mapped by the Universidad de Chile, but because site descriptions not were made available, the area was resurveyed by Stevenson.

Five different sites were chosen for excavation: two house sites, one agricultural site, a water diversion site, and a ceremonial site. The first house site, 10-241, showed a disturbed pavement of flat, irregular stones with several subsurface structures, which
were dated to c. A.D. 1200–1500 by 14C and obsidian hydration. Tool manufacturing was limited and microwear analyses indicated that the tools found were used mainly for scraping sweet potato or other tubers and cutting plants. The prehistoric remains at this site indicate short-term occupation and activities connected to planting, harvesting, and processing plants.

Site 10-242 was a large stone wall enclosure containing several stonelined circles for planting. Agricultural activities were indicated from A.D. 1179 to 1715 (obsidian hydration date) but the stone circles represented the last agricultural effort at the site. It was not possible to identify physically which plants were cultivated at this site. Few artifactual remains were found, but a shaped basalt artifact with a lid was interpreted as a tinder box for transporting fire, thus far unique for Easter Island.

A little further down slope was site 10-243, an alignment of stones excavated and interpreted as a water diversion channel. This is a feature not previously known to Easter Island. It was dated to A.D. 1344–1489 (obsidian hydration date).

Site 10-244 was interpreted as a rectangular house with a foundation of worked stones (paenga) and a pavement that covered most of the artificially dug-out terrace that formed the platform to the house. The house foundation was disrupted by a second occupation. Its proximity to a ceremonial structure and the attributes of the worked stones suggests that it was occupied by priests or other religious personnel. The occupation of the site may have occurred between A.D. 1254 and 1615 (obsidian hydration date). It is suggested to be seasonal occupation and the second use of the site is associated with cultivation, probably occurring at the end of the sixteenth century.

The last site excavated, 10-246, was interpreted as a small partly destroyed ceremonial structure (ahu). A statue (moai) probably had been associated with the structure and in the excavation a head-gear of a statue (pukao) was found. Uncut basalt stones set on edge defined a crematorium with cremated human and chicken bones. Small obsidian discs found in the crematorium indicate that wooden figurines may have been offered here. Stevenson suggests that this inland shrine coexisted with the agricultural complex of Maunga Tari and the priest house. The date is set at the late twelfth century and early fifteenth century, and secondary activity, which includes destruction of the site, is indicated at early A.D. 1600 (obsidian hydration dates).

Stevenson concludes that the upland area first was used around A.D. 1100 and more intensively occupied at A.D. 1425 and abandoned in the late A.D. 1500s. He also asserts that the archaeological data verify his initial hypothesis that agriculture was intensified between A.D. 1200 and 1600. The Maunga Tari area was a desirable location for cultivation, which was managed by elite personnel. Stevenson also indicates that the general model presented in the beginning of this volume is supported by the results.

Stevenson clearly shows that he has a solid knowledge of Easter Island prehistory, but to obtain a wider platform for interpretation concerning agricultural activities and settlement patterns it would have been favorable to discuss and compare similar problems in other parts of the Pacific area. This also pertains to the theoretical discussion with the outline of the settlement model.

There are some editorial problems with illustrations of varying quality, which convey the feeling of a preliminary report. However, it is excellent that the main part of the excavated features and sections are illustrated and described in detailed fashion. Even so, it would have added to this volume to use the data in a more extensive way and increase the number of prepared visual presentations. The lithic, microwear, and wood analyses add to the interpretation of the sites, but in the future it would be desirable to add pollen and phytolithic analyses as well.

Finally, I would like to end this review by stressing that this volume definitely fills a gap in the knowledge concerning Easter Island prehistory, and Stevenson makes a serious attempt to study changes in Easter Island prehistoric settlement in a contextual way.

Reviewed by C. Melvin Aikens, University of Oregon

This volume is based on a series of lectures delivered at University College, London, by Keiji Imamura, Professor of Archaeology at the University of Tokyo. It is a long-awaited work, presenting for the first time in English a book-length overview of Japan’s prehistory as viewed by an authoritative Japanese scholar.

Archaeology has long flourished in Japan, supported by strong provisions in law for the protection and preservation of the country’s cultural heritage. Japan’s phenomenal economic growth, with all the new construction that entails, has made rescue archaeology a nationwide job of huge proportions. The accumulated literature is even now incomprehensibly large, and continues to grow, with thousands of sites excavated and reported each year by a corps of archaeologists Imamura estimates at more than 5000. Indeed the thundering cascade of new data overwhelms the ability of the archaeological profession to synthesize it, and forces any attempt to provide an overall picture of cultural variation and development in Japan into a highly selective and summary mode. Nevertheless, in this work Imamura successfully presents an intriguing sketch of the country’s past, and one faithfully reflecting the focal interests and approaches of most Japanese archaeologists in their writing of prehistory.

Imamura describes the site of Iwajuku, north of Tokyo, as providing the first unequivocal evidence of a Japanese Paleolithic. Lithic specimens recovered from Iwajuku in the late 1940s, and from other sites soon after discovered, established a typological sequence leading from edge-ground stone axes through knife-shaped tools to leaf-shaped bifaces and then to microblades, which were followed by the first pottery. More recent work has extended the Paleolithic time scale back to perhaps 500,000 years ago, though Imamura does not discuss the controversial nature of some of the earliest claims.

The typological emphasis so central to paleolithic studies is also strong in the archaeology of later times. In an extended discussion of chronology, the author makes clear the dominance of pottery typology in Japanese archaeological periodization. Indeed pottery-based chronologies are so firmly established in archaeological practice that even today 14C and other modes of dating are decidedly secondary as bases for assigning archaeological time in any of the ceramic periods (which span the entire Holocene in Japan).

The remarkable stability of Jomon settlements and various aspects of Jomon subsistence economics are addressed in several chapters. During the earliest Jomon, hunting tools such as projectile points are numerous compared with grinding stones, pitted stones, and hammerstones used in vegetal food processing. Soon these proportions are reversed, and it is clear that plant as well as animal foods were central to Jomon subsistence. Fish hooks and gorges, as well as shells and bones from shoreline middens, indicate the early and continuing importance of littoral and marine species in the diet. Sea-level transgression over much of the Tokyo area during the middle Holocene is reflected by the distribution of Jomon shell midden sites in many places now distant from the Tokyo bay shore. Similar transgressions are also indicated at Osaka Bay and elsewhere.

Imamura devotes a fascinating chapter to pit traps and Jomon hunting, drawing on his own leading research into this topic. The remarkable prevalence of these small, narrow excavated traps around human occupation sites in Japan is surprising; Imamura found 116 of them in his early research at the site of Kirigaoka (in Yokohama City) alone, and more than 10,000 such traps were discovered by extensive rescue excavations in the 30 km²
area of Tama New Town in Tokyo's western suburbs. Others are now known from sites throughout the country. Imamura believes that wild boar were the most probable target prey, as reflected in surviving folklore about pit-trap hunting in Japan, but of course deer and other small animals might have been taken as well.

Around the fifth century B.C., wet-rice agriculture began to appear in Japan, along with bronze and iron tools of Korean make. Within a very few centuries a new Yayoi cultural pattern dominated southwestern Japan and was spreading rapidly northward. To what degree Korean immigration was responsible for this spread, and to what degree indigenous Jomon populations took up and propagated the Yayoi way of life, are two of the major questions of Japanese archaeology. Imamura discusses possible routes of diffusion, paddy-field features, changes in pottery types, and the importance of Yayoi culture to modern Japanese tradition. He devotes a chapter to racial questions about Jomon and Yayoi peoples, favoring an accounting in which significant but not overwhelming numbers of immigrant Koreans fostered a new and highly successful agricultural way of life that was soon taken up by indigenous Japanese (Jomon) peoples. In his view, because population growth was obviously rapid among an early Yayoi agricultural populace that initially included a substantial proportion of immigrants, the Korean contribution to later Japanese population genetics became substantial without there ever having been a massive migration into Japan.

Social stratification, political unification, and Japan's entry into international relations with Korea and China grew throughout the Yayoi and succeeding Kofun (tumulus) period, the process emerging into written history via early Chinese chronicles. Warfare became increasingly prominent within Japan, as archaeologically attested by weaponry and fortifications, and the chronicles mention Japanese diplomatic missions to Chinese commanderies in northern Korea. A Chinese account of the kingdom of Yamatai, in the land they knew as Wa, describes in telling detail a socially stratified and politically fractious society that existed in Japan around the third century A.D. The location of Yamatai, whether in Kyushu (a view favored by historians) or in the Kyoto-Nara-Osaka region traditionally called Yamato (a view favored by archaeologists), remains a matter of debate to this day, and Imamura eschews a definite conclusion. The matter of precise location aside, however, the Chinese account fits the Japanese archaeological evidence very well.

This has been a selective account of a book that is itself necessarily a selective account of the whole of Japanese prehistory. Imamura's work will whet the readers' appetite for more, and there is much more—a growing range of information on architecture, settlement, paleoenvironment, human ecology, and other topics only lightly touched in the present volume. In-depth study of course requires use of the Japanese language, but there is also a growing literature in English, by both Japanese and other scholars, that readers intrigued by Imamura's introduction might turn to for additional clues.


Reviewed by A. CATHERINE D'ANDREA, Simon Fraser University

This book is the fourth volume in a series reporting on the excavation of Khok Pha-
the 1985 excavations. A main goal of the project was to examine prehistoric subsistence and human adaptations to tropical lowland coastal ecosystems in Southeast Asia. This volume is written primarily by Jill Thompson, and details the study of macroscopic plant remains (seeds and wood charcoal). Two additional chapters are included at the end, one on phytoliths by Lisa Kealhofer and Dolores Piperno, and another dealing with micromollusc remains by Graeme Mason. It is worth mentioning that pollen data associated with this project have made a strong circumstantial case for the presence of agriculture in the region during the fifth millennium B.C. (Maloney et al. 1989). However, the evidence for Khok Phanom Di occupations, and most archaeobotanical data discussed in this volume, date to the second millennium B.C. This book will be of particular interest to environmental archaeologists because of extensive detail provided in description of methodology and procedures, but general conclusions reached have implications for ancient subsistence and rice domestication in Southeast Asia. Chapters are well-written and documented with excellent illustrations, photographs, and micrographs.

Prior to the completion of this study, comprehensive paleoethnobotanical studies based on Southeast Asian archaeological sites were, with a few notable exceptions, virtually nonexistent. Building on the work of Yen (e.g., 1977, 1982) and White (e.g., 1989), one of Thompson’s main contributions is demonstrating that flotation sampling for plant remains in the seasonally wet tropics can produce valuable results. Furthermore, this project is a good example of what can be achieved when there is a concerted effort and funding support for archaeobotanical research within the context of an excavation. Indeed, Thompson’s hope (p. 207) that these results will encourage the inclusion of archaeobotany in archaeological research designs for Southeast Asia is strongly echoed in this review.

Chapters I and II consist of brief introductory remarks by the editors on archaeological contexts, and by Thompson on archaeobotanical goals and approaches. Most results presented in this volume are based on one season of excavation which focused on one 10 x 10 m square. Flotation sampling was directed by Thompson, who also undertook ethnobotanical and ethnoarchaeological fieldwork during an eight-month period in 1986–1987. The volumes published to date are specialist reports, and all data will be integrated in a planned final Volume VII (no mention is made of the contents of Volume V).

The ethnobotanical work is detailed in Chapter III. It involved the collection of herbarium specimens from several different habitats, emphasizing species of economic importance, as well as wood samples. Establishing these kinds of collections is a critical first step to facilitate the identification of archaeological plant remains, particularly in regions that have not previously been the focus of intensive archaeobotanical research.

The recovery, identification, and analysis of wood charcoal and noncultigen seeds/fibers are described in Chapters IV and V, respectively. Seeds were recovered by flotation, while wood charcoal specimens were selected from hand-picked samples. It is not clear why hand-picked samples were chosen for analysis rather than subsampling charcoal recovered from flotation fractions. This latter strategy may have minimized sampling bias and taphonomic problems. A useful preliminary wood identification key is developed, and seeds are found to be more indicative of local habitats than economic preferences. The charcoal and seed data support the ecological reconstruction of Khok Phanom Di provided by pollen, phytolith, mollusc, and other biological remains of a shift through time from mangrove/saltflats to dryland freshwater riverine habitats farther removed from the sea.

Studies on rice, which is the only plant food recovered at Khok Phanom Di, are discussed in Chapters VI and VII. Ethnoarchaeological investigations on modern rice processing are presented in Chapter VI, while the following chapter outlines studies carried out on archaeological rice. The ethnoarchaeological work is based on
direct observation and farmer interviews, supplemented by recent geographical and anthropological investigations, as well as nineteenth century travelers' accounts. The result is a model of considerable utility to those interested in the interpretation of archaeological rice remains in Asia. A detailed sequence of processing is outlined from harvesting to the production of clean grain, and this leads Thompson to conclude that rice was cultivated and processed locally at Khok Phanom Di. The archaeological rice, which consists mainly of husk fragments, is thought to represent temper used in pottery making, and as such, it may be worthwhile at some point to extend the ethnoarchaeological model to include observations of ceramic production involving the use of chaff as temper. Studies on archaeological rice also examine the problem of distinguishing wild from domesticated species. In this regard, Thompson provides a comprehensive discussion of morphological traits useful in distinguishing wild from domesticated species, with a view to producing widely applicable archaeobotanical criteria. Qualitative rather than quantitative differences are found to be the most diagnostic features for rice husks, and she strongly cautions against the use of husk surface topography attempted in previous studies. Thompson concludes that some and probably most of the Khok Phanom Di remains are of a domesticated rice, but she points out that the majority of husk remains lacked critical features that would clearly indicate the presence of a domesticate.

Interpretations and conclusions relating to archaeobotanical evidence for site ecology, subsistence, and the changing environments of Khok Phanom Di are outlined in Chapter VIII. One of the most critical points arising from this discussion, and one that could have been explored in more detail, relates to implications for general theories proposed on early agrarian economies in Southeast Asia. Thompson concludes that theories pointing to deltaic regions as source areas for rice domestication (Higham 1984) are in need of re-evaluation. She argues convincingly that early attempts at rice cultivation were more likely carried out in inland riverine localities. Thompson also throws into question the idea of an environmental stimulus prompting the development of rice cultivation—in this case, a drop in sea level causing coastal populations to be removed from their food sources, such as stands of wild rice (Higham 1984). At Khok Phanom Di, domesticated rice is present both before and after an episode of sea level decline. These important issues warrant further discussion, which one hopes will appear in the final volume of this series.

Chapters IX and X deal with phytoliths and gastropods, respectively. Phytoliths document the presence of domesticated rice at Khok Phanom Di by c. 2000 B.C., and as in the pollen evidence, there are indications of agricultural activities in the area by at least the fifth millennium B.C. These results and those of related phytolith research programs (e.g., Pearsall et al. 1995) indicate that future applications of these techniques will almost certainly alter current thinking on the origins of rice domestication in Asia.

Two points regarding the general organization of this volume should be made; however, these observations in no way detract from the overall scholarly achievements of the authors. The first issue is the absence of proper concluding statements for some sections. Several chapters, in particular III, IV, and V, end with lists of species or identifications. While these are important data, they should be left to an appendix or an earlier section. Their placement at the end of the chapters, where a general summary statement would have been more appropriate, tends to detract from the continuity of the book. Another editorial matter relates to the inclusion of the final two chapters on phytoliths and micromolluscs. They seem curiously out of place in this volume, and this has lead to some minor editorial inconsistencies, for example, the brief discussion of phytoliths in Chapter VII seems redundant and somewhat out of date compared to that provided in Chapter IX. It may have been preferable to group phytoliths with other microscopic...
botanical remains and micromolluscs with other zooarchaeological data.

One issue arising from Thompson’s thorough study that merits further exploration is the nature of archaeological contexts sampled at Khok Phanom Di, and the resulting implications for recovered macroscopic plant remains. Because of time constraints, midway through the excavation it was decided that flotation sampling would concentrate on general occupational debris rather than defined features. In addition to burials, the features are mentioned briefly as pits and “architectural features suggestive of houses” (p. 221). Consequently, sampled deposits seem more akin to refuse or middens. This could partially account for the nature of Khok Phanom Di rice remains, which are by-products of processing, and may also explain the observation that rice is the only unequivocal food plant recovered at the site (p. 210). In future investigations, it may be worthwhile to target domestic and related contexts to recover evidence of different stages of rice processing, as well as the remains of additional food plants. It is interesting to note that whereas Khok Phanom Di rice remains are secondary products of processing rather than prime grain, a completely different pattern is indicated in recent paleoethnobotanical studies of Jomon domestic contexts in northeastern Japan (Crawford 1992; D’Andrea 1995). Virtually all rice recovered from these pithouse floors consists of charred naked grains with no husk or stem fragments. Given that variations in processing practices are not pronounced among climatic regions of Asia, where rice is almost always stored as complete spikelets (pp. 142, 145), Thompson’s model supports the view that rice recovered from these Jomon household contexts are remnants of a late stage in processing, possibly the result of cooking accidents.

Although some may criticize the abundance of methodological detail presented in this book, it is important to note that unlike areas such as the Near East, Southeast Asia has not had the benefit of several decades of archaeobotanical work to build upon. In this regard, the Khok Phanom Di archaeobotanical study is something of a pioneer work, and valuable interpretations are generated despite the limited area excavated. It will take years of dedicated research begun by Yen and continued by Thompson and others to reach a level of knowledge approaching that achieved with more than 30 years of similar investigations in the Near East. The work presented in this book certainly represents a significant step in that direction.

REFERENCES


YEN, D. E. 1977 Hoabinhian horticulture? The evidence and the questions from northwest Thailand, in Sunda and Sahul: Prehistoric Studies in Southeast Asia,
The people who created the classical civilizations of Southeast Asia were intent upon harmonizing their earthly kingdoms with a heavenly order. In addition to designing religious monuments meant to represent a mythological cosmos, classical Southeast Asian civilizations knew something about the real nature of the heavens. References to about forty different stars and numerous constellations appear in inscriptions. Ritual calendars required complicated calculations to predict lunar phases.

The book under review suggests that the ancient Khmer went to an even greater extent than has yet been acknowledged to ensure that their religious monuments mirrored macrocosmic reality. The author argues that Angkor Wat's dimensions and ground plan were determined by complex numerology reinforcing the correlation between the kingdom, the king, and heavenly order.

The book is well-written given the technical nature of much of the argument, and has been very well produced. The numerous figures and illustrations are almost always presented on the same page as the related text, a rare boon that assists enormously in following the complex argument. A slightly disagreeable error is the consistent use of “fit” as a past participle instead of “fitted.”

The discussion of the Khmer political system and the “devaraja cult” notes Kulke's (1974/1978) article on the subject (although it is omitted from the bibliography, it is cited in footnote 23, p. 302) but disputes his conclusion that this cult was relatively unimportant. Mannikka argues instead that the cult object “occupied a place of supremacy among all the territorial and ancestral gods” (p. 6). Similarly, she does not discuss the possibility that the deification of Khmer kings evolved gradually. It was long asserted that deification of Southeast Asian rulers was a result of Indianization; evidence suggests that this concept probably appeared in Cambodia in the early tenth century, with the advent of a usurper.

The nature and role of kingship are peripheral to the book's main thesis: that numerological and astronomical considerations played a dominant role in the design of Angkor Wat. It is clear that numbers of some elements at Angkor Wat were symbolic. For example, the bridge across the western moat depicts the churning of the sea of milk by the gods and demons (asuras). There are 54 statues of gods and 54 of asuras, giving a total of 108. This number was significant in pan-Asian symbolism. Examples of the use of 54 + 54 = 108 at Angkor Wat are not numerous, however. The key element in Mannikka's argument for numerology's influence on the design of Angkor rests on her contention that dimensions of various architectural components were determined by the desire to use symbolic numbers of units of length. This hypothesis depends on an accurate determination of the basic module used to lay out the monument. This module the author identifies as a cubit of 43.545 cm (p. 18), derived from measurements of axes and circumferences of elements of the complex. This procedure gives cause for concern, because such a method is subject to circular reasoning. A more thorough explication of the calculations that led to this
determination would be desirable. [For an example of a method by which the length of a cubit for another classical Southeast Asian structure was determined, see P. Lordeareu, “La coulée indo-javaise,” in Candi Sewu et l’architecture bouddhique de centre de Java, by J. Dumarcay (Paris: Publications de l’École Française d’Extrême-Orient, Mémoires Archéologiques xiv, 1981: 45–73).]

Mannikka argues that many measurements at Angkor Wat contain solar or lunar symbolism. Only a few examples can be given here. The outer enclosure can be calculated to measure 354.36 units, approximately the number of days in a lunar year. The method by which this measurement was obtained is as follows (p. 86): length of lunar year (354.3671 days) \( \times \) 24.007 cubits (the half-months of the lunar year). This explanation is extremely inventive, but is it indicative of ancient Khmer design? Furthermore, this calculation only works if one includes the east-west measurement of the axis of the western entrance chamber, which is not part of the circumference measurement.

The author concludes that at Angkor Wat distances around structures contain lunar symbolism, while distances along axes symbolize the sun (p. 66). The author further suggests that lunar and solar elements are in opposition to one another, “often symbolized at Angkor Wat by Garuda holding or fighting with two nagas.” This image could also refer to another legend concerning the *amerta* or elixir of immortality churned from the sea of milk. Garuda had to ransom his mother from the nagas by stealing the *amerta*. In Indonesian monuments this relationship between the nagas, Garuda, and *asura* was common. The emphasis on *amerta* at Angkor would seem to make this association a possible explanation for this motif’s popularity here, too.

The two halves of the western bridge can be made to total 431.07 cubits in length if the area of the central staircases is omitted. This figure is held to symbolize the 432,000 years in one kali *yuga* or dark age. The other three *yugas* in a cycle of rise and fall of an age are postulated as being symbolized by other distances. It seems difficult to accept such a concept; the distances have no fixed starting or ending points, and overlap with one another. The *kali yuga* area, for example, would simultaneously lie half in the *krta*, half in the *treta yuga*.

The author discerns astro-numerological symbolism in the content of the narrative reliefs. For instance, although the naga balustrade consists of 54 *asuras* and 54 gods, the bas-relief on the third gallery depicting the same act of churning the sea of milk shows 91 *asuras* and 88 gods. The gallery in which this relief is found is oriented in a north-south direction. The author interprets this as evidence that the 91 *asuras* represent the number of days between the autumnal equinox and the winter solstice, the 88 gods on the north standing for the number of days from the vernal equinox to the summer solstice (p. 37).

The relationship between the relief of the churning of *amerta*, the coronation of Suryavarman II, and the start of a “golden age” as Mannikka notes was posited by B. P. Groslier. She then proceeds to argue that this equation is in turn related to equinoxes and solstices. Evidence adduced in support of this opinion is the fact that the sun rises over certain gateways on a certain date when seen from a certain point on the western bridge.

It is also suggested (pp. 111–112) that the lengths of the axes in the third gallery symbolize dates: the installation of the Visnu image that once probably occupied the central chamber, the coronation of Suryavarman II, the founding of Angkor Wat itself, and Suryavarman II’s birth. There is no independent evidence that any of these events occurred on these dates, or that birth years were considered to be very important in ancient Southeast Asia, nor is there any other example of the use of a number of images to signify a date. Furthermore, it is highly unlikely that the designers of Angkor Wat, had they finished their work in 1038, could have foretold the precise date on which the future statue of Visnu would have been completed, if this event indeed took place 10 years later.
In order to view the major relief series on the third gallery at Angkor Wat in sequence, the visitor must circumambulate the monument in a counterclockwise direction, contrary to the pradakshina pathway common in earlier Southeast Asian monuments. Mannikka suggests that this feature can be perceived as a representation of solar movement through the year (p. 129). But here, too, there are alternative explanations. In Java, for example, in the thirteenth century, temple reliefs also began to require the visitor to move in the counterclockwise direction. This procedure, known as prasawiya, seems to have been connected with the increasing influence of tantrism.

Mannikka suggests that a statue of Brahma once stood in the center of the preau cruciforme, a major building west of the main tower of Angkor Wat. It is no longer possible to determine what statue (if any) stood in the center of this structure, but other candidates such as Garuda should at least be considered. The manipulation of circumambulation routes plays a vital role in the argument. The path measurements used always assume that each image was only circumambulated once. In fact, it was quite common to circumambulate images and structures as many as seven or more times. This possibility and its effects on measurement numerology are not considered.

Archaeoastronomy has been under development for some time, but has been hampered by epistemological problems stemming from the difficulty of deciding whether certain properties of ancient monuments were intentionally designed or merely fortuitous. One of the main concerns must be the verifiability of arguments in support of the hypothesis that numerical and astronomical coincidences at Angkor were intentionally created. Can one evaluate the probability that correspondences were (a) intentional, and (b) had the meanings which she attaches to them? Can one go beyond the realm of possibility into measurable probability? This book's argument, it must be concluded reluctantly, does not meet these criteria. Often "suitable" numbers can only be obtained by ingenious methods. If lunisolar phenomena were indeed a basic part of the monument's meaning, one might expect to find more parallelism between the symbolism of the measurements and other features such as relief carvings on the walls. For example, if measurements were used to suggest transitions from one yuga to another on the monument, as a visitor crosses from one to another, why are these transitions not more clearly emphasized? Without independent sources of confirmation, it is difficult to accept these arguments.

The author acknowledges that not all dimensions of Angkor Wat can be explained by reference to astronomical or numerical principles. Some other concept in addition to "significant numbers" must have been used by the designers of the complex. What other principles did they use to fix dimensions? No doubt a desire to maintain symmetry and balance was an important consideration. The interpretation of the number 32 provides an example. There are 32 gods in the western entrance of the third gallery; there are 32 false windows, 32 hells. The preau has 32 pillars. But 32 is a handy number, because it is simply two to the fifth power.

In conclusion, this book represents a brilliant but misguided effort. Mannikka has identified many suggestive coincidences in the numbers of countable items and measurements, but fails to develop a method by which we can evaluate the probability that they are anything other than coincidental.

She does make one important contribution to the study of classical architecture in Southeast Asia. Despite the caveats expressed here, some overall concept like the one Mannikka envisions probably was used to determine the dimensions and numbers of elements of these complexes. Her discussion demonstrates the complexity of the variables involved, and the difficulties entailed in reconstructing their symbolism. Probably the architects of Angkor would not have simply made up dimensions without some system behind them. The exposition in this book can be read as an example of how the system may have been arrived
at, rather than a blueprint of what must have occurred.

Further attempts to understand the system of numbers and measurements in ancient Southeast Asian buildings should attempt to discover a simple underlying system which would demonstrate that the whole complex was designed to be “read” in numerological terms, a single overarching concept that architects employed to decide how large to make the various parts of their edifices. Other bases for the overall paradigm in addition to astronomical phenomena should also be considered.

The author’s obvious enthusiasm for the subject has led to the creation of a fascinatingly complex theory. If it could be supported with more outside data, it would be a pleasure to be able to accept it.