

## History of Archaeological Study in the Mariana Islands

MIKE T. CARSON

*Micronesian Area Research Center, University of Guam, Mangilao, GU, 96923*

**Abstract**—Archaeological research has occurred for more than one century now in the Mariana Islands, and it naturally has undergone numerous changes in both thought and practice. A comprehensive historical view allows some insight into how archaeology has developed technically and theoretically, as well as how it has addressed various significant topics. The present overview intends to support intellectual contextualization of past, current, and future research.

### Introduction

While archaeology as a discipline evolved in different countries and at a global scale over the past several decades (Trigger 2006; see also Hodder 2001; Johnson 2010), some but not all of the same changes in thought and practice occurred within the Pacific Islands region. Within the Pacific Islands region, again some but not all of the same changes were manifest in local Mariana Islands studies. Generally, scholarly trends in the Pacific region have been about 20 years behind the global scene, and research specifically within the Marianas mostly has lagged slightly more. In addition, by the time these new concepts and perspectives are applied in the Pacific (and usually somewhat later in the Marianas case), they already have undergone some change for better or for worse.

The history of archaeological study in the Marianas has been shaped to some extent by imposed governments and world events, creating both opportunities and constraints for foreign and local researchers alike. Following Magellan's landing in 1521, Legaspi's official claim of the Marianas for Spain in 1565, and intensive missionary and military efforts in the late 1600s, the Spanish government controlled the Marianas region, but archaeological study was not a major concern until the late 1800s. After 1898, Guam became controlled by the U.S. government except for a brief period of rule by Japan during WW II, and today Guam is recognized as a U.S. Territory. As for all of the islands north of Guam, Germany maintained jurisdiction until WW I, followed by Japan ruling until the end of WW II, then most recently allied with the U.S. and today recognized as the Commonwealth of the Northern Mariana Islands (CNMI).

In the late 1800s through early 1900s, only a faint distinction existed between ethnography (observing living traditional cultures) and archaeology

(examining the material remains of ancient cultures) during the formative years of archaeology as a discipline (Trigger 2006). Time-depth or aging of artifacts was not a major concern of most researchers, except within very broad and approximate categories, such as a pre-Spanish *latte* period in the Marianas. In this context, *latte* sites were regarded as rather curious, relating to a known indigenous Chamorro culture that must have flourished at one time but was no longer intact in the same way. The pre-Spanish *latte*-associated culture appeared to have suffered near-total collapse or large-scale overhaul, so that archaeology and ethnography indeed substantiated quite separate lines of inquiry in this case.

Spanish colonial activity in the late 1600s included a *reduccion* program of large-scale extermination of the native Chamorro populations throughout the Mariana Islands, with the survivors re-located into more easily controlled villages in Guam. This program was effectively complete by 1700, so that the pre-Spanish *latte* period culture was irrevocably transformed by this time. Some generations later, substantive links to the past were extremely limited, especially with the massive loss of native population, and Spanish influence continued very intensively over the next nearly 200 years.

By the time researchers of the late 1800s and early-middle 1900s were interested in serious research of the *latte* period, the opportunity for accessing native cultural knowledge was all but lost. Ethnography and history could offer only very limited if any meaningful information about the pre-Spanish past. In this context, archaeology became the most appropriate means to learn about the *latte* period. The existence of an ancient culture pre-dating the *latte* period was not conceptualized as a possibility until after the 1950s, and even today this topic has received very little attention compared to the *latte* period.

Starting in the 1950s, the radiocarbon dating technique allowed calendar-year dating of sites and artifacts, opening new possible research questions and perspectives about *latte* and other issues. At the same time, at least a few archaeologists in the Pacific Islands region began systematic excavations by stratigraphic layers in an effort to document long-term chronological change previously not considered seriously (e.g., Gifford and Shutler 1956; Spoehr 1957). However, archaeologists as a whole have followed divergent and sometimes incompatible strategies for collecting fundamental baseline data during site survey, dating, and even the most rudimentary interpretation.

Only since the 1950s were *latte* sites recognized as just one component in a much longer chronology of archaeological sites in the Marianas (Spoehr 1957). *Latte* sites were found to span a potential range of approximately A.D. 900 through 1700, whereas the oldest sites (lacking *latte*) in the Marianas were dated at least as early as 1000 B.C. and perhaps as early as 1500 B.C. Several centuries of remarkably different material culture had preceded the *latte* period, making the *latte* period the last in a long succession of cultural periods prior to Spanish colonial rule. However, given that nearly all archaeological study focused on the

surface-visible *latte* remains, only very little was known of the much longer span of time pre-dating the *latte* period and represented only in deeply buried deposits without the same obvious surface-visible indicators of *latte* sites.

Since the 1980s, government laws have been enforced for protection of historical and archaeological resources in Guam and in the CNMI. The result has been an astounding volume of “gray literature” in the form of cultural resource management (CRM) reports on file at various government agencies. These reports consist mainly of site-specific or area-specific descriptions of the presence or absence of archaeological materials as part of land development permitting and resource management on a case by case basis. Nearly all of this work relates to findings generally from the *latte* period.

Also since the 1980s, academic research interest has been moderately strong in the Marianas region, including published works by professionals, at least a few academic conferences or sessions within larger conferences, and a number of post-graduate theses by students. Again, nearly all of this work relates to efforts of understanding the *latte* period, but some efforts have focused on earlier periods or comparison of different time periods.

### **Pre-1900 Emerging Interests**

The first archaeological studies in the Marianas focused exclusively on *latte* sites, and much this same focus maintains today. Scholars were attracted to the impressive megalithic ruins, said to be “casas de los antiguos” or “houses of the ancients.” Especially tantalizing were the grandly breath-taking sites such as the House of Taga in Tinian, made famous to the world by tales and illustrations from George Anson’s 1742 visit at Tinian (in Barratt 1988; see also Walter 1974).

The megalithic *latte* ruins inspired wonderment about a Romanticized “noble savage” and the ancient Chamorro society that must have existed prior to Spanish conquest in the late 1600s. By the time this interest had developed and by the time archaeology had emerged as a field of study in the late 1800s, however, only very little fragmentary knowledge persisted of relevance for reconstructing the pre-Spanish Chamorro society. During the first archaeological expedition in the Marianas by Antoine-Alfred Marche (1982) in 1887, Carolinian Islanders served as valuable guides, yet they did not possess directly inherited cultural knowledge about native Chamorro culture history.

The pioneering efforts by Marche (1982) proved that *latte* sites were abundant throughout the entire Marianas Archipelago, even in the smaller and remote northern islands. In other words, *latte* sites could be expected almost everywhere that once had supported an indigenous population prior to Spanish conquest and forced re-location of the *reduccion* program.

Marche (1982) described *latte* sites as “pillars” that he understood to be the former supports of ancient “huts,” for example offering (Marche 1982:29):

These pillars are topped with a capital in the shape of a deep basin of dimension proportioned to the pillar. They were used to support the joists of the huts.

The function of *latte* sites was not at all a mystery to Marche, following local traditions and existing Jesuit missionary records that *latte* were supports for raised houses during pre-Spanish times.

Also based on Marche’s (1982) efforts, broken pottery fragments and other findings revealed a broader scope of archaeological material worthy of study beyond just the *latte* stones. As Marche (1982:13) noted:

I encountered earthenware debris in all of my searches and in all of the islands; the form and texture of the earth used prove that these remains were of local manufacture. Finally, the islands, where I found the two large cooking pots mentioned above, had not been visited since it was abandoned in the seventeenth century.

This description emphasizes that locally made earthenware pottery, like the *latte* sites, referred to a time period prior to Spanish colonial rule, evidently during an era of widespread and intensive settlement and land use throughout the Mariana Islands.

### **1900 through 1920s Developing Scholarship**

Following removal of Spanish rule from the Marianas in 1898, scholarly interest in Chamorro history and archaeology has been more or less constant for longer than a century, punctuated by the contributions of a few extraordinary researchers. Throughout this era, *latte* have been virtually synonymous with Marianas archaeology and with symbolizing Chamorro cultural heritage.

In 1904, Georg Fritz published a detailed description and history of the Mariana Islands, based on research during his tenure as District Administer in Saipan for the German government. Fritz (2001) mainly was interested in documenting native Chamorro history as remembered at his time after centuries of Spanish colonial rule, but he also provided influential commentary about pre-Spanish *latte* sites (Fritz 2001:18):

The stone pillars scattered in the forest and in the savanna of almost all islands give proof to the descriptions of the missionaries. But these ruins only mark the former dwelling places of the nobles or wealthy commoners. The majority of the people lived in huts of wood and palm fronds. Numerous grinding stones made of basalt or limestone mark their previous locations.

This text verifies the abundant and widespread *latte* sites, yet these sites are considered to relate only to “nobles or wealthy commoners.” The basis for interpreting social ranking is unclear, but this notion and different variations of this theme would persist for several generations of scholars.

Social hierarchy and ranking had been noted by Jesuits and others commenting on native Chamorro society in a general sense during the 1600s through 1800s, as summarized by Russell (1998:142) for the social ranking schemes reported by Juan Pobre in 1602 (Driver 1993), Sanvitores in 1668 (Garcia 2004), Bonani in 1719 (Levesque 1997:144), and de Freycinet in 1819 (de Freycinet 1996). A match between social rank and housing type actually had never been claimed in the original historical sources, but proponents of this idea stress that the number of social ranks or categories may be reflected in the same number of housing forms. According to this logic, the highest ranking unit, however defined, most likely would be associated with the largest *latte* structures, and the lowest ranking unit would be associated probably with wooden pole-and-thatch structures. A number of additional categories might be proposed, accounting for different sizes and configurations of *latte*, possible forms of pole-and-thatch buildings, environmental settings such as coastal versus inland, and other factors.

The possibility of social status reflected in *latte* indeed is attractive, and something of this nature likely are accurate for the largest examples of monumental scale such as at the House of Taga in Tinian. Numerous versions of this core concept would develop as an enduring theme in Marianas archaeology. In retrospect today, some of the interpretations seem to have preceded the actual relevant data for testing them.

The first thorough data-gathering archaeological study of *latte* was part of a large-scale effort by Hans Hornbostel (n.d.), with contributions of local folklore collected by his wife Gertrude Hornbostel. The resulting several hundreds of pages of notes and diagrams focus mainly on *latte* and associated grave features and artifacts in Guam, Rota, Tinian, and Saipan. These unpublished notes, along with the material artifact collections, were studied by Laura Thompson in preparing a much abbreviated summary publication (Thompson 1932). The original notes and records are available by special request through the Bernice P. Bishop Museum in Honolulu.

Hornbostel’s (n.d.) body of work includes several draft manuscripts titled “Notes on *latte* and *latte* builders” in multiple “installments” that reveal some development of Hornbostel’s thoughts over the duration of his studies. These notes offer detailed maps, section views, excavation profiles, and other documentation of several *latte* sites, plus efforts to synthesize the large-scale patterns in the available evidence. The notes are exceptionally valuable for reporting site context and precise provenience of individual findings both in plan and section views, coded with a numbered catalog list of all collections.

Based on his examination of numerous *latte* sites, Hornbostel (n.d.) identified that “those of eight uprights comprise at least 80% of all *latte* found,” meaning that four-pair or eight-pillar sets are by far the most popular occurrence. The same set of field data allowed Hornbostel (n.d.) to observe that the paired rows of *latte* almost always were situated so that the long axis would align parallel with a nearby shoreline or stream. Moreover, on the side nearest the shoreline or stream, the pillars (*haligi*) sometimes measured slightly taller, yet the top levels of the stones achieved an even horizontal elevation, perhaps as a function of the shoreward or streamward side being slightly downslope and therefore at a lower base elevation.

Along with the predominate orientation of *latte* row alignments, Hornbostel (n.d.) noted that grave features were nearly always between the pillars and on the seaward (or streamward) side. Similarly, the remains of “feasts” or “kitchen middens” consistently were found in roughly the same distribution, so that very little if any artifacts or other remains ever were found on the landward or upslope side of any *latte* site.

According to Hornbostel’s (n.d.) data, the primary activity areas at *latte* were between and around the pillars (*haligi*) or on the downslope (seaward or streamward) side, leading to an implicit understanding of the downslope side as the “front” of a *latte* site. Following this logic, understandably the “front,” “middle,” “sides,” and “back” of a *latte* set might be appropriate for different sets of activities.

Although based on admirably robust field data, one of Hornbostel’s (n.d.) conclusions was contrary to local knowledge claims and colonial-era documentary sources, proposing that *latte* could not have functioned as pillars supporting houses. Instead, Hornbostel (n.d.) proposed that *latte* were regarded as special places or temples, specifically used as for ceremonial feasts and ritual cannibalism while burying other deceased individuals, or perhaps the formal burials and the cannibalistic feasts occurred at separate points in time reflecting an evolution in perception and use of these special places. In support of this interpretation, Hornbostel (n.d.) proposed that the pillars and capitals did not appear suitable to bear the weight of a house. In addition, skeletal remains were found in close association with nearly all *latte*, including both: a) re-deposited jumbles of often burned and butchered human bones in narrow pits, interpreted to represent victims of cannibalism; and b) other carefully laid extended skeletons within elongated pits, interpreted to represent non-cannibalized mortuary practice.

Regardless of his potentially controversial interpretations, one of Hornbostel’s (n.d.) most enduring contributions was a map of Guam, showing the distribution of *latte* and “dense *latte*” at an island-wide scale. This map has proven to be more valuable than perhaps originally envisioned, because it offers a reasonable record of the former distribution of *latte* sites prior to large-scale

damage and loss during WW II, post-war reconstruction, and intensive land development since the 1980s. Many of the *latte* depicted in this map no longer exist today, but often the approximate locations contain disturbed remnants of artifacts and midden where the *latte* presumably once stood.

### 1930s through 1945 Publicizing Primary Data

Based on Hornbostel's unpublished notes and collections at the Bernice P. Bishop Museum, along with additional study of the materials and historical records, Laura Thompson produced the first published synthesis of Marianas archaeology (Thompson 1932). The content was almost entirely about *latte* sites and the materials found at these sites or dating to the same general time period. Thompson's (1932) work emphasized fact-based description of the materials, with only very cautious interpretations.

Among her many contributions, Thompson (1932) described the pottery and other artifacts associated with the *latte* period, for example identifying a most common type of earthenware pottery with thickened rims. Of 1559 potsherds in the Hornbostel (n.d.) collection, Thompson (1932) identified more than 99% (N=1546) as belonging to this single category. This type later would prove to be the most widespread, abundant, and reliable material marker of the *latte* period, ironically more so than *latte* stones themselves.

After additional work, Thompson (1940) addressed the topic of the function of *latte* sites. Thompson (1940:447) observed:

There has long been a question as to the function of the *latte*, which, on account of their apparent resemblances to other types of stone-work in the Pacific, have been considered by various writers as burial-monuments, temple-sites, or house-foundations.

Based on a review of historical sources, comparison with other traditional cultures in the western Pacific, and archaeological data, Thompson (1940:463) concluded:

we may infer that the *latte* of the Marianas functioned as house-sites. Moreover, there were evidently at least two types of houses built on stone pillars in the Marianas, namely pile-houses and canoe-sheds.

Thompson (1940:463–464) defined two forms of *latte* structures as a “pile-house” and a “canoe-shed.” The “pile-house” was a wooden superstructure with the floor supported atop the *latte* stones and thereby elevated above the ground, containing a number of internal compartments. Graves often were found in the ground beneath or nearby the raised houses, reflecting a preference for proximity to the house. These houses were found in variable coastal and inland settings, designed with the long axis parallel with the coast or stream. Thompson (1940:464) defined the “canoe-shed” as a simple roofing (no raised floor or

walls) suspended over *latte* stones, presumably found only near coastlines and oriented perpendicular to the shore.

Thompson's (1940) two-part classification conceivably could include multiple internal categories associated with variation in social status, family-level versus community-level functioning, and other factors. However, no specific hypothetical models were proposed.

Resisting the temptation to advance any grandiose theories, Thompson (1940:463-464) instead offered a conservative summary about the "house-pile" type of *latte* site:

Concerning the pile-houses, we know that the roofs were thatched. The floors were raised above the ground and the floor-space was divided into compartments which probably served as sleeping rooms, kitchens, storage, carpentry shops, etc. The walls of some houses at least had openings which served as windows. The ground under the houses was used for burials, accompanied by broken artifacts. We may safely assume that at least some of the pile-houses served as men's clubs.

Beyond this modest outline, different patterns in artifacts and midden conceivably could help distinguish specific functions of family-scale residence, community-level meetings or other rituals, cooking, workshop crafting, and so on. Also, some sizes and designs of *latte* may be more suitable than others for the specific type of function involved. Most importantly, though, sufficient physical evidence must be gathered to test these kinds of notions.

Regarding the variations of *latte* layout, Thompson (1940:448) observed three overall size categories, wherein the overall length of ground plan depended almost entirely on the number of pillars involved. A "small" category was composed of eight pillars (four pairs), evidently the most common occurrence known. A "medium" category entailed ten pillars (five pairs), considered somewhat rare. A "large" category consisted of twelve pillars (six pairs), recognized as the most rare form. With a greater number of pillars, the length of floor plan of course increased, yet the width remained about the same presumably due to the limited lengths of available timbers for cross-beams. Thompson (1940:448) also observed that the height of pillars tended to increase in accordance with overall length of the ground plan or long axis, possibly as a function of supporting greater total weight of the superstructure.

Following later work, Thompson (1945, 1947) synthesized historical, anthropological, and archaeological information about the Chamorro cultural history. Among other things, Thompson noted a number of different housing forms other than *latte* (Thompson 1945:36-37), and she proposed that the majority of the pre-Spanish population must have used dwelling houses, cooking sheds, and other structures not necessarily associated with *latte* (Thompson 1945:37-38).



In addition to the emerging sense of *latte* as architectural phenomena and representations of ancient households, one of the more important contributions concerning *latte* was Ichiro Yawata's major effort to explore the entirety of the Marianas Archipelago, verifying that *latte* indeed were abundant throughout the archipelago, even in the more remote and sparsely inhabited northern islands (Yawata 1945). This verification also carried the implication that archaeologists potentially could study mostly intact sites and entire settlement systems in locales that had been preserved more or less in situ ever since large-scale depopulation of the northern islands in the late 1600s. Following WW II and more recent land developments since the 1980s, this same opportunity in the "Gani" (collective name for the smaller islands north of Saipan) has achieved even greater significance, yet to be explored to its full potential.

Another contribution by Yawata (1963) was to bring attention to similarities between megalithic *latte* and other wooden structures in the northern Philippines, echoing an earlier suggestion by Thompson (1940:459). Yawata (1963) reported that wooden discs atop wooden posts may have deterred rats from entering houses or rice storage areas in the northern Philippines examples, so the seemingly parallel manifestation in stone may have served the same function for *latte* in the Marianas. This proposal accounted for multiple factors at once: a) the apparent pre-Spanish existence of rice cultivation in the Marianas, despite its absence in pre-European contexts in all other Pacific Islands; b) a presumed cultural and linguistic connection between the Marianas and the Philippines; and c) the curious architectural anomaly of stone pillars with capitals in the Mariana Islands. Albeit attractive, the actual effectiveness or performance characteristics of the "rat guards" had yet to be proven, and currently this hypothesis may be regarded as one of several testable possibilities. In any case, the similarity in architectural design is worthy of consideration.

### **1945 through 1960 Systematic Efforts**

In the post-WW II years, three large-scale archaeological projects occurred in close succession, partly overlapping. In 1945–46, Douglas Osborne conducted an island-wide archaeological reconnaissance survey of Guam (Osborne n.d.; see also Osborne 1947). Shortly thereafter, Erik Reed reported the results of additional site survey as part of a synthesis of Guam history and archaeology (Reed 1952). Primarily in 1949–50, Alexander Spoehr undertook site survey and stratigraphic excavations throughout Saipan, Tinian, and Rota expressly to outline a chronology of Marianas regional material culture (Spoehr 1957; see also Pellett and Spoehr 1961).

Osborne's (n.d.) study focused almost exclusively on *latte* sites, based on a strategy of surface reconnaissance survey and informant testimony, augmented

by informal test pits at just a few sites. This strategy was reasonable for identifying presence versus absence of surface-visible *latte* stones and concentrations of pottery, and it provided a valuable update for *latte* archaeology of Guam. At the time, *latte* archaeology was thought to be synonymous with Marianas archaeology, and nothing older than the *latte* period was expected. In fact, Osborne (n.d.) referred to his study as “Chamorro archaeology,” implying an equivalent relationship among Marianas archaeology, *latte* sites, and Chamorro cultural heritage.

Osborne’s (n.d.) surviving report is an unfinished draft manuscript, with some hand-written editorial notes, probably intended to withstand some additional revision before formal publication. As such, the report must be regarded as tentative in terms of its interpretations, although the basic field data appear to be reported with reasonable confidence. Osborne (n.d.:48) explicitly referred to his interpretations as “intended not as concrete factual statements but as points of departure for future work.”

With the above-noted cautions, Osborne (n.d.:48-52) offered several “points of departure for future work,” all related to *latte* sites:

- a) *Latte* sites were found in abundance in both coastal and inland settings throughout Guam (Osborne n.d.:48-49), negating any notions of a primarily coastal focus of *latte*-associated settlement and land use.
- b) Some of the “archaeologically most complex, largest, and spectacular” *latte* sites were found in Guam’s inland areas rather than along the coasts (Osborne n.d.:49).
- c) Inland *latte* sites in Guam tend to show very little if any accumulated midden deposits, possibly as a result of younger age during “a more recent move inland” as part of “cultural as well as demographic expansion” (Osborne n.d.:49). In retrospect, this finding may reflect local taphonomic processes and preservation conditions.
- d) In terms of the design and observable characteristics of *latte*, no significant difference could be noted between coastal and inland sites, but rather all *latte* appeared to relate to a single theme or tradition (Osborne n.d.:49-50). The individual sites from coast to inland showed “no break of typologic continuity” (Osborne n.d.:50).
- e) Some difference in clay paste recipe was noted in pottery fragments found in coastal versus inland *latte* sites (Osborne n.d.:50-51). However, Osborne (n.d.:51) expressed some hesitation about this patterning and how to interpret it:

My impression was that the inland sherds were harder and less friable than the coastal. This I did not check empirically on each

sherd, and, if it were so, I should be inclined to explain it in terms of preservation.

- f) Regarding orientation of the long axis of *latte*, Osborne (n.d.:51) did not necessarily confirm the prior claims by Hornbostel (n.d.) and Thompson (1940) of alignment parallel with adjacent coastlines or streams, but rather Osborne (n.d.:51) proposed: “it would appear that there is a tendency toward a north-south orientation but that it yields easily to the needs of the locale.”
- g) The design of *latte* and other aspects of related material culture might be explored by comparisons with other culture areas. Osborne (n.d.:52) in particular proposed Japan, China, and the Caroline Islands as possible sources of external contact involved in developing the apparently unique *latte* period material culture found in the Mariana Islands.

Aside from the above-listed points, one of Douglas Osborne’s most remembered contributions was to document the reconstruction of a *latte* site at Gongkna (also known as Gongna or Gun Beach) at the north end of Tumon Bay in Guam (Osborne n.d.:36-43; see also Osborne 1947). The reconstruction effort mainly was by the U.S. Navy 56th Construction Battalion at a site considered to be of special importance in Guam. This undertaking was among the first attempts to reconstruct a *latte* site as a focal point and symbol of Chamorro cultural heritage.

Referring to *latte* in general, Osborne (1947:520) proposed:

There can be little doubt that each set or group supported, as a piling-foundation, some building. It is more than likely that these were chief’s houses, or clubhouses or constructions of equal importance.

The reasoning behind a high-status association for *latte* was not explicated.

Based largely on Osborne’s (n.d.) work with additional site observations, Erik Reed (1952) synthesized *latte* archaeology in the context of overall history and archaeology of Guam. As with prior work (e.g., Hornbostel n.d.; Osborne n.d.), Reed’s (1952) effort was based on surface reconnaissance survey, following the observation that megalithic *latte* remains were primarily in surface-visible contexts, although some midden may have accumulated in deep deposits at some of these same surface-visible sites. Based on this scope of work, Reed (1952:20–21) noted:

Little if any change in culture has been detected in the archaeological remains, which appear to represent a single period of continuous occupation, and there is no evidence to suggest that this occupation was preceded by any simpler culture or more primitive people.

In other words, the mostly surface-visible *latte* remains were regarded as reflecting the entirety of Marianas regional archaeology. Moreover, the multiple known *latte* sites appeared to yield more or less similar findings thought to represent a single and mostly undifferentiated cultural period. According to this view, the findings at any single *latte* site would be mostly the same as at any other site. Any geographical variation was regarded as minimal, and any chronological variation was regarded as similarly minimal within the presumably short duration of the *latte* period.

At the time of preparing his report, Reed (1952) became aware of Alexander Spoehr's not yet published (Spoehr 1957) radiocarbon dating of a Marianas cultural sequence at least 2000 years older than the *latte* period, thereby overturning much of what had been surmised about a shallow time-depth related just to the *latte* period in Marianas archaeology. Based on this realization, Reed (1952:21) wrote:

I have already deleted several statements in this report as to the supposed late date of immigration and brief period of cultural development. The [early radiocarbon-based] date is associated with red-slipped pottery suggestive of Philippine ware and superior rather than inferior to the coarse Marianas Plainware of the *latte* sites.

This text hints at the dominant thought or orthodox view of Marianas archaeology at the time, perceived as consisting of a single time period associated with *latte* sites, presumably not much older than the date of Magellan's arrival in 1521 and effectively extinguished by roughly 1700.

Reed's (1952:21) noted musings convey a sense of perplexity about why the most ancient pottery appeared to be more finely made red-slipped ware, not at all "primitive" when compared to the more crudely made examples occurring later during the *latte* period. If the *latte* architecture had marked a sophisticated technology and engineering, then why did the native pottery-making lose a sense of sophistication at this time? In other regions, archaeologists had followed a concept of cultural evolution, beginning with early archaic primitive forms, passing through a formative developmental period, and ending with a classic output of the most impressive monuments and artifacts. Spoehr's (1957) work showed this kind of thinking to be non-applicable in the Marianas case.

Reed's (1952) work was most important for establishing an updated baseline documentation of the locations and contents of *latte* sites throughout Guam, providing a solid starting point for any new study. This effort most helpfully noted the sites that evidently had been damaged or lost since the prior reconnaissance surveys by Hornbostel (n.d.) and Osborne (n.d.), prompting Reed (1952:119) to urge for "general protection by law of surviving historic structures and archeological sites from destruction or vandalism" as a "first and fundamental need." The same sentiment lives today, wherein a number of

government laws serve to protect *latte* and other sites, and many fear the possibility of site looting and vandalism.

Venturing beyond what had been so far a mostly Guam-centric view of Marianas archaeology, Spoehr (1957) undertook intensive systematic study in Saipan, Tinian, and Rota. More importantly, though, the explicit goal was to formulate a chronological sequence of material culture change, based on controlled excavations that could demonstrate associations between artifacts and their geological layers of measurable date range. This concept was quite novel at the time, contrary to the strategy of reconnaissance survey as sufficient to identify surface-visible ruins such as *latte*. Moreover, the notion of anything pre-dating the *latte* period was thought by many to be absurd. This new excavation-based research strategy was attempted by only very few researchers in the Pacific Islands region at the time (e.g., Emory 1953; Gifford 1951, 1955; Gifford and Shutler 1956), made more realistic by the new invention of radiocarbon dating. The procedure involved: a) formulating a relative sequence of material culture based on stratigraphic associations of definable artifact types; and b) obtaining absolute dates by radiocarbon dating for each of the key points in the relative ordering.

Spoehr's (1957) scope of work was one of just a handful of studies that marked a revolution of sorts in Pacific Islands archaeology, previously involving only examination of surface-visible ruins such as *latte* in the Marianas and numerous other stonework and earthwork ruins commonly found elsewhere in Oceania. As Spoehr (1957:17) opined: "The emphasis on digging, rather than only on description of surface remains, is a healthy trend and is a forerunner of solid results in the study of Oceanic prehistory." This new approach, stressing excavation and chronology, enabled a long-term perspective and entirely new types of research questions. For example, how did *latte* architecture and other material culture change over time? If buried layers were found deeper and pre-dating *latte*, then could they yield insights into older material culture? How might *latte* period material culture relate to possible predecessors witnessed in the archaeological record?

Spoehr's (1957) break-through findings of a much older cultural sequence pre-dating *latte* sites forever changed perceptions of the *latte* period, of Marianas archaeology, and of the first peopling of the western Pacific region. For various reasons, however, now more than a half-century later, the full parameters of the research implications have not yet been pursued. Meanwhile, investigations in other parts of the Pacific Islands have achieved much greater notoriety, and most efforts in the Marianas have continued to focus on surface-guided seeking of *latte* sites and concentrations of pottery.

Based on his systematic study, Spoehr (1957) concluded that he could define the material culture of the *latte* period with much confidence, yet he hesitated to propose much at all about the several centuries of earlier material culture known

from only very scant evidence in his opinion. Due to the scarcity of hard data pre-dating the *latte* period, Spoehr (1957:171–178) proposed a two-part chronology that would need further refinement based on new work that hopefully would occur in coming decades: a) a pre-*latte* period defined by absence of *latte* and presence of fine redware pottery, ranging approximately 1500 B.C. through A.D. 900 but with unknown internal divisions yet to be defined; and b) the *latte* period dated roughly A.D. 900 through 1700 and defined in considerable detail by the presence of *latte*, formal village layouts, thicker pottery, mortar-and-pestle stone technology, stone and shell adzes, simple fishhooks and gorges, implements of warfare such as spears and slingstones, shell ornaments, formalized burial practice, and other aspects of material culture.

Spoehr's (1957) reluctance to define the pre-*latte* period was due to very limited findings primarily in one site of Chalan Piao in Saipan. A few years later, additional results were reported from landward of the House of Taga site in Tinian, where deep layers were found, including an earliest occupation about 3 m deep (Pellett and Spoehr 1961). The pottery from the deepest cultural layer here proved to be very thin and well made red-slipped and black-burnished pottery with fine lime-infilled punctate-stamped, circle-stamped, and incised designs.

Based on the findings at Chalan Piao in Saipan (Spoehr 1957) and landward of House of Taga in Tinian (Pellett and Spoehr 1961), the mostly surface-visible and near-surface stratigraphic horizon of the *latte* period could be identified as clearly separate from the much deeper and older cultural layers pre-dating the *latte* period. Although some form of evidence of a *latte* period occupation could be expected almost everywhere in the Mariana Islands, older remnants in deeply buried layers could be expected only in a smaller number of locales where natural depositional circumstances contributed to their in situ burial and preservation. Such older cultural layers could not be detected by surface findings of *latte* sites, but rather some other strategy would be required.

Among Spoehr's (1957) defining characteristics of *latte* period material culture, the pottery documentation was perhaps the most important (Spoehr 1957:107–130), given the abundance of pottery fragments found throughout the Mariana Islands. Associated with the *latte* period, Spoehr (1957:109–113) defined a type of pottery called "Marianas Plain" generally thicker and coarser than earlier-dated pottery, mostly referring to medium to large bowls, and almost always showing rims with thickened profiles termed "B" rims. Of note, however, combed or "trailed" exteriors were apparent on many potsherds otherwise resembling the "Marianas Plain" type (Spoehr 1957:114–117). The thickened "B" rim later would prove diagnostic of the *latte* period, as distinguished from the straight-sided or thinning "A" type diagnostic of periods pre-dating *latte* sites. The thickened "B" rim, thicker vessel walls, coarser paste, and larger but simpler bowl shapes would prove to be the defining characteristics of *latte* period pottery, including both undecorated (plain) and combed or trailed versions.

The rudimentary two-part chronology (*latte* and *pre-latte*) maintains as accurate today, with the caveat that of course multiple components can be defined within the extremely lengthy *pre-latte* period, and at least some degree of chronological change can be expected within the *latte* period itself. Given the abundance and surface-visible nature of the *latte* period archaeology throughout the Marianas, this most accessible period understandably is known in the most detail, and indeed a quite thorough and lively reconstruction of *latte* period material culture and society is possible. Moreover, certain limited aspects of this time period appear to be comprehensible from written historical records and oral traditions, whereas the *pre-latte* period generally is regarded as more mysterious and less directly knowable.

The apparent distinctiveness of the *latte* period has prompted several enduring questions, none of which have yet been answered sufficiently. Does this period relate to a different population entering the Marianas region and if so then from where and with what motivation and other circumstances? What did houses look like prior to the *latte* period, and can an evolution in house forms be detected? Did all of the diagnostic material culture traits of the *latte* period occur at once, or can an internal chronological sequence be defined? How does the *latte* period in the Marianas relate to possible contacts with both Island Southeast Asia to the west and other parts of Micronesia to the east? If more details were learned from sites pre-dating the *latte* period, then how would these results affect current perceptions of the *latte* period as a distinctive era?

### **1960 through 1980 Building Programs and Paradigms**

Following the excitement of intensive surveys and break-through chronological discoveries of the preceding decades, Marianas archaeology during the period 1960 through 1980 concentrated on learning more site-specific details about selected *latte* sites and the traditional Chamorro society associated with the *latte* period. This general approach reflected a desire to preserve and protect sites, especially *latte* sites, by studying a few in detail and thereby preserving their information content in perpetuity while leaving others untouched. Concurrently, government laws were developed to protect archaeological sites, and government programs were enacted to manage these sites as cultural and scientific resources.

Most funding opportunities for academic research and for government-mandated resource management were in Guam, but some limited work was conducted in Saipan and Rota. As a result, these efforts are extremely useful toward understanding the majority of the *latte* period manifestations mainly in Guam.

The period 1960 through 1980 may be described as a time of building programs and paradigms for archaeology in the Marianas region, mostly

involving study of *latte* sites in Guam. Government programs of resource management were emerging, charged with identifying and protecting archaeological sites, yet funding and resources were somewhat scarce. Also, formal education and training were largely absent from the region, relying to some extent on external experts inspiring a local base of interested parties. Meanwhile, intellectual paradigms were developing, mostly implicitly, for example promoting the notion that *latte* sites should be perceived as resources in need of government management and protection. Other ideas involved frameworks for understanding *latte* period use of terrain and ecosystems, social hierarchy possibly reflected in *latte* sites, and so on.

During the 1960s through 1970s, a status quo developed that still persists today, involving surface reconnaissance of given study areas, with limited subsurface testing in selected locations where surface-visible remains were found. This procedure was effective for documenting surface-visible *latte* period sites and near-surface midden deposits associated with them. However, as demonstrated previously by Spoehr (1957) and especially by Pellett and Spoehr (1961), this strategy was insufficient for identifying the possibility of archaeological layers buried beneath the surface and considerably older than the *latte* period. The status quo of field research therefore reified preconceived notions about *latte* period archaeology.

Also during the 1960s through 1970s, archaeologists primarily working in the American continents became preoccupied with developing a body of explicit theory and philosophy of science for archaeology (Trigger 2006:386–444), yet the results of these efforts were not felt so strongly in the Pacific Islands at this time. Instead, Pacific Islands archaeology programs mostly emphasized studies of topics such as: a) social process responsible for material culture change; and b) relationships between ancient populations and their environments as reflected in patterns of settlement, land use, and ecological variables. This scope of study had gained popularity during preceding decades in the American continents (Trigger 2006:314–385), now just starting in the Pacific Islands as advanced primarily by Green (1967, 1970) and Kirch (1973, 1977, 1980a, 1980b) yet not necessarily including much relevant work in the Marianas region.

In the middle to late 1970s, academic interest had grown immensely in Pacific Islands archaeology, primarily due to discoveries in Polynesia and Melanesia, yet Marianas archaeology somehow remained obscure amidst the largely unknown field of Micronesian archaeology. Previously, the small low-lying atolls characterizing most of Micronesia were thought not to bear much potential at all for archaeological study, but Janet Davidson (1967) publicized that indeed the potential was more than had been realized so far.

Two major syntheses of Pacific Islands archaeology (Bellwood 1978; Shutler and Shutler 1975) offered narratives of the cultural history of island discovery and settlement, so the main focus was on earliest settlement dates and



not necessarily related to studies of the later developments such as the *latte* period. The few scattered “high islands” of Micronesia (the Marianas, Palau, Yap, Pohnpei, and Kosrae) were perceived as capable of supporting larger populations and probably for some appreciable antiquity of at least 1000–2000 years, whereas the numerous “small islands” more typical of Micronesia were perceived as supporting rather small populations and for less antiquity of about 1000 years or maybe less. This scenario for Micronesia was more complicated than the largely linear A-B-C population movements evident in island Melanesia and Polynesia, so places like the Marianas did not fit neatly into these larger Pacific Islands regional models. Moreover, the role of the *latte* period appeared unrelated to initial population movements, but perhaps it related to later events and interactions again complicating the overall model that was more appealing for Melanesia and Polynesia.

With large-scale Pacific Islands academic attention on dates of first settlement, study of the comparatively more recent *latte* period in the Marianas was not a primary concern. At the same time, researchers were discouraged by the evident difficulty of finding and then studying details of deeply buried sites pre-dating the *latte* period. Instead, sites with decorated Lapita pottery in Melanesia and Polynesia were regarded as more accessible and clearly related to first human settlement of this large region. Academic research was especially productive in Polynesia (Jennings 1979), but meanwhile Marianas archaeology (like Micronesian archaeology generally) by default received less attention, publicity, and funding.

Another academic development in the 1970s was the collaboration of archaeology with historical linguistics, most importantly formulating models of population movements from one island group to another (Pawley and Green 1973). The basic premise involved a notion of populations dispersing from one place to another, followed by diversification of their languages from their homeland areas after some time. This model worked extremely well among the closely related language families of Polynesia, where archaeological data also happened to be the most abundant. The model did not work so well, however, in more linguistically diverse areas and especially in places with greater time-depth of interacting language communities.

Augmenting the linguistics-archaeology synthesis, Shutler and Marck (1975) proposed that land-dependant horticulturalists (or some would prefer “agriculturalists”) likely displaced prior inhabitants, also replacing their languages, resulting in large-scale and rapid effects in areas of limited land such as in the Pacific Islands generally. This type of population expansion was equated with the sudden and widespread appearance of Lapita pottery in sites throughout island Melanesia and West Polynesia around 1500-1000 B.C. This viewpoint later became a central theme of Pacific Islands research.

By the time this interest in language had developed, the native Chamorro

language of the Mariana Islands already had been recognized for a long time as massively modified due to some centuries of Spanish influence (Topping et al. 1975). The ability to extract a core of pre-Spanish language to compare on an equal level with other Pacific Islands languages was regarded as extremely difficult at this time, made even less feasible by apparent geographic variation in the Chamorro language even within the Mariana Islands. On the other hand, any caricature of the Chamorro language as hopelessly contaminated by Spanish is inaccurate, because indeed the Chamorro language today retains its own unique features and has evolved in its own way to accommodate Spanish and other influences. In other words, evolution of any language is inevitable, and the evident Spanish effects in the Chamorro language reflect the expected degree of change during the Spanish colonial era.

Similar to the case of Chamorro language, local oral histories and folklore traditions in the Marianas were regarded as certainly important but also not of the same character as had been evident for research in Melanesia and especially in Polynesia. Most notably in Polynesia, traditional place-names offered a good starting point for studies of archaeology and cultural history (e.g., Pukui et al. 1974). In addition, extensive written texts were widely available from dedicated scholars with direct access to Polynesian cultural history and traditional practice (e.g., Fornander 1969; Handy and Handy 1972), affected by some colonial and post-colonial factors but not nearly to the extent as in the Marianas. In the Marianas, however, place-names and other folklore mostly pertained to the more recent past, not necessarily relevant for studies of the pre-Spanish era, and knowledge was retained in the living memories of just a few individuals about their own villages. Additionally, *latte* sites were regarded as reminders of a distant past and as homes of ancient spirits, and they mostly were not specified on a case by case basis as associated with particular people or events.

Partly in hopes to reclaim or revitalize a connection with Chamorro language and history for current and future generations, the Richard F. Taitano Micronesian Area Research Center (MARC) was established at University of Guam (UOG) in late 1960s, primarily as an archival repository and library for documents relevant to history and culture of Guam and generally of Micronesia. Especially since the 1970s, MARC has enabled centralized access to historical maps, notes, illustrations, and photographs toward scholarly interpretations about traditional Chamorro culture, language, and history. These insights have greatly influenced modern perception and appreciation of traditional Chamorro society, relevant at least to some degree for interpreting *latte* sites and the pre-Spanish *latte* period society overall. The physical documents at MARC, however, are entirely from Spanish and more recent times of written records, so the contents must be evaluated in their given context.

With better access to historical documents and especially with English translations, new studies of Chamorro cultural history became feasible in the

1970s beyond what had been realistic previously. At least some form of contextual background research then became expected as part of any archaeological study. Ideally, some insights could be gained into the cultural history of a particular study area or related to a specific topic. For example, a number of sources could be consulted to learn about *latte* sites in a specific locale or about *latte* sites generally.

One important historical document study was to estimate the native Chamorro population before, during, and after major effects of Spanish colonial influence in the Marianas region. Based on available historical documents, Jane H. Underwood (1973) illustrated a catastrophic population loss after Jesuit missionary arrivals in 1668. The Chamorro population around 1668 was estimated about 24,000 and then declined rapidly to a low of about 8100 in 1699 near the end of the Spanish-Chamorro wars. Even smaller counts of less than 2000 people were evident in the 1700s, followed by efforts to re-populate the islands with Carolinian Islanders (from modern-day Yap and Chuuk States of the Federated States of Micronesia or FSM).

In addition to the tragic loss of life due to warfare and infectious disease in the late 1600s, the population decline outlined by Underwood (1973) indicates a marked loss of cultural diversity including language, cultural practice, historical memory, and other factors. The reported loss of culture implies that Chamorro language and culture history known today must represent only a fraction or subsample a larger diversity now lost. Also, at least a few of the extant Chamorro traditions likely have been influenced by more recent Spanish and other traditions, as seen most clearly in the Chamorro language. Nonetheless, significant details are evident of an ancestral Chamorro language and cultural history, and a number of Spanish and post-Spanish elements may be regarded as having become emblematic of an evolving hybridized Chamorro culture as experienced today.

According to this portrayal of massive Spanish-era loss of Chamorro population and culture, the perception of *latte* sites as abodes of ancient spirits reflects a general recognition of these sites as ancestral to the Chamorro people today. These sites are respected in a broad sense. Site-specific information may not be available, but it is not necessarily considered relevant to the ability of people to respect and appreciate these sites and their associated spirits and cultural history. In fact, the desire of many archaeologists to know the exact mapping coordinates, radiocarbon date range, and precise activity loci of a *latte* site potentially could be viewed as unnecessary.

Beyond the limits of Spanish-era and more recent historical documents, archaeology offered a means to learn about the pre-Spanish cultural heritage of the Chamorro people, most especially working with physical artifacts found at *latte* sites that evidently were rather abundant throughout the Mariana Islands. In other words, archaeological research opportunities were not only available but

also abundant for learning about *latte* period society, and these efforts conceivably could go a long way toward recapturing a sense of native Chamorro cultural history and heritage identity.

Efforts of reconstituting a Chamorro cultural identity were becoming increasingly popular in the 1960s through 1970s in conjunction with new developments of government laws and regulations in the Marianas. In particular, a sense of cultural heritage and identity would become extremely important for political movements supporting indigenous rights and representation. However, the extent to which archaeology contributed to these movements has been variable and questionable, and unfortunately some degree of misinterpretation and misinformation has been inevitable.

While this sense of identity-seeking was forming, the best known archaeological project of this era in the Marianas was yet another island-wide survey in Guam, once again focusing almost exclusively on *latte* sites, coordinated by Fred Reinman, funded by National Science Foundation (Grant GS-662) and with additional financial support by the Field Museum of National History in Chicago. The field effort was primarily in 1965–1966 (Reinman n.d., 1968, 1977), and it formed the basis with some minor updates (most notably in 1974) for the Government of Guam Historic Preservation Plan some years later (Guam Department of Parks and Recreation 1976). Now more than three decades later, the official government site registry is little more than the same inventory proposed on the basis of the 1960s-1970s survey program. The original intention was for baseline scientific research, but the results have come to be used by others implicitly as if they comprised a through representation of Guam archaeology.

The 1960s–1970s island-wide site inventory for Guam (Guam Department of Parks and Recreation 1976; see also Reinman 1977) appears to be a modification of prior efforts by Hornbostel (n.d.), Osborne (n.d.), and Reed (1952), offering an update accounting for damage and loss of site data during the intervening years. As with the prior efforts, the strategy mainly involved surface reconnaissance and local informant guidance in order to cover the most ground possible in the shortest field time. With this scope of work, the focus was virtually entirely on surface-visible manifestations of the *latte* period. Accordingly, the results are most useful as a starting point for more detailed study of the *latte* period.

Although indisputably an essential tool for any study of the *latte* period in Guam, Reinman (1977) noted three major limitations of the 1960s-1970s Guam site survey: a) lack of detail for some sites where only restricted time was possible for the survey team; b) inability to document sites in non-surveyed portions of the island; and c) inability to detect site components occurring in subsurface settings during the program of surface reconnaissance survey.

The limitations of the 1960s-1970s Guam site survey eventually would be

overcome, at least partially, whenever new opportunities presented themselves for additional field efforts. Meanwhile, the survey results were less than a complete inventory of Guam archaeological sites, especially considering the potential for deeply buried cultural layers pre-dating the *latte* period as revealed previously by Spoehr (1957) for the Marianas region. Concerning the archaeology of the *latte* period, however, the Guam site survey was remarkably successful for the portions of the island that had been surveyed, requiring additional work only in some areas.

Reinman's (1977) final published report offers a useful intellectual summary with highlights from selected sites, but the primary field data for each site are in an unpublished report for the National Science Foundation (Reinman n.d.). The unpublished report includes at least some standard text to describe each site identified during the 1965–66 field effort. Additional primary data site records had been compiled previously by Clement Meighan (n.d.) during less formal reconnaissance survey around Guam in 1961.

The unpublished site records (Meighan n.d.; Reinman n.d.) provide the baseline data for reference probably just by a few individuals interested in certain site-specific data, whereas Reinman's (1977) final published volume offers a more comprehensible interpretive narrative. The same two-part approach more recently has become a standard for cultural resource management work, especially for large-scale projects involving an overwhelming morass of site-specific documentation.

The results of Reinman's (1977) work supported possible interpretations of a settlement pattern study of the *latte* period in Guam, examining the geographic distribution of habitation sites throughout the environmentally diverse island of Guam. Reinman (1977:153–156) discussed the survey results in terms of speculating about the preferred choices of environmental zones for village settlements, about the internal components of each village, and about possible relationships among different village areas. Nonetheless, this brief discussion was not explicitly called a "settlement pattern study," nor did it involve the same approach outlined by Green (1967, 1970) for settlement pattern research elsewhere in the Pacific Islands.

Apparently considered among his most important conclusions, Reinman (1977:153) noted a difference in the *latte* period settlement between coastal and inland settings. The densest concentration of *latte* sites and thickest habitation deposits were in coastal areas, including beaches, coastal plains, and the lower (coastal) portions of river valleys. The least dense *latte* sites and thinnest habitation deposits were in inland settings of the northern limestone plateau and the southern volcanic mountains of Guam. Perhaps, though, additional inland sites would be discovered after further survey work.

Based primarily on the thicker midden deposits in coastal areas and thinner such deposits in inland locales, Reinman (1977:154) proposed that inland

settlement occurred somewhat later than coastal settlement, or perhaps the inland component was somehow less frequent. Specifically about inland settlement, Reinman (1977:154) wrote:

The lack of evidence for extensive midden deposits suggests that occupation was either quite late, infrequent (seasonal), or perhaps both. Radiocarbon dates from the large site at Pulantat are post-European and reinforce the impression of lateness for these site areas. This suggests a gradual movement from coastal and riverine areas into the interior, perhaps in response to population pressures. Similar pressures generated by the early Spanish efforts at pacification of the population may also be a factor since people tended to move into the interior to escape.

Reinman's (1977:153–154) basic ideas of a coastal-inland dichotomy appear reasonable, but they require some modification according to modern understanding of the depositional contexts of inland sites. At least four points are most relevant:

- 1) inland settings, especially in elevated landforms, generally do not allow substantial accumulation of sediments that potentially could bury or stabilize midden deposits;
- 2) preservation of organic midden material tends to be poor in the acidic inland clays of Guam;
- 3) many inland ridgetop settings have been eroding, thus removing much of the archaeological record of *latte* period settlement where such erosion has occurred; and
- 4) the surface-visible materials necessarily represent only the most recent time period of occupation, but older components may have been compromised or removed by later over-printing or restructuring of the same site locations or simply not preserved in the generally shallow and acidic inland soils.

Additionally, the notion of a coastal-inland dichotomy becomes less realistic (or greatly changes in its meaning) for smaller islands. Guam happens to be the largest by far of the Marianas Islands, but its total 339 sq km (212 sq miles) may be considered rather small by some standards. A more useful measure may be the locally perceived scale of accessibility of a landform or resource zone.

Perhaps the greatest strength of Reinman's (1977) work was to support some understanding of the multiple component elements of a *latte* site or village beyond just the *latte* stones alone, yet Reinman (1977:154) cautioned: "Knowledge of the components of a single village, hamlet, or settlement are still unresolved." Nonetheless, Reinman (1977:154–155) described at least seven components other than the *latte* stones themselves:

- a) "mounds of debris similar to those on which stone *latte* are found" (Reinman 1977:154);

- b) “Stone mortars situated between the *latte* uprights” (Reinman 1977:155);
- c) “midden concentrations, often as dark black burned ash, charcoal, soil, food, and artifactual debris ... near many of the structures” (Reinman 1977:155);
- d) possible “wells” (Reinman 1977:155);
- e) small structures “associated with the larger *latte*” (Reinman 1977:155);
- f) apparent “retaining walls on the downhill slope at some *latte*, all on the sandy beaches of the northern and northwestern coast” (Reinman 1977:155); and
- g) “platforms and walls found along the northeastern side of the island” (Reinman 1977:155).

Collectively, these items (a–g) suggest a variety of activity spaces used during the *latte* period, including activities at *latte* structures and in other locations, all related to the same support system of *latte* period settlement and land use. As a caution, though, some of these elements actually could post-date the use of *latte* sites, for example in cases of rock walls or other constructions all in the same generalized surface-visible horizon but of unclear origin.

In addition to what he observed of *latte* settlement remains, Reinman (1977:154) commented on what he did not observe, such as evidence for housing forms other than *latte*. Specifically, Reinman (1977:154) offered that *latte* settlements probably included elements such as structures “placed on wooden posts” or “on the ground,” yet “these other houses await identification in an archaeological context.” The lack of confirmatory evidence may be attributed to the emphasis of the survey program on surface-visible *latte* sites, wherein other types of house structure evidence (e.g., post molds) would be expected only in subsurface layers and outside the immediate footprints of *latte* structures.

Despite identifying numerous components of a *latte* period settlement system as outlined above, Reinman (1977: 155) noted that specific functional categories of *latte* (such as dwelling houses, cooking areas, canoe sheds, high-ranking versus low-ranking structures, and so on) “remain to be demonstrated archaeologically.” Perhaps some of this functional diversity of the *latte* settlement system was evident in the evidence other than just the *latte* stones as already noted. Also, perhaps comparison of artifacts and food remains among multiple *latte* could reveal differences in the sets of activities that took place there. These and other notions in principle could be tested (i.e., confirmed or denied) by the available archaeological data, yet no such analysis was undertaken. Arguably, the existing data were inconclusive at the time.

In addition to the surface survey results, Reinman’s (1977:156–161) test excavations yielded some limited findings. Unfortunately, radiocarbon dates at the Nomna site contradicted their stratigraphic ordering, and results from the

Gakushuin Laboratory at this time tended to include unpredictable occurrences of anomalously old dates. The excavated collections of artifacts and midden significantly documented the material culture of the *latte* period, but these results mostly replicated surface-visible findings and verified prior studies by others (e.g. Hornbostel n.d.; Thompson 1932; Osborne n.d.; Reed 1952; Spoehr 1957).

Reinman (1977:156–158) made one very important new observation about variation in the composition of non-plastic inclusions (i.e., “temper”) in pottery fragments. A distinction was evident between predominately calcareous sand-tempered (CST) and predominately volcanic sand-tempered (VST) pottery. The CST pottery appeared to be quite rare, and it appeared to be associated with stratigraphic layers pre-dating *latte* deposits. The VST pottery appeared much more numerous, very strongly associated with *latte* sites, and most often coinciding with the thickened rim type or Spoehr’s (1957) “B” rim form.

Reinman’s (1977) linking of VST pottery with the *latte* period would prove to be extremely useful for coarse-scale dating of isolated finds of broken pottery that now appear to be considerably more numerous than may once have been appreciated in the past. Moreover, the presence of volcanic sand temper is easy to identify with minimal training, and observations can be made of any potsherd (not just the largest pieces or rim portions).

Concurrent with Reinman’s (1977:156–158) observations of VST and CST pottery types in the Marianas, formal petrographic analysis of clay paste and temper inclusions was emerging as a major advance in Pacific Islands archaeology (Dickinson and Shutler 1968, 1971, 1974, 1979). This ambitious research program aimed to identify possible long-distance transport of pottery according to the presence of exotic minerals in some pottery fragments, based primarily on mineral inclusions other than CST. Calcareous beach sand grains generally are not diagnostic of specific locales, but other mineral types of volcanic origin potentially can be unique to certain geological source areas. The same research also allowed some basis to speculate about technological differences in types of clay paste and temper inclusions. Along these lines, definitive conclusions relevant to Marianas pottery would develop some time later.

Partly concurrent with but also following Reinman’s (1977) survey effort, a number of area-specific projects were undertaken in support of resource management planning in Guam, generally for the purpose of identifying possible archaeological sites in areas prior to new construction work. Overall, the resulting reports provided more detail to augment the island-wide Guam survey reporting. For example, more detail was provided for the Pagat Site on the eastern coast of Guam (Reinman 1970), and test excavations were described for the Asan area (Reinman and Taylor 1981). Other similar projects included baseline survey reporting for the Orote Peninsula (McCoy et al. 1978), additional survey reporting for the Ugum River Valley (Dye et al. 1978), additional survey



reporting for the Inarajan River Valley (Dye 1979), and detailed recording and test excavation at an isolated *latte* site amidst a U.S. Navy construction zone in Finegayan (Birkedal and McCarty 1972).

Most archaeology projects at this time verified or augmented Reinman's (1977) island-wide survey for Guam, but the new survey results from the Ugum and Inarajan River Valleys of southern Guam (Dye 1979; Dye et al. 1978) challenged Reinman's (1977:153–154) interpretation of inland *latte* period settlement as either later or less frequent than coastal settlement in Guam. In particular, Dye (1979:11) proposed a hypothetical scenario:

All ridges were at one time covered with a well-developed soil and pottery was deposited on all ridges. On some ridges, where erosion has been especially fierce, most of the pottery had eroded away. Where erosion had proceeded more slowly, both soil and pottery remain.

This possible explanation was proposed as congruent with survey findings of pottery along ridgetops and also found eroding from some ridgetops in southern Guam. Dye (1979:13) also noted that the notion of late inland migration and limited seasonal use of the island interior seemed insufficient by itself, and other explanations were needed such as described above. According to Dye (1979:13):

Instead, the wide distribution of pottery on ridges adjacent to rivers, the magnitude of ecological change on the whole of southern Guam, and the apparently long prehistory of man on the island impel a consideration of settlement models based on long-term exploitation of, and adaptation to, the changing resources and constraints of the environment of inland Guam.

Some years later, these concepts would be presented in a formal publication (Dye and Cleghorn 1990), along with a proposal for additional study to test the new proposed hypothesis about inland settlement in southern Guam.

Also primarily in the 1970s, the "Guam Territorial Archaeology Laboratory" was active, based at "Dean Circle House 9" of University of Guam, and tasked with government resource management of archaeological and historical sites. The staff members included Marvin Montvel-Cohen, Alejandro T. Lizama, William L. Hernandez, Victoriano April, Cherry Goudeau, Jillette L. G. Guest, Anthony Manglona, Alfred S. Masga, Darlene R. Moore, Adriano Pangelinan, Anthony L. G. Ramirez, and John Q. Salas. Other non-staff contributors included Frank Aldan, Alex Ching, Marilyn Chaviers, Gary Chester, Mike Fleming, James Hardy, Osamu Kataoka, Paul Roland Palomo, Anthony Pangelinan, and Laura Caso.

The "Guam Territorial Archaeology Laboratory" produced its own publication series called "Latte," explicitly embracing a sense of *latte* sites as the

focus of attention. The first publication in this series included three summary reports concerning: 1) an examination of the As Nieves *latte* stone quarry site in Rota (Lizama et al. 1981); 2) salvage recovery of *latte* village remains at Toguan Bay in support of a sewer line construction (Montvel-Cohen et al. 1981); and 3) a baseline archaeological resource assessment at Ylig (Hardy et al. 1981). In all three cases, the reporting emphasized clear description of site form and contents, and the findings generally were useful for interpreting site-specific aspects of the *latte* period.

At the end of the 1970s, two notable academic projects in Guam focused on the evident discontinuity between *latte* period and pre-*latte* archaeology as identified by Spoehr (1957). These two projects were quite unique at their time, examining more than just the *latte* period. In this view, the *latte* period could be understood more meaningfully by a longer-term perspective and by inquiring about how the *latte* period society developed from an earlier ancestry. Both projects formed the basis of M.A. theses, in one case focusing on a description of pre-*latte* pottery at the Ypao site in Tumon by Helen Leidemann (1980) and in the other case focusing on stratigraphic ordering of *latte* and pre-*latte* occupation layers at the Tarague Site in northern Guam by Erwin Ray (1981).

The two above-mentioned M.A. thesis projects in Guam at their time were regarded as exceptional departures from the main focus of the *latte* period. Both projects relied on analysis of artifacts from excavations, whereas nearly all other efforts in Guam were based on surface reconnaissance with only very limited (if any) test excavation. Issues of chronology therefore had not been considered by most people active in Guam archaeology at the time.

Outside Guam, funding opportunities were extremely limited for archaeological work elsewhere in the Mariana Islands, especially during the 1960s through 1970s. Japanese teams focused on *latte* sites such as Mochong in Rota (Takayama and Egami 1971; Takayama and Intoh 1976) and Regusa in Pagan (Egami and Saito 1973). Meanwhile, following Spoehr's (1957) cue, two scholars pursued stratigraphic excavations to document the relationship between *latte* and pre-*latte* occupation layers in Saipan, specifically involving work coordinated by Jeffrey Marck (1978) at Unai Bapot and by Dean Thompson (1977) for an island-wide geomorphology-based site predictive model far ahead of its time.

The excavations at the Mochong site in Rota revealed an expected abundance of artifacts and midden associated with the surface-visible *latte* horizon, overlaying a slightly older cultural deposit (Takayama and Egami 1971; Takayama and Intoh 1976). This work did not identify a substantially ancient pre-*latte* cultural layer, but it was sufficient to document some of the change in pottery and other artifacts that occurred around the initial transition into the earliest portion of the *latte* period. Most interesting, some degree of continuity can be observed between the latest pre-*latte* pottery and the earliest *latte* pottery,

thereby suggesting uninterrupted local production of pottery across this transition. This finding may be interpreted to suggest that the local population of pottery-makers (and presumably of pottery-users) was not significantly interrupted, so any notion of a population replacement during the *latte* period would need to address these findings.

Excavations at the Regusa *latte* site in Pagan yielded probable European and definite Chinese imports within the cultural deposit associated with the surface-visible *latte* remains (Egami and Saito 1973). Radiocarbon dates from this layer calibrate primarily in the range of A.D. 1400–1600, but a more liberal interpretation calibrates more broadly in the potential range of A.D. 1300–1700. This finding requires one of two possible explanations that both are quite intriguing; 1) European and Chinese goods were integrated very rapidly into Chamorro material culture; or 2) contact with the outside world may have occurred slightly earlier than Magellan's arrival in the region in 1521.

Jeffrey Marck's (1978) excavations at Unai Bapot in Saipan were most important for documenting stratified deposits more than 2 m deep, including a number of distinctive cultural occupation layers pre-dating the surface-associated *latte* period occupation. As outlined at other sites by Spoehr (1957; see also Pellett and Spoehr 1961), each deeper layer contained a different configuration of pottery types and other materials. The oldest layer at Unai Bapot dated at least as early as 1000 B.C., and the surface-associated *latte* period occupation very clearly was within its own stratigraphic horizon and dated much more recently.

Dean Thompson's (1977) visionary exploratory research of Saipan coastal geomorphology allowed a sophisticated model of where to expect deeply buried pre-*latte* deposits. Other research had indicated that the *latte* period was mostly surface-associated and within a stratigraphic horizon readily understandable from modern surface observations, yet the evidently deeply buried pre-*latte* archaeological layers posed something of a mystery that could not be understood as easily as the surface-accessible *latte* period ruins. According to this new model, the earliest site deposits could be expected some distance from the present shoreline, variable depending on the specific coastal landform, and at least 1 m deep. At the time of this work, change in sea level was not clearly understood, but now some decades later this additional information potentially can help to refine the original model.

At the close of the 1970s, Marianas regional archaeology was dominated by basic descriptions of the *latte* period in Guam, although in retrospect probably the most innovative and informative research consisted of just a few and generally poorly funded projects in the islands north of Guam. The efforts in Guam were supported by local and U.S. government funding, and new opportunities were emerging due to government-mandated resource management work.

### **1980 through 2000 Growing Pains of the Discipline**

During the years 1980 through 2000, archaeology in the Marianas region developed strongly defined sub-categories of academic scholarship, government regulation, and private contracting. The same three sub-categories were evident nation-wide in terms of employment and daily work focus. Now some years later, these decades can be viewed as critical toward developing these three career branches separately but with virtually no attempt at integrating the discipline as a whole.

Since the 1980s, government-regulated cultural resource management (CRM) has been in the forefront of Marianas archaeology, especially in Guam and to a lesser extent in Saipan. Opportunities for private contracting began to take shape, wherein archaeologists could offer their professional services for a fee as part of the larger scope of resource management in support of construction development projects. However, enforcement of the government regulations was slow and awkward. Also, only very few trained experts were available in the region, both for undertaking the field projects and for evaluating the sufficiency for the appropriate government agencies.

Along with the sudden new surge in the professional practice of archaeology in the private sector, issues of “scientific archaeology” or “new archaeology” had been gaining popularity in the U.S. since the 1970s and clearly dominant in the 1980s. This perspective was not highlighted in the Marianas, but of course efforts at being scientifically grounded were appreciated.

Generally in the Pacific Islands, an explicit body of theory and method for a “scientific archaeology” was not a major concern in itself, but more effort instead focused on baseline data collection throughout the region. A few researchers attempted to promote their versions of archaeological science, not always in agreement and also not always verified by real data.

Also stemming from trends in the 1970s were two approaches often allied with the “new archaeology” of the U.S., namely ethnoarchaeology and experimental archaeology, gaining more notoriety in the 1980s. Ethnoarchaeology involves ethnographic observations of human behavior as a means to inform or interpret archaeological material remains. Experimental archaeology involves controlled testing of the performance of materials or proxies to ascertain how they most likely were used.

Ethnoarchaeology or something vaguely like it was especially popular in Polynesia, embraced as a way to combine traditional cultural knowledge, oral history, and linguistics with archaeology (Kirch and Green 1987, 2001). The special attraction in Polynesia was the unusually close congruence of the different lines of evidence. However, this approach was not feasible in the Mariana Islands, due to large-scale language change and transformation of cultural practice over the course of some centuries before archaeologists first became interested in this potential line of inquiry.

Experimental archaeology somehow was not attempted very much at all in Pacific Islands archaeology, so its absence in the Marianas region can be understood as consistent with this larger pattern. Nonetheless, a number of research topics could be ideal for experimental approaches, for example testing processes of quarrying, transporting, and erecting *latte* stones.

Specifically within the Marianas region at the beginning in the 1980s, academic research interest began to strengthen due largely to the formal role of University of Guam in advancing archaeology in the region. Of note, Dr. Hiro Kurashina organized research at the deeply stratified Tarague site in Guam (Kurashina et al. 1981) and then at several other sites of the *latte* period, while Dr. Michael Graves worked at various sites throughout the region. The Tarague research proved to be extremely informative about the sequence of cultural change over the last 3000 or more years (Kurashina and Clayshulte 1983a, 1983b), especially in terms of the pottery remains that became the subject of a M.A. thesis by Darlene Moore (1983). The efforts by Michael Graves produced overviews of the history and archaeology of Tumon and of Asan just prior to large-scale development in both of these areas in Guam (Graves and Moore 1985, 1986).

Concurrent with the University of Guam efforts, other researchers became active in the region due to government-mandated resource management work, yet this scope of work did not always accommodate traditional research pursuits. These opportunities were especially appealing in the islands north of Guam, while Guam itself already was occupied by other professional researchers. Ross Cordy (1983, 1985) pursued notions of social ranking during the *latte* period. John Craib (1983) highlighted the Mariana Islands in a ground-breaking scholarly publication about Micronesian archaeology, whereas previously Marianas archaeology (like Micronesian archaeology as a whole) had been obscure and unnoticed.

In the middle to late 1980s, interest increased in notions of social ranking as reflected in *latte* sites. Cordy (1983, 1985) interpreted historical Spanish records to suggest levels of social hierarchy potentially reflected in *latte* sites. Craib (1986) interpreted differential spatial patterns and possible implications for social ranking at the Pagat *latte* site in Guam, concluding that the evidence did not necessarily reflect social ranking. Meanwhile, Graves (1986) proposed that *latte* sites indeed reflected social ranking or status, but actual archaeological data to test this model was unclear. Supporting data were offered slightly later in limited fashion, demonstrating convincing differences in types of sites but not necessarily linking these differences with social ranking or any other explanation (Graves et al. 1990). As Craib (1986) proposed in his study, the differential patterns at *latte* sites could be explained in any number of ways.

Regardless of social ranking implications, the high-frequency spatial distribution of *latte* sites was considered very impressive, especially in

comparison to the extremely few earlier sites known in the region. Kurashina (1991) synthesized prior survey data plus results of newer investigations for an island-wide view of *latte* period site distribution of Guam. These results provided a baseline for beginning any serious study of settlement pattern, land use, population demography, or ecological carrying capacity. These further studies, however, have not been undertaken, and some substantive update of the baseline synthesis now would be required.

During the 1980s, archaeological research was encouraged in the Commonwealth of the Northern Mariana Islands (CNMI), and a published overview of Northern Marianas archaeology (Russell and Fleming 1986) further encouraged researchers in region, continuing into the 1990s. Much of this research was possible in conjunction with resource management contracting. Not all of the results were published or reported in full, but several notable contributions included re-excavation of the Unai Bapot site in Saipan (Bonhomme and Craib 1986), excavations at Achugao and San Roque in Saipan (Butler 1994, 1995), excavations at Unai Chulu in Tinian (Craib 1993), survey work in large portions of Rota (Butler 1988; Craib 1998), and an island-wide survey of Aguijan (Butler 1992).

Re-excavation at Unai Bapot in Saipan was important for establishing a better chronology of the stratified cultural layers, previously noted by Marck (1978). A series of new radiocarbon dates in stratigraphic order verified that the deepest and oldest layers probably were at least 3000 years old (Bonhomme and Craib 1986).

Excavations at Achugao and San Roque in Saipan were remarkably productive for defining the pottery type of the earliest period around 1500-1000 B.C. (Butler 1994, 1995). A buried layer was documented, yielding thin redware pottery, some bearing fine decoration with lime in-fill. Radiocarbon dates from this layer were contradictory to stratigraphic order, but the oldest portion appears to be around 1500 B.C. or possibly slightly older. Other dates from the same layer, however, are significantly younger. The dating problems are unfortunate, but the collection of early decorated redware pottery is among the largest in the region.

Excavations at Unai Chulu in Tinian revealed yet another buried early site deposit, containing finely decorated redware pottery (Craib 1993). The radiocarbon dating in this case suggested an age slightly younger than 1500 B.C. and certainly older than 1000 B.C. These results helped to provide a reasonable age constraint on the earliest settlement period in the Marianas region.

The large-scale survey projects in Rota and Aguijan focused almost entirely on surface-visible ruins and near-surface layers, related to the *latte* period and more recent historical eras (Butler 1988, 1992; Craib 1998). The reported results potentially can be useful for studies of site distribution, settlement pattern, and related issues.

While a number of researchers were encouraged to be active in the Commonwealth of the Northern Mariana Islands (CNMI), the situation in Guam during the 1980s through 1990s was driven primarily by competition among private consulting firms bidding against each other for contracting opportunities as a source of business revenue. A number of private firms opened business offices in Guam, some more successful than others over the years. Contracting jobs mostly were in areas of urban development, wherein archaeological resource management was mandated by law but not always enforced. The most consistently enforced and funded cases were related to undertakings by U.S. government agencies throughout Guam and to a lesser extent in Tinian. Guam-based private firms had only very few realistic opportunities to compete for projects in the CNMI.

Resource management efforts focused almost entirely on basic site identification and evaluation, with the possibility of salvage recovery of data. In principle, the documented data could be useful toward scientific and scholarly study. In reality, the so-called “gray literature” reporting became archived in largely inaccessible government storage bins. The gray literature, if it could be accessed and synthesized, potentially could supply basic descriptive documentation in support of significant research.

In terms of contributing to the historical development of archaeological practice, some of the more notable research management projects in Guam during the 1980s included controlled excavations and construction monitoring throughout the Tumon area (Bath 1986), large-scale excavation recovery in and around the Gun Beach portion of Tumon (Kurashina et al. 1987), an effort to synthesize information about the Hagatna area overall (Cordy and Allen 1986), the first explicitly palaeoenvironmental study at the Hagatna Marsh (Hunter-Anderson et al. 1989), and an inter-disciplinary study at Ritidian in northern Guam (Kurashina et al. 1990). These new directions would be followed more successfully in future decades.

Based on the broad scope of observations during controlled excavations and construction monitoring throughout Tumon, Joyce Bath (1986) proposed a model of change over time in sea level and coastal morphology at Tumon. The earliest site deposits were found far removed from the present-day shoreline. Closer to the present-day shoreline, only more recent deposits were evident. Unfortunately, radiocarbon dating of the earliest deposits was rather suspiciously older than 2000 B.C. and not associated with any artifacts, midden, or cultural layer. Also unfortunately, past change in sea level was very poorly understood at that time, so the proposed model was lacking in technical supporting details. A prior study by Dean Thompson in Saipan (1977) was by comparison more accurate and also more sophisticated in its methodology, but both efforts were lacking useful information about sea-level change that eventually would be available some years later.

Within one portion of Tumon, Kurashina (1988) directed detailed excavations for recovering information of a very intensive coastal habitation dating to the *latte* period in and around Gun Beach. In addition to illustrating the procedures for detailed excavation recovery, these efforts yielded the largest known collection of fishing gear artifacts from any single site in the region. The resulting collection has proven important for defining the fishing gear of the *latte* period, especially including V-shaped gorges or gorgets made of *Isognomon* sp. shell fragments (Sinoto 2007).

Related to the general engineering development and resource management in the Hagatna and Fonte River Drainages, Cordy and Allen (1986) synthesized extensive documentary historical and ecological information, along with a program of archaeological reconnaissance survey and limited test excavations. This effort showed the rather high value of historical and ecological information toward general cultural resource management work in Guam. Awkwardly, though, the actual archaeological component of this work was somewhat lacking in survey coverage and excavation methodology.

Another study in Hagatna explicitly pursued palaeoenvironmental data through coring in the marshland (Hunter-Anderson et al. 1989). This study was the first of its kind in the Mariana Islands, and it very importantly demonstrated the value of coring in sediments at the bottoms of lakes and swamps, where preservation conditions potentially could reveal sequences of pollen, charcoal particles, and other remains reflecting the past environment. Of special interest was the ability to identify proxies of human impacts on the environment, such as burning and clearing of native forests and introduction of culturally useful plants. Also with some effort, the environmental context possibly could be reconstructed in terms of the physiological setting. This particular case study in Hagatna yielded somewhat vague results, but the methodology seemed appropriate for future efforts to follow.

An inter-disciplinary study of natural and cultural resources was undertaken at Ritidian in northern Guam (Kurashina et al. 1990), setting a good example for how such a comprehensive research program could be organized with archaeology as one of the key components. The U.S. government-funded project unfortunately was very limited in its geographic “footprint” at Ritidian, so the resulting data were relevant only to a rather small area. The most promising locales for archaeological research rather frustratingly were outside the permitted scope of work. Nonetheless, the notion of an integrated natural-cultural research program was exemplary for its time.

Near the end of the 1980s, an academic conference about Micronesian archaeology encouraged scholastic and professional attention for Micronesian archaeology as a whole, including the Mariana Islands as just one part of this larger scope. Most of the individual presentations were published in a special supplement of the journal *Micronesica* (Hunter-Anderson and Graves 1990).



Also near the end of the 1980s, Morgan (1989) published a sophisticated study of Micronesian monumental architecture, with an important treatment of *latte* in terms of the stone elements and the wooden superstructures that likely once existed according to architectural design and performance criteria. The new advantage of this perspective was to bring architectural engineering issues into a more mainstream scope accessible to archaeologists and others. Curiously, this work did not receive much follow-up attention.

At the beginning of the 1990s, archaeological research and resource management continued much the same as in the 1980s in the Marianas region. It was characterized by a dominance of cultural resource management (CRM) work performed by private contracting firms in Guam and to a much lesser extent in Saipan, Rota, and Tinian if supported by local economic developments. The focus of work depended on urban developments and bureaucratic triggers for government-compliance involving resource management. Realistically, compliance with resource management was quite unevenly applied in the private sector, but exceptional funding and opportunities were unleashed through the U.S. Navy and to a lesser extent through the U.S. Air Force, with most this attention in Guam and also in the northern portion of Tinian.

The dominance of resource management work resulted in tremendous volumes of baseline descriptive information, preserved in the so-called “gray literature” of dense reports on file in government offices. Meanwhile, university programs were diminishing as the previous regional academic leaders shifted their attention to other areas, so opportunities for recruiting new students and academic notoriety also were diminishing. Instead, archaeological work in the Marianas proceeded by a capitalist business model. Only a few rare individuals made efforts to pursue scholarly research interests, and extremely rare were attempts at peer-reviewed academic publication.

The Tumon area of Guam grew dramatically during the 1990s as a tourist center, and archaeological projects were quite intensive as hotels, resorts, and shopping areas were constructed and expanded in the mostly sandy beach terrain. Considerable developments already had occurred during the 1980s, and the major opportunities both for studying intact *latte* settlements and for identifying earliest preserved sites were lost. The attention during the 1990s was almost entirely on *latte* period remnants of middens and grave features, mostly in truncated shallow subsurface contexts beneath prior zones of bulldozing disturbance. A few earlier deposits were documented in rare cases.

Generally for beach sites, the government-approved scopes of work have involved limited test trenching and monitoring. The test trenching in principle could identify the geographic boundaries of whatever sites were present, and the monitoring presumably provides a means to observe and record additional discoveries during the mechanized construction projects. Test trenching almost never exceeds 1.5–2 m, whereas earliest sites in the region have been known for

some decades to be buried more than 2–2.5 m deep in beach sites (Pellett and Spoehr 1961). In addition, monitoring of construction clearly does not allow close attention to detail, and it depends entirely on the scope of construction work and the construction crew's willingness to cooperate with the archaeological monitor typically perceived as a hindrance or obstacle to the construction project. This unfortunate methodology allowed many sites to be destroyed without clear documentation and study.

Several beach sites in Tumon and other similar settings of course have been documented, but the focus has been on the near-surface layers and lacking reasonable understanding of long-term stratigraphic sequence formation. In this manner, the remnants of *latte* period habitation middens and grave features have been reported in numerous instances but each within certain limits, and slightly earlier site deposits have been identified in a few rare cases. Meanwhile, the full scope of what once may have existed has been lost, and the larger context of sites generally has not been comprehended accurately.

While the opportunity to study long-term natural-cultural sequencing was apparently lost in the most promising Tumon area of Guam, the antiquity of first settlement in Guam was in some cases being questioned and in other cases being grossly misunderstood. The Ypao beach site in Tumon (Leidemann 1980) was known to contain an early redware pottery, but it clearly was not the earliest of the total regional sequence. Nonetheless, it has been misunderstood by many as evidence of the first settlement episode, despite a program of test pits with radiocarbon dates proving a younger age (Olmo and Goodman 1994). Meanwhile, the prior radiocarbon dating of the earliest layers at the Tarague site in northern Guam (Kurashina et al. 1981) were by now considered to include too much of broad error ranges to be useful, and additional excavations in different portions of the general Tarague area were unable to uncover more of the same earliest-period pottery and cultural deposit (Athens 1986; Liston 1996; Ray 1981).

The outlook during the 1990s was very poor for finding the earliest human occupation layers, but three important beach site excavations during the 1990s reported very early site deposits in Saipan and Tinian. At the Chalan Piao site in Saipan, previously reported by Spoehr (1957) to contain very early decorated redware pottery dated probably around 1500 B.C., Moore et al. (1992) documented more of the same pottery but without excavating the deepest and earliest portion of the site. At the Achugao and San Roque sites also in Saipan, the best known collection of early decorated redware pottery was reported (Butler 1994, 1995), but the associated radiocarbon dates included some unusually broad error ranges, some degree of stratigraphic mis-ordering, and apparent ambiguity of association with the pottery of most interest. At the Unai Chulu site in Tinian, Craib (1993) reported a convincing radiocarbon sequence according with the pottery sequence beginning slightly later than 1500 B.C., and Craib (1999) also

realized the importance of these findings for revolutionizing theoretical models of the first human explorations of the western Pacific region. Later, a large-scale excavation effort at this site was reported in a difficultly dense government report, but the raw descriptive data survive as an exceedingly valuable reference (Haun et al. 1999).

Although having missed opportunities for studying the earliest preserved sites in beach settings, *latte* period occupations have been documented in almost every beach that has been examined in the Marianas region. In addition, *latte* period and later materials are virtually the only surviving archaeological record in inland settings of shallow acidic clays overlaying bedrock. While most beach settings had been developed by the end of the 1990s and leaving little further opportunity for archaeological study, the inland locales still represented at least some potential albeit not well understood.

Given the practical constraints of inland settings for preserving archaeological materials in shallow acidic clays, the status quo methodology adopted in cultural resource management was surface reconnaissance, sometimes with limited shovel testing. This approach was quite expedient for covering large areas of land within a short amount of time, and it was considered sufficient for the mostly surface-visible and near-surface findings expected of *latte* period sites. However, this approach was not always practical in areas of extremely dense tropical vegetation cover. The spacing between survey transects sometimes varied several meters apart, creating opportunities for missing information lost between the transect lines, and errors were compounded by involving large crews of people working independently along separate survey transect lines. Also, subsurface testing was not always conducted or at least not in a systematic manner, so the possibility of subsurface deposits, even if just very shallow, often was not ascertained.

Updating an earlier proposal (Dye 1979), Dye and Cleghorn (1990) proposed that inland settings, especially with their case study example in the southern Guam mountains, deserved a more sophisticated methodology for site survey and interpretation of context. The main point was to recognize that inland locales likely were used throughout the full scope of human occupation in the Marianas region, yet the status quo approach of superficial reconnaissance was insufficient to identify many site remnants and to comprehend the past environmental settings.

A number of inland projects reportedly involved closely spaced survey transects and systematic shovel testing or sometimes mechanical backhoe trenching, followed by detailed excavation efforts in areas of major findings. Unfortunately, the results typically were reported in nearly incomprehensible formats of multi-volume sets of chapters and appendices detached from one another, moreover destined to obscurity in the “gray literature” of government office archives.

Most inland projects involved non-intensive field protocol, and at least a few cases proceeded as monitoring of mechanized vegetation-clearing in hopes of finding remnants of sites in the disturbed wakes of grubbing and grading. The most obvious surface-visible *latte* sites presumably were identified and documented, but the less obvious vestiges were not always recognized, especially in subsurface contexts. The most physically substantial site components probably were studied sufficiently, but the resulting data-sets could not convincingly be viewed as accurate representations of the total archaeological record.

Partly inspired by the apparent problems of finding earliest sites and of understanding long-term sequences of occupation in the Marianas region, a program of palaeoenvironmental study greatly strengthened during the 1990s as an alternative new component augmenting more traditional archaeological approaches. The basic premise involved examination of sediment cores from the bottoms of lakes and swamps, where pollen, charcoal, and other materials had been preserved within the sedimentary sequences. The first study of this kind was in Hagatna Marsh (Hunter-Anderson et al. 1989). A number of other studies were undertaken throughout the 1990s (Athens and Ward 1993, 1998, 1999; Ward 1994) and also more recently (Athens et al. 2004; Athens and Ward 2004, 2006; Dega and Cleghorn 2003).

During the 1990s, palaeoenvironmental coring studies consistently showed a horizon marker of first anthropogenic impact proxies around 1500 B.C. One of the more convincing proxies was the first evidence of charcoal influx, reflecting human-induced burning of native forests, following some millennia of no burning episodes. Other proxies were decline in native forest taxa, replaced by introduced economic plants and secondary-growth disturbance taxa. However, the sediments in the bottoms of lakes and swamps did not yield direct hard evidence such as artifacts associated with clear time periods, so precise coordination with archaeological chronology remained somewhat problematic.

The same palaeoenvironmental coring studies also showed an apparent increase in intensity of land use roughly coincident with the beginning of the *latte* period around A.D. 900–1000. However, this later period was not the primary research focus, so the dating was not always as precise as might be desired. Nonetheless, an approximate correlation is apparent between intensive landscape use and the *latte* period, potentially of much importance for understanding the larger context of human-environment relations.

Similar to the palaeoenvironmental coring studies, efforts to examine animal bones in principle could reveal aspects of the ancient environment and potentially about human-environment relations. The typical strategy involves excavation of sequences of animal bones preserved in caves. Unfortunately, very little was found in this manner pre-dating about A.D. 900–1000, and nothing at all was found pre-dating about A.D. 200–400 (Pregill 1998; Pregill and Steadman 2009; Steadman 1992, 1999). Within their limits, the results indicated an absence of

introduced domesticated animals in the region prior to Spanish contact, whereas domesticated pigs, dogs, and chickens were in most other Pacific Islands settings with the first settlements (Wickler 2004). Also, rats were absent before the *latte* period, although they appeared with first human settlement elsewhere. Moreover, the delayed arrival of rats may have been linked to the delayed decline in native bird populations, as compared to their depopulation in nearly all other Pacific Islands directly following the first human presence.

Unlike the somewhat disappointingly limited findings of the animal bone studies, examination of marine shellfish remains has proven more productive and applicable to the full chronological scope of human settlement in the Marianas region. The most obvious pattern noticed during the 1990s was a dominance of *Anadara* sp. shells in early sites versus a dominance of *Strombus* sp. shells in *latte* period sites (Amesbury 1999; Amesbury et al. 1996). Part of the explanation for this two-part pattern was not well understood until later, relating to a drawdown of sea-level starting around 1050 B.C. and lasting until the first few centuries A.D. (Dickinson 2000, 2003). The supporting habitat of swamps and shallow lagoons for *Anadara* sp. no longer existed after the drawdown, but instead newly prograded sandy beaches and newly formed lagoons supported gastropods such as *Strombus* sp. and others. Also, this two-part sequence revealed some aspect of chronological change in dietary preference and interaction with natural resource zones.

Another aspect of subsistence economy was addressed during the 1990s, relating to the role of rice as a food valuable during the *latte* period (Hunter-Anderson et al. 1995). This study showed impressions of rice inside fragments of *latte* period pottery. These particular pottery fragments were dated only vaguely, but at least a broadly generalized *latte* period association seems appropriate. This finding was of much interest for demonstrating rice grown in the Mariana Islands, whereas it was entirely absent in all other Pacific Islands settings at the time of European contacts.

Based on a perceived need for public knowledge of Marianas archaeology, two popular publications achieved some success. One was a brief summary about *latte* (Goddard 1995). The other was a full-length textbook intended for school children but somehow used as a general academic reference in Guam (Cunningham 1992). Both works were based largely on readings of historical references and modern cultural knowledge about the *latte* period. The final products were not necessarily in accordance with archaeological data and interpretations, but certainly they brought general public attention to regional archaeology.

In addition not the above-mentioned works, five key scholarly publications of general reference came to light during the middle to late 1990s. These included: 1) an overview of Micronesian archaeology with a section devoted to the Marianas (Rainbird 1994); 2) a synthesis overview of Northern Marianas

archaeology (Hunter-Anderson and Butler 1995); 3) an overview of first human settlement chronologies of Micronesia again with one portion specifically about the Marianas (Intoh 1997); 4) an edited volume for the topic of physical anthropology in the Mariana Islands (Hanson and Butler 1997); and 5) a summary cultural history of the Northern Mariana Islands (Russell 1998).

Rainbird's (1994) overview of Micronesian archaeology was a major milestone in regional research, because previously Micronesian archaeology had been mostly ignored compared to other regions of the Pacific. Rainbird (1994) synthesized the available archaeological data in summary form, necessarily abbreviating rather complicated details into a concisely readable product. The ending result was to emphasize just the major research findings for each geographic area, so the summary about the Marianas for example was limited to the same constraints and deficiencies of the primary data generated by other researchers.

A summary of Northern Marianas archaeology (Hunter-Anderson and Butler 1995) provided a useful narrative of major findings and research topics. At its time, this summary overview was an extraordinary effort and significant contribution to regional research. Also at its time, however, the authors themselves noted it already was somewhat out-dated due to rapid generation of new data. The total information content in any case was impressive and still stands as a milestone in Marianas regional archaeology.

Intoh (1997) offered an insightful overview of the initial settlement episodes responsible for human population dispersals throughout Micronesia, highlighting the Mariana Islands as an exceptionally early and apparently separate case compared to the rest of Micronesia overall. Dating of earliest Marianas settlement was not as precise or as reliable then as it is now, but the overall pattern still was convincing.

Also in 1997, special issue of *American Journal of Physical Anthropology* was devoted to the results of research in the Mariana Islands (Hanson and Butler 1997). The internal contributing articles covered multiple topics generally within the scope of physical anthropology and of at least some interest for archaeology. Some years later, detailed examination of human remains would become viewed by some as unnecessary intrusion into the privacy of the deceased, yet many other opinions of course co-exist. Examination of skeletal remains actually has been very common in the "gray literature," but the 1997 special issue remains one of the few existing scholarly publications of this general scope of research.

Russell's (1998) summary of Northern Marianas culture history presented a refreshing cultural heritage perspective, also drawing on several years of familiarity with historical and archaeological data. The final product was remarkably successful for general readership and for specialized historical and archaeological studies. As with all overview synthesis works, naturally some update and refinement eventually will be desired.

In hindsight, the impressive volume of archaeological work 1980 through 2000 surely allowed baseline documentation of new data, but most of the results may be considered less than satisfactory especially by today's standards of practice in a world-wide perspective. Perhaps this opinion seems unfair when detached from the circumstances of the time, but in fact very detailed and thorough work was conducted in other Pacific Islands and other parts of the world at that same time. Not much of substance had been accomplished that advanced beyond Spoehr's (1957) initial findings and outline of Marianas archaeology. A few rare individuals made efforts to publish new research data, sometimes of limited success due to the raw data available, but also sometimes ignored by colleagues more interested in other issues.

### **Post-2000 New Directions and Directives**

The very recent history of Marianas archaeology since the year 2000 probably cannot be evaluated meaningfully in historical context at this time, but at least the major points of interest can be reviewed. As in previous decades, local research was not always up to date with world-wide trends in method and theory. In general, this last decade involved a continuation of the status quo work strategy established in prior decades. A few efforts were made to improve the quality of work overall, not always successfully. Also, a few efforts were made for scholarly publication of research, again not always successfully.

Archaeological theory has continued to be mostly absent in the region, and accordingly absent have been developments of methods linking the virtually non-existent intellectual theory with baseline physical data. Elsewhere, theoretical notions already had advanced in great strides, with robust interpretive and analytical methods to make sense of raw field data relevant to the theories in question, such as in schools of thought of behavioral archaeology, historical ecology, cultural evolution, landscapes, evolutionary psychology, agency theory, identity issues, and more (Hodder 2001).

Compared to prior decades, the last decade since the year 2000 has been remarkably productive for testing and refining archaeological theories world-wide, but the level of productivity was by comparison astonishingly low throughout the Pacific region and almost non-existent in the Mariana Islands. Especially since the 1990s, a variety of ecological and landscape perspectives have been successful in many Pacific Islands settings (Kirch and Hunt 1997), for example including the palaeoenvironmental coring studies as mentioned above for the Marianas. A larger theory and body of methodology, however, did not develop coherently.

Probably the strongest attempt at theory recently in the Pacific Islands has been a "biocomplexity" model in Hawaii, drawing on aspects of landscapes and

historical ecology (Kirch 2007). The “biocomplexity” model was based on work in two rather marginal and exceptionally arid ecological zones, also with site remnants of very shallow time-depth mostly post-dating A.D. 1400–1600 and often post-dating the 1700s. These models posed ideal settings for study within easily controlled parameters not possible elsewhere. However, these unique and narrowly focused parameters also indicate that attempt to apply this model in other cases therefore would require extensive new work. In the near future, perhaps the most interesting aspect of this model would be to test its application in diverse physical and cultural settings, especially with long-term chronological sequences.

The general theme of human-environment relations can be traced back several generations in the history of archaeology as a discipline (Wilson 2011), so its application in the Pacific Islands is not at all a novel approach. The unique advantage for the Pacific Islands, however, is the opportunity to control variables in islands as “model systems” (Kirch 2007).

Unfortunately, research of human-environment relations in the Pacific has been mired in controversy over so-called “environmental determinism,” centering around a fundamental disagreement between two viewpoints: a) the extent to which people affected their environments; versus b) the extent to which environments affected people (Nunn 2003). In this “nature versus nurture” debate, some favor the role of people in altering their environments, whereas others stress the constraints of the physical world on cultural behavior. Both perspectives can be argued successfully but within certain limits. One solution is to consider the environment as a symbiosis of both cultural and physical elements that co-evolve (Wilson 2011).

Directly relevant to human-environment relational issues were several palaeoenvironmental coring studies, most productive during the 1990s as noted above but also continuing into this last decade (Athens et al. 2004; Athens and Ward 2004, 2006). The earlier work in the 1990s pointed to a consistent horizon marker of first human impacts around 1500 B.C., but the more recent work was interpreted to indicate the same horizon marker much earlier around 2200 B.C. The more recent interpretations of an older date were based on lesser resolution of sampling than in some of the earlier studies, and in fact the new dating results were rather vague and not directly associated with the evidence of human impacts. Instead, the researchers interpolated the age of first human impact proxies, based on the depth of the pollen and charcoal particles within the soil column, relative to the dating samples above (post-dating) and below (pre-dating) the actual horizon target-point of interest. Even more importantly, the dating results in some cases contradicted stratigraphic ordering, thereby invalidating the interpolation of an age-depth profile.

The full range of dating results and errors should be applied instead of proposing a particular point in an age-depth interpolation, so that the first human



impacts conceivably could have occurred at any time during a broad potential range. This potential range conceivably could be as early as 2200–2000 B.C., but it also could be much later approaching 1000 B.C. Compared to other studies, a date around 1500 B.C. is the most plausible.

In a recent critique of the palaeoenvironmental coring interpretations, Hunter-Anderson (2009) questioned the early dating, based not on the above-noted technical issues but rather on notions of savannah-grasslands as naturally occurring versus human-induced products. Grasslands cannot persist unless they are maintained by periodic burning episodes that could be either natural or human-caused, or else forest cover eventually would develop. A low-frequency existence of grass does not indicate a grassland-savannah, but rather the relative abundance of grasses versus forest-cover taxa needs to be considered. Hunter-Anderson (2009) suggested that the constant horizon marker of charcoal influx in the Marianas coring records might have been due to a region-wide dry period during which fires occurred naturally, and then the grassland habitat was maintained by a series of natural fires and perhaps later by a combination of natural fires and human-caused firing. The problem with this argument is that the coring records reveal a few thousand years of absolutely no charcoal or grassland indicators prior to the constant horizon marker, but instead the environment was dominated by tropical forest cover until after this apparent horizon. Moreover, in the soil columns post-dating the initial human-impact horizon in each of the coring records, burning episodes and major grassland indicators are constant and increasing over time. The relevant argument therefore is not about the origin of the charcoal and grassland indicators as human-caused or not, but rather the accurate dating of this very clear and obvious horizon marker of first human impact needs closer attention.

The dating of earliest settlement in the Marianas is significant not only for local studies but also for larger-scale understanding of population dispersals in the western Pacific region. A date around 1500 B.C. would indicate Marianas settlement equal if not prior to the widely publicized Lapita-associated Austronesian settlement of Remote Oceania (Spriggs 2007), and moreover the earliest decorated pottery type indicates a direct link with the Philippines at this early date (Hung 2008). Unfortunately, the earliest dating for the Marianas has been problematic as outlined above for both archaeological sites and palaeoenvironmental studies. The world's most popular scholarly overviews of Pacific Islands archaeology therefore have been somewhat vague about the Marianas (Kirch 2000), and virtually no update has been incorporated since then (Kirch 2010).

Recent archaeological excavations at Unai Bapot in Saipan and at Ritidian in Guam both point to first settlement around 1500 B.C. (Carson 2008, 2010), in both cases associated with very thin redware pottery and also securely associated with tightly defined date ranges. Moreover, the earliest pottery without any doubt

appears to be a sub-set derived from a larger diversity of pottery types of the same age and earlier in the northern Philippines (Hung 2008; Hung et al. 2011). Comparative and historical linguistic studies also conclude very confidently a connection with the Philippines and specifically with the northern Philippines (Blust 2000; Reid 2002; Zobel 2002). Clark et al. (2010) caution that the precise earliest dating of at least some key sites may be slightly younger than 1500 B.C.

In addition to the confident dating of first settlement, another major scientific advance of the last decade has been the solid understanding of sea-level change (Dickinson 2000, 2003), thereby enabling proper contextualization of the earliest settlement sites and other more recent sites relative to the chronology of coastal geomorphology (Carson 2011). The earliest sites were occupied during a time of higher sea level, a maximum 1.8 m higher than today, lasting approximately 3400 through 1050 B.C. and then followed by a period of sea-level drawdown lasting until the first few centuries A.D. This overall regional information, together with findings at the earliest sites themselves, reveals that the initial settlement sites were very close to the ancient shorelines during a time when the broad sandy beaches of today did not exist, but rather the earliest sites were in offshore sand berms, very narrow pocket beaches, and unstable inter-tidal settings that were occupied for just a very short time before the period of sea-level drawdown. Also, the more recent sites can be interpreted in the context of prograding beaches and transforming nearshore ecosystems.

The new dating of earliest Marianas settlement and the new sea-level chronology could be viewed rather simply as modern verification and refinement of much older models (Pellett and Spoehr 1961; Spoehr 1957; Dean Thompson 1977) that unfortunately were ignored or misunderstood for some decades. In this sense, the new information is not necessarily surprising, but it does allow scientific research to proceed based on confident facts instead of the prior vague models.

Marianas archaeology specifically, like Micronesian archaeology generally, seems to be a rather esoteric field receiving just very little serious academic attention. In this context, Rainbird's (2004) full-length book treatment of Micronesian archaeology clearly is an outstanding example of what the region potentially can offer for archaeological research. Rainbird's (2004) overview was mostly an expansion with minor update of his earlier abbreviated summary (Rainbird 1994). As with any overview synthesis, however, details cannot always be considered fully, and summary statements are only as accurate as the primary data sources available for consultation. The most ideal success of these efforts would be to encourage more scholarly attention in the region, but these kinds of results are yet to be seen.

The major focus of archaeological work in the Mariana Islands has been and continues to be for cultural resource management, in accordance with local government laws and in some cases guided by U.S. government laws and

guidelines. Within the last few years, the level of private sector business interest has increased dramatically in the region, due to new contracting opportunities related to the U.S. military build-up, as well as unprecedented growth in the private sector and in local government infrastructure developments based on speculation of massive population increase. The U.S. government-funded studies broadly ranging through Guam, Tinian, Saipan, and Pagan since 2006 have included extensive new site surveys, detailed updates of existing site survey data, refinement of site locations based on the latest geographic positioning system (GPS) technology, development of high-medium-low probability maps using the newest geographic information systems (GIS) programs, and integration of the archaeological findings with studies of traditional cultural properties (TCP) in recognition of potential site significance other than material archaeological ruins. By comparison, the private sector projects overseen by local government agencies have involved continuation of previous lowest-bid competition and status quo methodologies that arguably have been insufficient for some decades already, especially in Guam with the most intensive and widespread private sector developments.

The resource management approach generally involves first knowing the locations and boundaries of sites, so that potential impacts can be either avoided or else somehow mitigated. In this regard, technological advances in GPS and GIS truly have revolutionized archaeological research and resource management world-wide (McCoy and Ladefoged 2009). New skill sets simply are becoming an expected standard, and lack of such skills in the Marianas no longer can be acceptable. Accurate locations and boundaries of archaeological sites previously have been quite frustrating in the Marianas region with only vaguely plotted site locations. In addition, some local government agencies insisted on not releasing site location data, in some cases providing intentionally incorrect information or in other cases simply refusing to share information. For the last several years, however, survey-grade accuracy of GPS has been available, and extensive georeferenced satellite imagery and other mapping data also have been available for more sophisticated GIS studies.

The new advances of GPS and especially GIS now enable various integrations of archaeological findings with geographic data, creating opportunities for new types of research questions and new ways of addressing these and other questions. This development has been important not only for archaeology but also for other fields of study involving coordination of different lines of evidence. Within the Mariana Islands, these new capabilities mostly have been used for rather mundane tasks of managing site locations and boundaries relative to proposed development projects. Other potential has not yet been realized in full, but nascent efforts so far have related to precise overlaying of historical era maps, estimation of resource catchment zones around sites of different time periods, calculation of slope erosion and deposition patterns,

modeling of high-medium-low probability zones for site discovery, and modeling of long-term coastal geomorphological sequences. The results so far have been limited to a few study areas and reported only in the “gray literature” of government-compliance documents.

Site location is critical not only for various research questions but also for the ability to make fact-based resource management decisions. In reality, knowing a site location makes little if any difference for private sector and local government infrastructure developments, because these undertakings already are planned for consuming the available land area regardless of the presence or absence of sites. In these cases, knowing a site location helps only for designing mitigation and salvage efforts, and only in exceptional cases does it allow for avoidance and in-place preservation of significant sites. Although it is contrary to popular current opinions about the U.S. government, sites found within U.S. government properties actually are better documented and given more attention for in-place preservation than is the case for sites in other lands. Partly, this increased effort is due to more funding and stricter laws applicable in U.S. government undertakings, and partly it is due to the large land-holdings within which development projects can be designed and re-designed to avoid or at least to minimize effects on significant natural and cultural resources.

Typically for private sector land developments, archaeological sites are identified just prior to (or sometimes during) land-clearing and foundational excavations, and salvage recovery proceeds during the course of archaeological monitoring of the construction efforts. Among the most high-profile of these cases within the last decade was the salvage recovery of more than 300 grave features within the footprint of a hotel expansion in Tumon, Guam (DeFant 2008). Many of the graves date to the *latte* period as may be expected, but many others date around 500 B.C. and are thus extremely rare opportunities to study an ancient burial population pre-dating the *latte* period. This site is about 1000 years younger than the earliest of the region that are dated around 1500 B.C., but it is the oldest known site containing large numbers of grave features. The results of this work undoubtedly will be of exceptionally high research interest.

Despite the research potential of ancient grave sites, questions may be asked of the appropriateness of removing skeletons from their final resting place. For example, a site could be avoided and preserved, or perhaps some provisions could be made to accommodate important new scientific study without disinterment of the human skeletal remains. However, this way of thinking is radically contradictory to the status quo approach of government-compliance resource management and contract-based business models. Specifically for the above-mentioned grave site in Tumon, its existence was known prior to the construction work, but the government-approved work plan called for emergency salvage recovery of each grave feature found during the monitoring of mechanized construction excavations. After some years of field effort and

additional years of data analysis, a report on this archaeological project has not yet been completed, and funding issues have been problematic for the land owner and developer while the total cost has increased with each grave feature now numbering more than 300. Critics easily can point to other ways in which this project might have been managed better, but in fact it is only one high-profile example of a much more common occurrence in local resource management made possible by a conglomeration of factors.

New directions of archaeological research have been frustratingly slow to develop while the vast majority of work proceeds according to out-dated notions of field methodology and poor understanding of research questions. For example, initial stages of site discovery currently rely on shallow testing of beach sites with virtually no concept of long-term site formation processes, as well as superficial reconnaissance survey with little or no subsurface testing in inland settings. Also, the apparently inadequate site discovery efforts are followed by inherently crude monitoring of construction activities, almost guaranteeing that at least some portion of the site contents will be missed as well as incapable of being contextualized due to the deficiencies of the original site discovery efforts. These problems are exacerbated by long-standing difficulties of finding qualified personnel to conduct and to supervise field and laboratory tasks, as well as to fill government agency positions, often with long-term negative consequences that rarely if ever are corrected.

Although the above-outlined situation is rather depressing for prospects of new archaeological research in the Marianas region, in fact a number of innovative new research projects have occurred within the last decade, thanks to a few individuals willing to make extra efforts on their own accord beyond the scope of their excessively time-consuming employment duties. These include: a) documentation and comparison of *latte* stone quarries (April 2004); b) consideration of rock art in caves (April 2006; Cabrera and Tudela 2006); c) examination of temper inclusions in pottery fragments (Descantes et al. 2001; Dickinson et al. 2003); d) a study of yam cultivation techniques represented in a *latte* period archaeological deposit (Moore 2005); e) evaluation of charcoal-stained mounds apparently associated with some *latte* period sites (Bulgrin 2006); f) examining differential use of space at *latte* sites (Dixon et al. 2006); g) deep excavations of beach sites with updated understanding of geomorphological sequencing (Carson 2008, 2010, 2011); and h) new modeling of ancient population movements based on cross-regional data comparisons (Clark et al. 2010; Hung 2008; Hung et al. 2011; Peterson 2009; Spriggs 2007; Wickler 2004).

A baseline documentation of *latte* stone quarries (April 2004) now allows a larger perspective on the larger life-history sequence of *latte* sites. The full life-history would need to consider stages of quarrying, transport, and on-site erection. This kind of study lends itself very well to controlled experiments, but

such has not yet been undertaken. For now, knowing more about the *latte* stone quarries is a good first step toward a more comprehensive understanding.

Other baseline documentation focused on rock art in caves, specifically at Tarague in Guam (April 2006) and at Kalabera Cave in Saipan (Cabrera and Tudela 2006). Associated midden deposits in these caves indicate *latte* period activities, but earlier site use also needs to be considered. Reddish, white, and black pigments were used for making positive and negative hand-prints, male and female figures, possible animal representations, and various geometric shapes. Following this scope of baseline documentation, other studies can proceed, for example evaluating possible chronological sequence of art motifs, association with possible rites of passage, and analysis of artistic design system.

Given the ubiquity of pottery fragments throughout the Mariana Islands, studies of individual pottery fragments offer exceptional potential. Beyond basic classificatory descriptions, detailed examination of clay paste composition and temper inclusions potentially can support studies of production and exchange (Descantes et al. 2001; Dickinson et al. 2003). These studies mainly have shown that all Marianas pottery is locally made and did not involve long-distance trading, and the rare longest movements were still within the Mariana Islands. Finer-scale examinations may yet reveal patterns of individual clay sources and pottery production groups. For now, the findings suggest that pottery-making was a standard skill practiced among all *latte* period communities but perhaps by specialists living within each community, and presumably the same situation applied in earlier periods as well.

Research of ancient cultivation practice has been exceptionally slow in the Mariana Islands, due to the lack of visible ruins of agricultural fields that dominate other Pacific Islands landscapes. At least one study, however, has shown that attention not detail can in fact document physical traces of ancient yam cultivation dating to the *latte* period in Guam (Moore 2005). Perhaps more such discoveries will yet be possible by virtue of similar attention to detail and ability to think in new ways.

One good example of thinking in new ways was Bulgrin's (2006) study of charcoal-stained mounds that appear to be associated with *latte* period sites. Previously, these kinds of mound features were ignored or misunderstood, but Bulgrin's (2006) study demonstrates quite well that vigilance of observation and recording can contribute to significant new interpretation and understanding.

Also contributing to larger perspective of *latte* sites and their settings, Dixon et al. (2006) examined differential use of space within *latte* sites in Tinian. Based on expedient surface documentation and shovel-test sampling, spatial patterns of different activity areas can be ascertained quite clearly. In addition to simple comparison of high-medium-low densities of artifacts and midden, the different types of represented activity also can be evaluated for example as related to tool manufacture, food preparation, and other such activities. The same approach can

be expanded for comparison of multiple sites and a more comprehensive study of the diverse past activities that took place at contemporaneous *latte* sets and sites.

Exploring beyond the abundant *latte* period archaeological remains, studies of the earliest Marianas sites have been most productive with special attention to secure radiocarbon dating and contextualizing the earliest site layers relative to long-term geomorphological sequences (Carson 2008, 2010, 2011). This work has shown earliest sites to date around 1500 B.C. during a time of higher sea level as described above. In addition, the results indicate that more recent periods of occupation can be understood in relation to prograding shorelines and ongoing transformations of nearshore ecosystems, so the long-term relationship between people and their environment may have been more dynamic than previously has been appreciated.

Also building on the secure dating of earliest Marianas sites, new models can be considered regarding ancient population movements. Clark et al. (2010) suggested a linear progression model, wherein a date slightly younger than 1500 B.C. would seem more plausible compared to the more recent dates of earliest Lapita-associated settlement elsewhere in Remote Oceania. However, Marianas regional archaeology seems anomalous throughout its entire sequence compared to other Pacific Islands, so congruence with other Pacific Islands is not a necessity of modeling. Wickler (2004) commented on this anomalous nature of the Marianas, specifically in terms of the absence of domesticated animals that were quite important for earliest settlement elsewhere, supporting a conclusion that Marianas settlement must have been significantly different from anything else in Micronesia and probably also from anything else in the Pacific Islands as a whole. Historical and comparative linguistic studies also stress the anomalous nature of Marianas settlement (Blust 2000; Reid 2002; Zobel 2002), indicative of culture origins and history clearly separate from the rest of the Pacific Islands and rather more closely associated with Island Southeast Asia.

Reconsidering earliest Marianas settlement as an early-dated extension of Island Southeast Asian culture seems more plausible than trying to make sense of it compared to larger patterns of Pacific Islands settlement (Bellwood 1997; Carson 2008), and indeed a close connection with the Philippines is now quite clear (Hung 2008; Hung et al. 2011). Spriggs (2007) emphasizes this connection as proof of an Island Southeast Asian origin of population movements that eventually would become responsible for the peopling of the vast expanse of the Pacific Islands. Further along these lines, Peterson (2009) suggests a new way of conceptualizing cross-regional movements and contacts of cultures throughout large spheres and over long sequences of time, resembling a “swarm” movement of people, materials, and ideas from an Island Southeast Asian core and oscillating through various inter-related regions at variable geographic and temporal scales.

### Future Prospects

At least two rudimentary points can be made in anticipation of how to plan for the future of Mariana Islands archaeology. First and foremost is a need to think of Marianas archaeology in new ways and thereby to support new ideas, methods, and results. However, these new approaches of course must be justified and fulfill both government-mandated requirements and scholarly obligations. A second but related issue involves a need for training a new generation of professionals with updated skills and knowledge to occupy various roles in government agencies, private contracting, and education.

Some of the new emerging research questions include refinement of earliest settlement dating and site contexts, integration of natural-cultural sequences, expanding notions of sites within larger landscape contexts, developing controlled experimental studies, and cross-regional comparisons through multiple time periods. Pursuit of these research topics will require not only more sophisticated theoretical models but also new ways of obtaining primary field data and of analyzing the new data-sets. This scope of work will necessitate entirely new ways of thinking about Marianas archaeology.

The pace of private development continues to increase dramatically, especially in Guam, thereby creating a need for more resource management efforts and promotion of significant research values. The supposedly imminent U.S. military build-up activity also contributes to this growing regional need. Meanwhile, the reality is that very few qualified professionals are available in the region. A revitalized practical training program has been underway during the last few years at University of Guam and in cooperation with University of Hawaii, but the results of this effort will need yet a few more years for full effect.

Finally, at least some comment seems appropriate regarding the relationship between Marianas archaeology and local cultural identity and heritage issues. Generally, cultural heritage and identity studies emphasize a connection with *latte* period society as a singular entity, but an archaeological perspective reveals the *latte* period as more diverse geographically and chronologically. Moreover, the details of the *latte* period clearly are not as well known as may have been presumed. Perhaps even more important in an archaeological perspective, the *latte* period is only the most recent in a long sequence of cultural periods, and this larger perspective of cultural history will be more appropriate for considering long-term cultural identity formation. Despite whatever archaeologists might propose, notions of cultural identity and heritage studies in reality are based on modern notions of cultural history, and input of new and different knowledge from archaeology will require a sustained effort of perhaps some generations for eventual recognition and incorporation into these and other perspectives. This last point relates to a need for archaeologists not only in the Mariana Islands but also world-wide to develop new ways for their work to be perceived as more valuable by the general public.



### Acknowledgements

This work was made possible by access to various documents at the Micronesian Area Research Center, University of Guam.

### References

- Amesbury, J.R. 1999. Changes in species composition of archaeological marine shell assemblages in Guam. *Micronesica* 31: 347–366.
- Amesbury, J.R., D.R. Moore & R.L. Hunter-Anderson. 1996. Cultural adaptations and late Holocene sea level change in the Marianas: recent excavations at Chalan Piao, Saipan, Micronesia. *Bulletin of the Indo-Pacific Prehistory Association* 15: 53–69.
- April, V. 2004. *Latte* Quarries of the Mariana Islands. Occasional Papers in Anthropology and Historic Preservation No. 2. Guam Historic Resources Division, Department of Parks and Recreation.
- April, V. 2006. Talagi pictograph cave, Guam. *Micronesian Journal of the Humanities and Social Sciences* 5: 53–69.
- Athens, J.S. 1986. Archaeological investigations at Tarague Beach, Guam. Report prepared for Base Civil Engineering, Andersen Air Force Base, Guam. J. Stephen Athens, Ph.D., Archaeological Consultant, Honolulu.
- Athens, J.S., M.F. Dega & J.V. Ward. 2004. Austronesian colonisation of the Mariana Islands: the palaeoenvironmental evidence. *Bulletin of the Indo-Pacific Prehistory Association* 24: 21–30.
- Athens, J.S. & J.V. Ward. 1993. Paleoenvironment of the Orote Peninsula. *In* J. Carucci (ed), *The archaeology of Orote Peninsula: phase I and II, archaeological inventory survey of areas proposed for projects to accommodate relocation of Navy activities from the Philippines to Guam, Mariana Islands*, pp. 153–197. Report prepared for Department of the Navy, Pacific Division, Naval Facilities Engineering Command. International Archaeological Research Institute, Inc., Honolulu.
- Athens, J.S. & J.V. Ward. 1998. Paleoenvironment and prehistoric landscape change: a sediment core record from Lake Hagoi, Tinian, CNMI. Report prepared for Department of the Navy, Pacific Division, Naval Facilities Engineering Command. International Archaeological Research Institute, Inc., Honolulu.
- Athens, J.S. & J.V. Ward. 1999. Paleoclimate, vegetation, and landscape change on Guam: the Laguas core. *In* B.M. Dixon, J.S. Athens, J.V. Ward, T. Mangieri & T. Rieth (eds), *Archaeological inventory survey of the Sasa Valley and Tenjo Vista Fuel Tank Farms, Piti District, Territory of Guam, Mariana Islands*, pp. 121–151. Report prepared for Department of the Navy, Pacific Division, Naval Facility Engineering Command. Honolulu:

- International Archaeological Research Institute, Inc., Honolulu.
- Athens, J.S. & J. V. Ward. 2004. Holocene vegetation, savanna origins and human settlement of Guam. *In* V. Attenbrow & R. Fullagar (eds), *A Pacific Odyssey: Archaeology and Anthropology in the Western Pacific: Papers in Honour of Jim Specht*, pp. 15–30. Records of the Australian Museum, Sydney.
- Athens, J.S. & J.V. Ward. 2006. Holocene Paleoenvironment of Saipan: Analysis of a Core from Lake Susupe. *Micronesian Archaeological Survey Report 35*. Division of Historic Preservation, Commonwealth of the Northern Mariana Islands, Saipan.
- Barratt, G. (ed). 1988. H.M.S. Centurion at Tinian, 1742: The Ethnographic and Historic Records. *Micronesian Archaeological Survey Report No. 26*. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan.
- Bath, J.E. 1986. The San Vitores Road Project, part one: final report. Report prepared for Maeda Pacific Corporation. Manuscript on file, Guam Historic Resources Division, Agana Heights.
- Bellwood, P. 1978. *Man's Conquest of the Pacific*. William Collins, Auckland.
- Bellwood, P. 1997. *Prehistory of the Indo-Malaysian Archipelago*, Revised Edition, University of Hawai'i Press, Honolulu.
- Birkedal, T.G. & D. McCarty. 1972. Preliminary report on the NCS Latte Site, south Finegayan, Guam. Unpublished manuscript on file. Department of Anthropology, University of Guam, Mangilao.
- Blust, R. 2000. Chamorro historical phonology. *Oceanic Linguistics* 39: 83–122.
- Bonhomme, T. & J.L. Craib. 1987. Radiocarbon dates from Unai Bapot, Saipan - implications for the prehistory of the Mariana Islands. *Journal of the Polynesian Society* 96: 95–106.
- Bulgrin, L. 2006. Fina'okso' antigu: prehistoric soil mounds in the interior of Rota. *Micronesian Journal of the Humanities and Social Sciences* 5: 31–41.
- Butler, B.M. 1988. *Archaeological Investigations on the North coast of Rota, Mariana Islands*. Occasional Paper No. 8. Center for Archaeological Investigation, Southern Illinois University, Carbondale.
- Butler, B.M. 1992. *An Archaeological Survey of Aguiguan (Aguijan), Northern Mariana Islands*. *Micronesian Archaeological Survey Report No. 29*. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan.
- Butler, B.M. 1994. Early prehistoric settlement in the Mariana Islands: new evidence from Saipan. *Man and Culture in Oceania* 10: 15–38.
- Butler, B.M. (ed). (1995). *Archaeological Investigations in the Achugao and Matansa Areas of Saipan, Mariana Islands*. *Micronesian Archaeological Survey Report No. 30*. Division of Historic Preservation, Department of Community and Cultural Affairs, Commonwealth of the Northern Mariana

Islands, Saipan.

- Cabrera, G. & H. Tudela. 2006. Conservations with *i man-aniti*: interpretation of discoveries of the rock art in the Northern Mariana Islands. *Micronesian Journal of the Humanities and Social Sciences* 5: 42–52.
- Carson, M.T. 2008. Refining earliest settlement in Remote Oceania: renewed archaeological investigations at Unai Bapot, Saipan. *Journal of Island and Coastal Archaeology* 3: 115–139.
- Carson, M.T. 2010. Radiocarbon chronology with marine reservoir correction for the Ritidian archaeological site, northern Guam. *Radiocarbon* 52: 1627–1638.
- Carson, M.T., 2011. Palaeohabitat of first settlement sites, 1500–1000 B.C. in Guam, Mariana Islands, western Pacific. *Journal of Archaeological Science* 38: 2207–2221.
- Clark, G., F. Petchey, O. Winter, M. Carson, and P. O'Day. 2010. New radiocarbon dates from the Bapot-1 site in Saipan and Neolithic dispersal by stratified diffusion. *Journal of Pacific Archaeology* 1: 21–35.
- Cordy, R. 1983. Social stratification in the Mariana Islands. *Oceania* 53: 272–276.
- Cordy, R. 1985. Settlement patterns of complex societies in the Pacific. *New Zealand Journal of Archaeology* 7: 159–182.
- Cordy, R. & J. Allen. 1986. Archaeological investigations of the Agana and Fonte River Basins, Guam. Report prepared for U.S. Army Engineer Division, Pacific Ocean. J. Stephen Athens, Ph.D. Archaeological Consultant, Honolulu.
- Craib, J.L. 1983. Micronesian prehistory: an archaeological overview. *Science* 219: 922–927.
- Craib, J.L., 1986. Casas de los antiguos: social differentiation in protohistoric Chamorro society, Mariana Islands. Unpublished doctoral dissertation, University of Sydney, Sydney.
- Craib, J.L. 1993. Early occupation at Unai Chulu, Tinian, Commonwealth of the Northern Mariana Islands. *Bulletin of the Indo-Pacific Prehistory Association* 13: 116–134.
- Craib, J.L. 1998. Archaeological Excavations in the Uyulan region of Rota. *Micronesian Archaeological Survey Report No. 33*. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan.
- Craib, J.L. 1999. Colonisation of Mariana Islands: new evidence and implications for human movements in the western Pacific. In J.C. Galipaud & I. Lilley (eds), *Le Pacifique de 5000 à 2000 avant le Présent: Suppléments à l'Histoire d'une Colonisation*, pp. 477–485. Institut de Recherche pour le Développement, Paris.
- Cunningham, L.J. 1992. *Ancient Chamorro Society*. Bess Press, Honolulu.
- Davidson, J.M. 1967. Archaeology on coral atolls. In G.A. Highland, R.W.

- Force, A. Howard, M. Kelly & Y.H. Sinoto (eds), *Polynesian Culture History: Essays in Honor of Kenneth P. Emory*, pp. 363–375. Bernice P. Bishop Museum Special Publication No. 56. Bishop Museum Press, Honolulu.
- DeFant, D.G. 2008. Early human burials from the Nation Beach Site, Tumon Bay, Island of Guam, Mariana Islands. *Journal of Island and Coastal Archaeology* 3: 149–153.
- de Freycinet, L.C. 1996. *An Account of the Corvette l'Uranie's Sojourn at the Mariana Islands, 1819*. Translated by G. Barratt. Occasional Historical Papers No. 13. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan.
- Dega, M.F. & P.L. Cleghorn. 2003. Historic preservation studies for remedial design investigations for the Defense Environmental Restoration Program, Formerly-Used Defense Sites (DERP/FUDS). Kagman Airfield, Saipan, Commonwealth of the Northern Mariana Islands. Report prepared for U.S. Army Corps of Engineers, Pacific Ocean Division. Scientific Consultant Services, Inc., Honolulu.
- Descantes, C., H. Neff, M.D. Glascock & W.R. Dickson. 2001. Chemical characterization of Micronesian ceramics through instrumental neutron activation analysis: a preliminary provenance study. *Journal of Archaeological Science* 28: 1185–1190.
- Dickinson, W.R. 2000. Hydro-isostatic and tectonic influences on emergent Holocene paleoshorelines in the Mariana Islands, western Pacific Ocean. *Journal of Coastal Research* 16: 735–746.
- Dickinson, W.R. 2003. Impact of mid-Holocene hydro-isostatic highstand in regional sea level on habitability of islands in Pacific Oceania. *Journal of Coastal Research* 19: 489–502.
- Dickinson, W.R., B.M. Butler, D.R. Moore & M. Swift. 2003. Geologic sources and geographic distribution of sand tempers in prehistoric potsherds from the Mariana Islands. *Geoarchaeology* 16: 827–854.
- Dickinson, W.R. & R. Shutler, Jr. 1968. Insular sand tempers of prehistoric pottery from the southwest Pacific. *In* I. Yawata & Y.H. Sinoto (eds), *Prehistoric Culture in Oceania: A Symposium*, pp. 29–37. Bishop Museum Press, Honolulu.
- Dickinson, W.R. & R. Shutler, Jr. 1971. Temper sands in prehistoric pottery of the Pacific Islands. *Archaeology and Physical Anthropology in Oceania* 6: 191–203.
- Dickinson, W.R. & R. Shutler, Jr. 1974. Probable Fijian origin of quartzose temper sands in prehistoric pottery from Tonga and the Marquesas. *Science* 185: 454–457.
- Dickinson, W.R. & R. Shutler, Jr. 1979. Petrography and sand tempers in Pacific Islands potsherds. *Geological Society of America Bulletin, Part II* 90: 1644–1701.

- Dixon, B., T. Mangieri, E. McDowell, K. Paraso & T. Rieth. 2006. Prehistoric Chamorro household activities and refuse disposal patterns on the Micronesian island of Tinian, Commonwealth of the Northern Mariana Islands. *Micronesica* 39: 55–71.
- Driver, M. 1993. The Account of Fray Juan Pobre's Residence in the Marianas, 1602. Third printing. Miscellaneous Series No. 8. Micronesian Area Research Center, University of Guam, Mangilao.
- Dye, T.S. 1979. Archaeological reconnaissance survey in the Inarajan River Valley, Territory of Guam. Manuscript 031379. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Dye, T.S., S.T. Price & J.L. Craib. 1978. Archaeological and historical reconnaissance survey of the Ugum River Valley, Guam, Mariana Islands. Manuscript 061578. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Dye, T. & P.L. Cleghorn. 1990. Prehistoric use of the interior of southern Guam. *Micronesica Supplement* 2: 261–274.
- Egami, T. & F. Saito. 1973. Archaeological excavation on Pagan in the Mariana Islands. *The Journal of the Anthropological Society of Nippon* 81: 203–226.
- Emory, K.P. 1953. A program for Polynesian archaeology. *American Anthropologist* 55: 752–755.
- Fornander, A. 1969. An Account of the Polynesian Race, Its Origins and Migrations, and the Ancient History of the Hawaiian People to the Time of Kamehameha I. Charles E. Tuttle Company, Rutland.
- Fritz, G. 2001. The Chamorro: A History and Ethnography of the Mariana Islands. Translated by E. Craddock. Occasional Historical papers Series No. 1. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan.
- Garcia, F. 2002. The Life and Martyrdom of the Venerable Father Diego Luis de San Vitores, S.J. translated by M.M. Higgins, F. Plaza & J.M.H. Ledesma, edited by J.A. McDonough. Monograph Series No. 3. Micronesian Area Research Center, University of Guam, Mangilao.
- Gifford, E.W. 1951. Archaeological Excavations in Fiji. *Anthropological Records* 13:3. University of California, Berkeley.
- Gifford, E.W. & R. Shutler, Jr. 1956. Archaeological excavations in New Caledonia. *Anthropological Records* 18:1. University of California, Berkeley.
- Goddard, P. 1995. *Latte: the Mysterious Megaliths of the Marianas*. Abroholos Publishing, Perth.
- Graves, M.W. 1986. Organization and differentiation within late prehistoric ranked social units, Mariana Islands, western Pacific. *Journal of Field Archaeology* 13: 139–154.
- Graves, M.W., T.L. Hunt & D. Moore. 1990. Ceramic production in the Mariana Islands: explaining change and diversity in prehistoric interaction and

- exchange. *Asian Perspectives* 29: 211–233.
- Graves, M.W. & D.R. Moore. 1985. Tumon Bay overview: cultural and historical resources. Report on file, Guam Department of Parks and Recreation, Agana Heights.
- Graves, M.W. & D.R. Moore. 1986. The prehistoric and historic development of a beach and community at Asan on the west central coast of Guam. Report on file, Guam Department of Parks and Recreation, Agana Heights.
- Green, R.C. 1967. Settlement patterns: four case studies from Polynesia. In W.G. Solheim (ed), *Archaeology at the Eleventh Pacific Science Congress*, pp. 101–132. *Asian and Pacific Archaeology series No. 1*. Social Science Research Institute, University of Hawaii, Honolulu.
- Green, R.C. 1970. Settlement pattern archaeology in Polynesia. In R.C. Green and M. Kelley (eds), *Studies in Oceanic Culture History, Volume 1*, pp. 13–32. *Pacific Anthropological Records 11*. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Guam Department of Parks and Recreation. 1976. *Guam Historic Preservation Plan*. Report prepared by Belt Collins, Honolulu.
- Handy, E.S.C. & E.G. Handy. 1972. *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bernice P. Bishop Museum Bulletin No. 233. Bishop Museum Press, Honolulu.
- Hanson, D.B. & B.M. Butler. 1997. A biocultural perspective on Marianas prehistory: recent trends in bioarchaeological research. *American Journal of Physical Anthropology* 104: 271–290.
- Hardy, J.P., G.J. Chester & A.P. Pangelinan. 1981. Ylig archaeological assessment: A marine and riverine archaeo-survey. *Latte* 1: 96–144.
- Haun, A.E., J.A. Jimenez, and M. Kirkendall. 1999. *Archaeological investigations at Unai Chulu, Island of Tinian, Commonwealth of the Northern Mariana Islands*. Report prepared for Department of the Navy, Naval Facilities Engineering Command. Paul H. Rosendahl, Ph.D., Inc., Hilo, HI.
- Hodder, I. (ed). 2001. *Archaeological theory Today*. Polity Press, Cambridge.
- Hornbostel n.d. Unpublished field notes, 1921–1924. Manuscript on file. Bernice P. Bishop Museum, Honolulu.
- Hung, H.C. 2008. *Neolithic interaction in Southern coastal China, Taiwan and the northern Philippines, 3000 BC to AD 1*. Unpublished doctoral dissertation, the Australian National University, Canberra.
- Hung, H.C., M.T. Carson, P. Bellwood, F. Campos, P.J. Piper, E. Dizon, M.J.L.A. Bolunia, M. Oxenham & C. Zhang. 2011. *The first settlement of Remote Oceania: the Philippines to the Marianas*. *Antiquity* 85: in press.
- Hunter-Anderson, R.L. 2009. Savanna anthropogenesis in the Mariana Islands: re-interpreting the palaeoenvironmental data. *Archaeology in Oceania* 44: 125–141.

- Hunter-Anderson, R.L. & B.M. Butler. 1995. An overview of Northern Marianas Prehistory. Micronesian Archaeological Survey Report No. 31. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Saipan.
- Hunter-Anderson, R.L. & M.W. Graves. 1990. Coming from where? An introduction to recent advances in Micronesian archaeology. *Micronesica Supplement 2*: 5–16.
- Hunter-Anderson, R.L., D.R. Moore, and J.R. Amesbury. 1989. Archaeological investigations in Agana Swamp. Report prepared for Jones and Guerrero, Inc. Micronesian Archaeological Research Services, Mangilao.
- Hunter-Anderson, R.L., G.B. Thompson & D.R. Moore. 1995. Rice as a prehistoric valuable in the Mariana Islands, Micronesia. *Asian Perspectives* 34: 69–89.
- Intoh, M. 1997. Human dispersals into Micronesia. *Anthropological Science* 105: 15–28.
- Jennings, J. (ed). 1979. *The Prehistory of Polynesia*. Harvard University Press, Cambridge, MA.
- Johnson, M. 2010. *Archaeological Theory: An Introduction*. Second edition. Wiley-Blackwell, Oxford.
- Kirch, P.V. 1973. Prehistoric subsistence patterns in the northern Marquesas Islands, French Polynesia. *Archaeology and Physical Anthropology in Oceania* 8: 24–40.
- Kirch, P.V. 1977. Valley agricultural systems in prehistoric Hawaii: an archaeological consideration. *Asian Perspectives* 20: 246–280.
- Kirch, P.V. 1980a. Polynesian prehistory: adaptation in island ecosystems. *American Scientist* 68: 39–48.
- Kirch, P.V. 1980b. The archaeological study of adaptation: theoretical and methodological issues. In M.B. Schiffer (ed), *Advances in Archaeological Method and Theory*, Volume 3, pp. 101–156. Academic Press, New York.
- Kirch, P.V. 2000. *On the Road of the Winds: An Archaeological History of the Pacific Islands before European Contact*. University of California Press, Berkeley.
- Kirch, P.V. 2007. Three islands and an archipelago: reciprocal interactions between humans and island ecosystems in Polynesia. *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* 98: 85–99.
- Kirch, P.V. 2010. Peopling of the Pacific: a holistic anthropological perspective. *Annual Review of Anthropology* 19: 131–148.
- Kirch, P.V. & R.C. Green. 1987. History, phylogeny, and evolution in Polynesia. *Current Anthropology* 28: 431–443, 452–456.
- Kirch, P.V. & R.C. Green. 2001. *Hawaiki, Ancestral Polynesia: An Essay in Historical Anthropology*. Cambridge University Press, Cambridge.

- Kirch, P.V. & T.L. Hunt (eds). 1997. *Historical Ecology in the Pacific Islands: Prehistoric Environmental and Landscape Change*. Yale University Press, New Haven.
- Kurashina, H. 1991. Prehistoric settlement patterns on Guam. *Journal of the Pacific Society* 14(2): 1–18.
- Kurashina, H. & R.N. Clayshulte. 1983a. Site formation processes and cultural sequence at Tarague, Guam. *Bulletin of the Indo-Pacific Prehistory Association* 4: 114–122.
- Kurashina, H. & R.N. Clayshulte. 1983b. Site Formation Processes and Cultural Sequence at Tarague, Guam. *Miscellaneous Publications 6*. Micronesian Area Research Center, University of Guam, Mangilao.
- Kurashina, H., D. Moore, O. Kataoka, R.N. Clayshulte & E. Ray. 1981. Prehistoric and protohistoric cultural occurrences at Tarague, Guam. *Asian Perspectives* 24: 57–68.
- Kurashina, H., J.A. Simons, J.A. Toenjes, J. Allen, S.S. Amesbury, G.M. Heathcote, R.H. Randall, B.D. Smith, R.A. Stephenson & E.F. Wells. 1990. Archaeological investigations at the Naval Facility (NAVFAC) Ritidian Point, Guam, Mariana Islands. Report prepared for Department of the Navy. Micronesian Area Research Center, University of Guam, Mangilao.
- Kurashina, H., J. Toenjes, J. Simons, L. Prishmont & E. Wells. 1987. Nikko Hotel at Gun Beach. Report prepared for Taniguchi, Ruth, Smith, and Associates. Micronesian Area Research Center, University of Guam, Mangilao.
- Leidemann, H.H. 1980. Intrasite variation at Ypao Beach, Guam: a preliminary assessment. Unpublished master's thesis. University of Guam, Mangilao.
- Levesque, R. (ed). 1997. Translation of German Jesuit documents, Manuscript on file. Commonwealth of the Northern Mariana Islands Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan.
- Liston, J. 1996. The legacy of Tarague Embayment and its inhabitants, Andersen AFB, Guam, volume 1: archaeology. Report prepared for 36 CES/CEV Unit 14007, Environmental Flight, Andersen Air Force Base. International Archaeological Research Institute, Inc., Honolulu.
- Lizama, A., M. Montvel-Cohen & D. Moore. 1981. The As Nieves Quarry and Tatgua Site, Rota, M.I. *Latte* 1: 1–33.
- Marche, A.A. 1982. *The Mariana Islands*. Translated by S.E. Cheng. Micronesian Area Research Center, University of Guam, Mangilao.
- Marck, J. 1978. Interim report of the 1977 Laulau excavations, Saipan, NMI. Manuscript on file. Division of Historic Preservation, Commonwealth of the Northern Mariana Islands, Saipan.
- McCoy, M.D. & T.N. Ladefoged. 2009. New developments in the use of spatial technology in archaeology. *Journal of Archaeological Research* 17: 263–295.
- McCoy, P.C., S.T. proce & J.L. Craib. 1978. Archaeological review of Orote



- Historical Complex, Orote Point, Guam. Report prepared for U.S. Department of the Navy, Pacific Division. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Meighan, C. n.d. Archaeological research in Guam. Unpublished manuscript notes on file. Micronesian Area Research Center, University of Guam, Mangilao.
- Montvel-Cohen, M., D. Moore & Staff. 1981. Conservation archaeology report: Toguan Bay archaeological excavation, Guam. *Latte* 1: 34–95.
- Moore, D.R. 1983. Measuring change in Marianas pottery: the sequence of pottery production at Tarague, Guam. Unpublished master's thesis. University of Guam, Mangilao.
- Moore, D.R. 2005. Archaeological evidence of a prehistoric farming technique on Guam. *Micronesica* 38: 93–120.
- Moore, D.R., R.L. Hunter-Anderson, J.R. Amesbury & E.F. Wells. 1992. Archaeology at Chalan Piao, Saipan. Report prepared for Jose Cabrera. Micronesian Archaeological Research Services, Mangilao.
- Morgan, W.N. 1989. Prehistoric Architecture in Micronesia. University of Texas Press, Austin.
- Nunn, P.D. 2003. Revising ideas about environmental determinism: human-environment relations in the Pacific Islands. *Asia-Pacific Viewpoint* 44: 63–72.
- Olmo, R.K. & W.L. Goodman. 1994. Archaeological investigations for Ypao Beach Park ground penetrating radar survey, Guam. Report prepared for Department of Parks and Recreation, Government of Guam. International Archaeological Research Institute, Inc., Honolulu.
- Osborne, D. n.d. Chamorro archaeology. Unpublished manuscript. On file at Micronesian Area Research Center, University of Guam, Mangilao.
- Osborne, D. 1947. Archaeology on Guam: a progress report. *American Anthropologist* 49: 518–524.
- Pawley, A. & R. Green. 1973. Dating the dispersal of the Oceanic languages. *Oceanic Linguistics* 12: 1–67.
- Pellett, M. & A. Spoehr. 1961. Marianas archaeology: report on an excavation on Tinian. *Journal of the Polynesian Society* 70: 321–325.
- Peterson, J.A. 2009. The Austronesian moment. *Taiwan Journal of Indigenous Studies* 2: 39–62.
- Pregill, G. 1998. Squamate reptiles from prehistoric sites in the Mariana Islands. *Copeia* 1998 (1): 64–75.
- Pregill, G.K. & D.W. Steadman. 2009. The prehistory and biogeography of terrestrial vertebrates on Guam, Mariana Islands. *Diversity and Distributions* 15: 983–996.
- Pukui, M.K., S.H. Elbert & E.T. Mookini. 1974. Place Names of Hawaii. Revised and expanded edition. University of Hawaii Press, Honolulu.

- Rainbird, P. 1994. Prehistory of the northwest tropical Pacific: the Caroline, Mariana, and Marshall Islands. *Journal of World Prehistory* 8: 293–349.
- Rainbird, P. 2004. *The Archaeology of Micronesia*. Cambridge University Press, Cambridge.
- Ray, E. 1981. The material culture of prehistoric Tarague Beach, Guam. Unpublished master's thesis. Arizona State University, Tempe.
- Reed, E. 1952. General report on archaeology and history of Guam. Report prepared for Honorable Carlton Skinner, Governor of Guam. National Park Service, Santa Fe, NM.
- Reid, L. 2002. Morphosyntactic evidence for the position of Chamorro in the Austronesian language family. In R.S. Bauer (ed), *Collected Papers on Southeast Asian and Pacific Languages*, pp. 63–94. Pacific Linguistics, Canberra.
- Reinman, F.M. n.d. Report to the National Science Foundation. Unpublished manuscript on file. Micronesian Area Research Center, University of Guam, Mangilao.
- Reinman, F.M. 1968. Guam prehistory: a preliminary field report. In I. Yawata and Y.H. Sinoto (eds), *Prehistoric Culture in Oceania: A Symposium*, pp. 41–50. Bishop Museum Press, Honolulu.
- Reinman, F.M. 1970. Preliminary report of the Pagat Site. Unpublished manuscript on file. Micronesian Area Research Center, University of Guam, Mangilao.
- Reinman, F.M. 1977. *An Archaeological Survey and Preliminary Test Excavations on the Island of Guam, Mariana Islands, 1965–1966*. Miscellaneous Publications No. 1. Micronesian Area Research Center, University of Guam, Mangilao.
- Reinman, F.M. & R.E. Taylor. 1981. *Archaeological historical evaluation: Asan Community Development Project*. Report prepared for Guam Housing and Urban development Agency. Professional Archaeological and Geoscience Associates, Los Angeles.
- Russell, S. 1998. *Tiempon I Mannofo'na: Ancient Chamorro Culture and History in the Northern Mariana Islands*. Micronesian Archaeological Survey Report 32. Division of Historic Preservation, Commonwealth of the Northern Mariana Islands, Saipan.
- Russell, S. & M. Fleming. 1986. Archaeology in the Northern Mariana Islands: an overview. *Journal of the Polynesian Society* 95: 115–126.
- Shutler, R., Jr. & J. Marck. 1975. On the dispersal of the Austronesian horticulturalists. *Archaeology and Physical Anthropology in Oceania* 10: 81–113.
- Shutler, R., Jr. & M.E. Shutler. 1975. *oceanic Prehistory*. Cummings Publishing Company, Melno Park, CA.
- Sinoto, Y.H. 2007. A study of gorges from the Gognga-Cove Beach Site, Tumon,

- Guam. In A. Anderson, K. Green & F. Leach (eds), *Vastly Ingenious: the archaeology of Pacific Material Culture*, pp. 209–215. Otago University Press, Otago.
- Spoehr, A. 1957. *Marianas Prehistory: Archaeological Survey and Excavations on Saipan, Tinian and Rota*. Fieldiana: Anthropology Volume 48. Chicago Natural History Museum, Chicago.
- Spriggs, M. 2007. The Neolithic and Austronesian Expansion: within Island Southeast Asia and into the Pacific. In S. Chiu and C. Sand (eds), *From Southeast Asia to the Pacific: Archaeological Perspectives on the Austronesian Expansion and the Lapita Cultural Complex*, pp. 104–140. Academia Sinica, Taipei.
- Steadman, D.W. 1992. Extinct and extirpated birds from Rota, Mariana Islands. *Micronesica* 25: 71–84.
- Steadman, D.W. 1999. The prehistory of vertebrates, especially birds, on Tinian, Auiguan, and Rota, Northern Mariana Islands. *Micronesica* 31: 319–345.
- Takayama, J. & T. Egami. 1971. Archaeology on Rota in the Mariana Islands: Preliminary Report on the first Excavation of the Latte site M-1. Report of Pacific archaeological Survey No. 1. Tokai University, Tokyo.
- Takayama, J & M. Intoh. 1976. Archaeological Excavation of Latte Site M-13, Rota in the Marianas. Report of Pacific archaeological Survey No. 6. Tokai University, Tokyo.
- Thompson, D. 1977. Archaeological surveys and text excavations along the leeward coast of Saipan, Mariana Islands, part1: a summary of methods and procedures. Unpublished manuscript on file, Historic Preservation Office, Commonwealth of the Northern Mariana Islands, Saipan.
- Thompson, L.M. 1932. Archaeology of the Mariana Islands. Bernice P. Bishop Museum Bulletin No. 100. Bishop Museum Press, Honolulu.
- Thompson, L.M. 1940. The function of *latte* in the Marianas. *Journal of the Polynesian Society* 49: 447–465.
- Thompson, L.M. 1945. The Native Culture of the Marianas Islands. Bernice P. Bishop Museum Bulletin No. 185. Bishop Museum Press, Honolulu.
- Thompson, L.M. 1947. *Guam and Its People*. Third revised edition. Princeton University Press, Princeton, NJ.
- Topping, D.M., P.M. Ogo & B.C. Dungca. 1975. *Chamorro-English Dictionary*. PALI Language Texts: Micronesia. University of Hawaii Press, Honolulu.
- Trigger, B.G. 2006. *A History of Archaeological Thought*. Second edition. Cambridge University Press, Cambridge.
- Underwood, J. 1973. Population history of Guam: context and microevolution. *Micronesica* 9 11–44.
- Walter, R. 1974. *Anson's Voyage round the World in the Years 1740–1744*. Dover Publications, New York.
- Ward, J.V. 1994. A Holocene pollen record from the Pago River Valley, Guam.

- In* R.L. Hunter-Anderson (ed), *Archaeology in Manenggon Hills, Yona, Guam, Volume II*, pp. 9.34–9.51. Report prepared for MDI Guam Corporation. Micronesian Archaeological Research Services, Mangilao, Guam.
- Wickler, S. 2004. Modelling colonization and migration in Micronesia from a zooarchaeological perspective. *In* M. Mondini, S. Munoz, and S. Wickler (eds), *Proceedings of the 9th Conference of the International Council of Archaeozoology*, Durham, August 2002, pp. 28–40. Oxbow Books, Oxford.
- Wilson, L. 2011. The role of geoarchaeology in extending our perspective. *Geological Society of London Special Publications* 352: 1–9.
- Yawata, I. 1945. Peculiar forms of the stone-piles on the Mariana Islands. *Mariana sekichuretsu iko no tokushu keishiki*. *Zinruigaku Zasshi* 59: 418–424.
- Yawata, I. 1963. Rice cultivation of the ancient Mariana Islanders. *In* J. Barrau (ed), *Plants and the Migration of Pacific Peoples*, pp. 91–92. Bishop Museum Press, Honolulu.
- Zobel, E. 2002. The position of Chamorro and Palauan in the Austronesian family tree: evidence from verb morph syntax. *In* F. Wouk & M. Ross (eds), *History and Typology of Western Austronesian Voice Systems*, pp. 405–434. Pacific Linguistics, Canberra.

Received 20 January 2010, accepted 20 March 2010